M-BUS communication protocol

User manual

1MSUECMBS006

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M-BUS communication protocol

for M-BUS modules

for counters with integrated M-BUS interface

October edition 2014

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1. M-Bus interface

The M-BUS Interface (1 module wide, DIN rail mount) is developed to connect the Energy Counter to M-BUS.
The interface receives the measurement data from the Energy Counter using infrared port available on the side of the counter, and gets the power supply from the bus.

Energy counters with integrated M-BUS interface allows to transmits data directly in M-BUS network, to manage counter without need of external communication module.

1.1 Overview

- M-BUS Interface complying with EN13757-2 and EN13757-3
- Circuiting by means of drilled two-wires cables
- 2 screw clamps on M-BUS Interface
- Current consumption of M-BUS Interface: ≤ 3 mA. This corresponds to 2 standard loads.
- The data transmission speed is selectable between 300, 600, 1200, 2400, 4800 and 9600 baud
- The default speed is 2400 baud
- The default Primary Address is 000

2. Telegram formats

The telegram formats are three, identified by the first character.

Byte	Single character (HEX)	Short Telegram (HEX)	Long Telegram (HEX)
1	E5	10	68
2		C Field	L Field
3		A Field	L Field (Ripetition)
4		CS (Checksum)	68
5		16	C Field
6			A Field
7			CI Field
8 - YY			Data (0 – 246 Bytes)
YY + 1			CS (Checksum)
YY + 2			16

Table 2.1 – The M-BUS Telegram Formats

- **Single Character**: This telegram format consists of the single character E5h and is used to acknowledge the telegram received.
- **Short Telegram**: This telegram is identified by the start character 10h and consists of five character. It's used by the M-BUS Master to command the transmission of data from the M-BUS Slave.
- **Long Telegram**: This telegram is identified by the start character 68h and consists of a variable number of characters, in which are present also the active data. It's used by the M-BUS Master to transmits commands to the M-BUS Slave, and by the M-BUS Slave to send the read-out Data from the M-BUS Master.

2.1 Telegram fields

The telegram fields (C, A, CI Fields, L and CS) have a fixed length of one byte (8 bit) and serve predetermined effects in the M-BUS communication. The L Field defines the number of bytes of the active data.

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2.1.1 C FIELD

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

Bit Number	7	6	5	4	3	2	1	0
Master → Slave	0	1	FCB	FCV	F3	F2	F1	F0
Slave → Master	0	0	ACD	DFC	F3	F2	F1	F0

Table 2.2 – C Field Bit Division

The Bit Nr 6 is set to 1 if the communication has the direction Master → Slave; viceversa it is set to 0.
In the Master → Slave direction, if the frame count bit valid (FCV - Bit Nr 4) is set to 1, then the frame count bit (FCB – Bit Nr 5) has not to be ignored.

The FCB is used to indicate successful transmission procedure. A Master shall toggle the bit after a successful reception of a reply from the Slave. After this, if the Slave answer is multi-telegram, the Slave has to send the next telegram of the multi-telegram answer.
If the expected reply is missing, or the reception faults, the master resends the same telegram with the same FCB.
The Bits Nr 3 – 0 are the function code of the message.
The C Field used here, are:

Telegram Name	C Field (BIN)	C Field (HEX)	Telegram	Description
SND_NKE	01000000	40	Short Frame	Initialization of the Slave
SND_UD	01x10011	53 / 73	Long Frame	Master send data to Slave
REQ_UD2	01x11011	5B / 7B	Short Frame	Master requests Class 2 Data to Slave
RSP_UD	000x1000	08 / 18	Long Frame	Data transfer from Slave to Master

Table 2.3 – C Field of the commands used in this protocol

2.1.2 A FIELD

The Address Field (A Field) is used to address the recipient in the calling direction, and to identify the sender of information in the receiving direction.
The size of this field is one byte, and it can assume the value between 0 – 255, divided in this way:

A Field (HEX)	Primary Address	Remarks
00	0	Default Address Given by Manufacturer
01 – FA	1 – 250	Primary Address Settable
FB, FC	251, 252	Reserved for Future Use
FD	253	Used for Secondary Address Procedures
FE	254	Use to Transmit Information to All Partecipants in the M-BUS System
FF	255	Use to Transmit Information to All Partecipants in the M-BUS System

Table 2.4 – Value of Address Field

Using the address 254 (FEh) every Slave answer with the acknowledging (E5h) or with their primary address.
Using the address 255 (FFh) no one Slave replies.

2.1.3 CI FIELD

The Control Information (CI Field) contains information for the receiver of the telegram.
The CI Field values used here, are:

CI Field (HEX)	Primary Address
51	The telegram contains data for the Slave
52	Selection of the Slave
72	The telegram contains data for the Master
B8	Set Baud Rate to 300 bps
B9	Set Baud Rate to 600 bps

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CI Field (HEX)	Primary Address
BA	Set Baud Rate to 1200 bps
BB	Set Baud Rate to 2400 bps
BC	Set Baud Rate to 4800 bps
BD	Set Baud Rate to 9600 bps
BE	Set Baud Rate to 19200 bps
BF	Set Baud Rate to 38400 bps

Table 2.5 – Value of CI Field

2.1.4 L FIELD

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

2.1.5 CS FIELD (CHECKSUM)

The Checksum (CS Field) serves to recognize transmission and synchronization faults, and is configured from specific parts of telegram. The checksum is calculated from the arithmetical sum of the data mentioned above plus the Active Data, i.e. from C Field to CS Field (excluded).

2.2 Active data

The Active Data (0 – 246 bytes) in Long Telegrams include the data to be read from the M-BUS Master (Read-Out Data), or Command Information transmitted by the Master to the Slave.

2.2.1 CODING OF ACTIVE DATA TRANSMITTED FROM SLAVE TO MASTER: FIXED DATA RECORD HEADER

Each block of Active Data transmitted by the Slave to the Master starts with the following Fixed Data Record Header (FDH):

Byte Nr.	Size (Byte)	Value (Hex)	Description
1 – 4	4	xx xx xx xx	M-BUS Interface Identification Number
5 – 6	2	xx xx	Manufacturer's ID
7	1	xx	Version Number of M-BUS Interface Firmware (00 – FF)
8	1	02	Medium: Electricity
9	1	xx	Access Number (00 – FF → 00)
10	1	xx	M-BUS Interface Status (20 = Energy Counter Unreachable, 00 = Energy Counter Reachable)
11 – 12	2	0000	Signature (always 0000, i.e. not used)

Table 2.6 – Fixed Data Record Header

The Identification Number is a changeable number by the customer and runs from 00000000 to 99999999.
The Access Number has unsigned binary coding, and is incremented (modulo 256) by one after each RSP_UD from the Slave.

2.2.2 CODING OF ACTIVE DATA TRANSMITTED FROM SLAVE TO MASTER: DATA RECORDS

Every Data Record sent by Slave to the Master consist of the following Data Record Header (DRH) :

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

Table 2.7 – Data Records Structure

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2.2.2.1 Data Information Block (DIB)

The Data Information Block (DIB) contains as a minimum one Data Information Field (DIF). This byte can be extended by a further 10 Data Information Field Extension Bytes (DIFE).
The coding of DIF for this protocol is:

Bit	Name	Description
7	Extension Bit	Specifies if a DIFE Byte follows: 0 = No 1 = Yes
6	LSB of Storage Number	Always at 0, i.e. not used
5 - 4	Functions Field	Specifies the kind of the value, always at: 00 = Instantaneous Value
3 - 0	Data Field	Length and Coding of Data: 0001: 8 Bit Integer 0010: 16 Bit Integer 0011: 24 Bit Integer 0100: 32 Bit Integer 0110: 48 Bit Integer 0111: 64 Bit Integer 1100: 8 digit BCD 1101: Variable Length

Table 2.8 – Data Information Field Structure

The coding of DIFE for this protocol is:

Bit	Name	Description
7	Extension Bit	Specifies if a DIFE Byte follows: 0 = No 1 = Yes
6	Unit	Specifies the kind of Energy or Power when Bit 7 is set to 1: 0 = Reactive 1 = Apparent
5 - 4	Tariff	Specifies which tariff the values are related: 00 = Total Value 01 = Tariff 1 02 = Tariff 2
3 - 0	Storage Number	Always at 0000

Table 2.9 – Data Information Field Extension Structure

If Bit 7 is set to 0, the following Data Byte are related to Active Energy or Power. So, if the first DIFE is followed by another DIFE (i.e. Bit 7 is set to 1), the following Data Byte are related to Reactive or Apparent Energy or Power, depending on Bit 6 value.

2.2.2.2 Value Information Block (VIB)

The Value Information Block (VIB) contains as a minimum one Value Information Field (VIF). This byte can be extended by a further 10 Value Information Field Extension Bytes (DIFE).
The coding of VIF is:

Bit	Name	Description
7	Extension Bit	Specifies if a VIFE Byte follows: 0 = No 1 = Yes
6 - 0	Value Information	Contains Information on the single Value, such as Unit, Multiplicator, etc...

Table 2.10 – Value Information Field Structure

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The coding of VIFE is:

Bit	Name	Description
7	Extension Bit	Specifies if a VIFE Byte follows: 0 = No 1 = Yes
6 - 0	Value Information	Contains Information on the single Value, such as Unit, Multiplicator, etc...

Table 2.11 – Value Information Field Extension Structure

2.2.2.3 Standard Value Information Field (VIF) Used

VIFE (BIN)	VIFE (HEX)	Description	Unit
10000010	82	Energy	0.1Wh
01111001	79	Set Secondary Address	Dimensionless
01111010	7A	Set Primary Address	Dimensionless
10101000	A8	Power	mW
11111101	FD	A standard VIFE from extension table follows	Dimensionless
11111111	FF	A further manufacturer specific VIFE follows	Dimensionless

Table 2.12 – Standard Value Information Field Used

2.2.2.4 Standard Value Information Field Extension (VIFE) Used

VIF (BIN)	VIF (HEX)	Description	Unit
00001011	0B	Parameter Set Identification	Dimensionless
00001100	0C	Firmware Version	Dimensionless
00001101	0D	Hardware Version	Dimensionless
11001100	C6	Voltage	mV
11011001	D9	Current	mA

Table 2.13– Standard Value Information Field Extension Used

2.2.2.5 Manufacturer Specific Value Information Field Extension (VIFE) Used

VIFE (BIN)	VIFE (HEX)	Description	Unit
00000000	00	3-Phase	0.1Wh, mV, mA, mW, mVA or mvar
00000001	01	Phase 1	0.1Wh, mV, mA, mW, mVA or mvar
00000010	02	Phase 2	0.1Wh, mV, mA, mW, mVA or mvar
00000011	03	Phase 3	0.1Wh, mV, mA, mW, mVA or mvar
00000100	04	Neutral	mA
00000101	05	Line 12	mV
00000110	06	Line 23	mV
00000111	07	Line 31	mV
00010000	10	3-Phase Imported Inductive Energy	0.1VAh or 0.1varh
00010001	11	Phase 1 Imported Inductive Energy	0.1VAh or 0.1varh
00010010	12	Phase 2 Imported Inductive Energy	0.1VAh or 0.1varh
00010011	13	Phase 3 Imported Inductive Energy	0.1VAh or 0.1varh
00100000	20	3-Phase Exported Inductive Energy	0.1VAh or 0.1varh
00010001	21	Phase 1 Exported Inductive Energy	0.1VAh or 0.1varh
00010010	22	Phase 2 Exported Inductive Energy	0.1VAh or 0.1varh

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VIFE (BIN)	VIFE (HEX)	Description	Unit
00010011	23	Phase 3 Exported Inductive Energy	0.1VAh or 0.1varh
00100100	24	3-Phase Inductive Energy	0.1VAh or 0.1varh
00110000	30	3-Phase Imported Capacitive Energy	0.1VAh or 0.1varh
00110001	31	Phase 1 Imported Capacitive Energy	0.1VAh or 0.1varh
00110010	32	Phase 2 Imported Capacitive Energy	0.1VAh or 0.1varh
00110011	33	Phase 3 Imported Capacitive Energy	0.1VAh or 0.1varh
01000000	40	3-Phase Exported Capacitive Energy	0.1VAh or 0.1varh
01000001	41	Phase 1 Exported Capacitive Energy	0.1VAh or 0.1varh
01000010	42	Phase 2 Exported Capacitive Energy	0.1VAh or 0.1varh
01000011	43	Phase 3 Exported Capacitive Energy	0.1VAh or 0.1varh
01000100	44	3-Phase Capacitive Energy	0.1VAh or 0.1varh
01010000	50	Frequency	mHz
01010001	51	Phase Order	Dimensionless
01010010	52	CT Value	Dimensionless
01010011	53	PT Value	Dimensionless
01010100	54	Actual Tariff	Dimensionless
01010101	55	Serial Number	Dimensionless
01010110	56	Model	Dimensionless
01010111	57	Type	Dimensionless
01011000	58	Firmware Release	Dimensionless
01011001	59	Hardware Release	Dimensionless
01100000	60	Wiring Mode	Dimensionless
01100001	61	Primary or Secondary Value	Dimensionless
01100010	62	Error Code	Dimensionless
01100011	63	Out Of Range	Dimensionless
01100100	64	FSA Value	A
01110000	70	Reset Counter	Dimensionless
01110001	71	Start Counter	Dimensionless
01110010	72	Stop Counter	Dimensionless
01110011	73	Partial Counter Status	Dimensionless
10000000	80	Imported Energy	0.1Wh
10000001	81	Exported Energy	0.1Wh
10000010	82	Partial	Dimensionless
10000011	83	Balance	Dimensionless
10000100	84	Power Factor	Dimensionless
10010000	90	Unit Volt-Ampere * 10^{-3}	mVA
10010001	91	Unit Volt-Ampere per hour * 10^{-1}	0.1VAh
10010010	92	Unit Reactive Volt-Ampere * 10^{-3}	mvar
10010011	93	Unit Reactive Volt-Ampere per hour * 10^{-1}	0.1varh
10010100	94	Unit Hertz (cycle per second) * 10^{-3}	MHz

Table 2.14 –Manufacturer Specific Value Information Field Extension Used

If Bit No. 7 in the Specific Value Information Field Extension (VIFE) is set to 1, another VIFE Byte follows.
If Bit 7 is set to 0, the first Data Byte follows next.

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3. Communication process

The M-BUS module accepts two kinds of transmission:

Send / Confirm → SND / CON

Request / Respond → REQ / RSP

A standard straight communication between M-BUS Master and M-BUS Slave is:



3.1 Send / confirm procedure

3.1.1 SND_NKE

This procedure serve to start up after an interruption or beginning of communication. If the Slave was selected for secondary addressing, it will be deselected.
The value of the frame count bit FCB is cleared in the Slave, i.e. it expects that the first telegram from a Master with FCV = 1, has the FCB = 1.
The Slave confirms a correct reception of the telegram with the single character acknowledge (E5h) or omits the answer if it didn't receive the telegram correctly.
Here follows the structure of SND_NKE command:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	10	Start character - short telegram
2	1	40	C Field
3	1	xx	A Field – Primary Address 00 – FA: Valid Primary Address FB, FC: Reserved for Future Use FD: Transmission is by Secondary Address FE: Transmission to All M-BUS Slave in the System (everyone sends E5h) FF: Transmission to All M-BUS Slave in the System (no one sends E5h)
4	1	xx	CS Checksum, summed from C-Field to Selected Parameter of Parameter Set 19 (byte 2 → byte 4)
5	1	16	Stop charcater

Table 3.1 – SND_NKE command Structure

Answer of the Slave: E5h

3.1.2 SND_UD

This procedure is used to send user data to the M-BUS Slave. The Slave confirms a correct reception of the telegram with the single character acknowledge (E5h) or omits the answer if it didn't receive the telegram correctly.
Here follows the structure of the SND_UD commands used in this protocol.

3.1.2.1 Set Primary Address

This action enables to set a new Primary Address in the Slave interface.
Here follows the command:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	68	Start character long query
2	1	06	L-Field
3	1	06	L-Field Ripetition
4	1	68	Start character long query ripetition
5	1	73	C-Field SND_UD
6	1	xx	A-Field, Primary Address (00-FF = 0-255)
7	1	51	CI-Field
8	1	01	DIF: 8 Bit Integer, 1 Byte
9	1	7A	VIF: Set Primary Address
10	1	xx	Value: New Primary Address Valid Range: 00 – FA (0 - 250) Invalid Range: FB – FF
11	1	xx	CS Checksum, summed from C-Field to Selected Parameter of Parameter Set 19 (byte 5 → byte 10)
12	1	16	Stop character

Table 3.2 – SND_UD command: Set Primary Address

Answer of the Slave: E5h

3.1.2.2 Set Secondary Address

This action enables to set a new Secondary Address in the Slave interface.
The Secondary Address has this structure:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1 – 4	4	xx xx xx xx	Identification Number Range : 00000000 - 99999999
5 – 6	2	xx xx	Manufacturer ID Range: 01 – FF, 01 - FF
7	1	xx	Version Number Range: 01 - FF
8	1	02	Device Type Identification 02: Electricity

Table 3.3 – Secondary Address Structure

Here follows the command:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	68	Start character long query
2	1	09	L-Field
3	1	09	L-Field Ripetition
4	1	68	Start character long query ripetition
5	1	73	C-Field SND_UD
6	1	xx	A-Field, Primary Address (00-FF = 0-255)
7	1	51	CI-Field
8	1	0C	DIF: 8 digits BCD, 4 Byte
9	1	79	VIF: Set Secondary Address

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Byte Nr.	Size (Byte)	Value (HEX)	Description
10	1	xx	Value: New Secondary Address digit 7 and 8 Range: 00 - 99
11	1	xx	Value: New Secondary Address digit 5 and 6 Range: 00 – 99
12	1	xx	Value: New Secondary Address digit 3 and 4 Range: 00 – 99
13	1	xx	Value: New Secondary Address digit 1 and 2 Range: 00 - 99
14	1	xx	CS Checksum, summed from C-Field to Selected Parameter of Parameter Set 19 (byte 5 → byte 13)
15	1	16	Stop character

Table 3.4 – SND_UD command: Set Secondary Address

Answer of the Slave: E5h

3.1.2.3 Set Baud Rate

This action allows to change the Baud Rate of the M-BUS Slave.
The Slave answers with single character acknowledgement (E5h) in the old baud rate. As soon as the ACK is transmitted, the Slave switches to the new baud rate.
To make sure that the Slave has properly changed its baud rate, the Master, within 2 minutes has to send a command to the Slave in the new baud rate. If the Slave doesn't send the ACK after x retry, the Master has to return to the old baud rate.
Here follows the command:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	68	Start character long query
2	1	03	L-Field
3	1	03	L-Field Ripetition
4	1	68	Start character long query ripetition
5	1	73	C-Field SND_UD
6	1	xx	A-Field, Primary Address (00 - FF = 0 - 255)
7	1	xx	CI-Field: Set New Baud Rate B8: Set Baud Rate to 300 baud B9: Set Baud Rate to 600 baud BA: Set Baud Rate to 1200 baud BB: Set Baud Rate to 2400 baud BC: Set Baud Rate to 4800 baud BD: Set Baud Rate to 9600 baud BE: Set Baud Rate to 19200 baud BF: Set Baud Rate to 38400 baud
8	1	xx	CS Checksum, summed from C-Field to Selected Parameter of Parameter Set 19 (byte 5 → byte 7)
9	1	16	Stop character

Table 3.5 – SND_UD command

Answer of the Slave: E5h

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3.1.2.4 Reset Total/Tariff 1/Tariff 2/All Energy Counters

This action is permitted only if the Energy Counters is "NO MID" or "yes reset" type.
Here follows the command:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	68	Start character long query
2	1	07	L-Field
3	1	07	L-Field Ripetition
4	1	68	Start character long query ripetition
5	1	73	C-Field SND_UD
6	1	xx	A-Field, Primary Address (00-FF = 0-255)
7	1	51	CI-Field
8	1	01	DIF: 8 Bit Integer, 1 Byte
9	1	FF	VIF followed by manufacturer specific VIFE
10	1	70	manufacturer specific VIFE: Reset Counter
11	1	xx	Value: Kind of Energy Counters 00: Reset Total Energy Counters 01: Reset Tariff 1 Energy Counters 02: Reset Tariff 2 Energy Counters 03: Reset ALL Energy Counters
12	1	xx	CS Checksum, summed from C-Field to Selected Parameter of Parameter Set 19 (byte 5 → byte 11)
13	1	16	Stop character

Table 3.6 – SND_UD command: Reset Active Energy Counters

Answer of the Slave: E5h

3.1.2.5 Reset Partial Energy Counters

Here follows the command:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	68	Start character long query
2	1	09	L-Field
3	1	09	L-Field Ripetition
4	1	68	Start character long query ripetition
5	1	73	C-Field SND_UD
6	1	xx	A-Field, Primary Address (00-FF = 0-255)
7	1	51	CI-Field
8	1	01	DIF: 8 Bit Integer, 1 Byte
9	1	FF	VIF followed by manufacturer specific VIFE
10	1	82	VIFE: Partial Counters
11	1	FF	VIFE followed by 3E specific VIFE
12	1	70	Manufacturer specific VIFE: Reset Counter

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Byte Nr.	Size (Byte)	Value (HEX)	Description
13	1	xx	Value: Kind of Energy 00: Imported Active Energy 01: Exported Active Energy 02: Imported Inductive Apparent Energy 03: Exported Inductive Apparent Energy 04: Imported Capacitive Apparent Energy 05: Exported Capacitive Apparent Energy 06: Imported Inductive Reactive Energy 07: Exported Inductive Reactive Energy 08: Imported Capacitive Reactive Energy 09: Exported Capacitive Reactive Energy 0A: ALL partial counters
14	1	xx	CS Checksum, summed from C-Field to Selected Parameter of Parameter Set 19 (byte 5 → byte 13)
15	1	16	Stop character

Table 3.7 – SND_UD command: Reset Partial Energy Counter

Answer of the Slave: E5h

3.1.2.6 Start Partial Energy Counters
Here follows the command:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	68	Start character long query
2	1	09	L-Field
3	1	09	L-Field Ripetition
4	1	68	Start character long query ripetition
5	1	73	C-Field SND_UD
6	1	xx	A-Field, Primary Address (00-FF = 0-255)
7	1	51	CI-Field
8	1	01	DIF: 8 Bit Integer, 1 Byte
9	1	FF	VIF followed by manufacturer specific VIFE
10	1	82	VIFE: Partial Counters
11	1	FF	VIFE followed by 3E specific VIFE
12	1	71	Manufacturer specific VIFE: Start Counter
13	1	xx	Value: Kind of Energy 00: Imported Active Energy 01: Exported Active Energy 02: Imported Inductive Apparent Energy 03: Exported Inductive Apparent Energy 04: Imported Capacitive Apparent Energy 05: Exported Capacitive Apparent Energy 06: Imported Inductive Reactive Energy 07: Exported Inductive Reactive Energy 08: Imported Capacitive Reactive Energy 09: Exported Capacitive Reactive Energy 0A: ALL partial counters
14	1	xx	CS Checksum, summed from C-Field to Selected Parameter of Parameter Set 19 (byte 5 → byte 13)
15	1	16	Stop character

Table 3.8 – SND_UD command: Start Partial Energy Counter

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Answer of the Slave: E5h

3.1.2.7 Stop Partial Energy Counters

Here follows the command:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	68	Start character long query
2	1	09	L-Field
3	1	09	L-Field Ripetition
4	1	68	Start character long query ripetition
5	1	73	C-Field SND_UD
6	1	xx	A-Field, Primary Address (00-FF = 0-255)
7	1	51	CI-Field
8	1	01	DIF: 8 Bit Integer, 1 Byte
9	1	FF	VIF followed by manufacturer specific VIFE
10	1	82	VIFE: Partial Counters
11	1	FF	VIFE followed by 3E specific VIFE
12	1	72	Manufacturer specific VIFE: Stop Counter
13	1	xx	Value: Kind of Energy 00: Imported Active Energy 01: Exported Active Energy 02: Imported Inductive Apparent Energy 03: Exported Inductive Apparent Energy 04: Imported Capacitive Apparent Energy 05: Exported Capacitive Apparent Energy 06: Imported Inductive Reactive Energy 07: Exported Inductive Reactive Energy 08: Imported Capacitive Reactive Energy 09: Exported Capacitive Reactive Energy 0A: ALL partial counters
14	1	xx	CS Checksum, summed from C-Field to Selected Parameter of Parameter Set 19 (byte 5 → byte 13)
15	1	16	Stop character

Table 3.9 – SND_UD command: Stop Partial Energy Counter

Answer of the Slave: E5h

3.1.2.8 Select a Slave Using Secondary Address

Here follows the command to select a Slave by Secondary Address:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	68	Start character long query
2	1	0B	L-Field
3	1	0B	L-Field Ripetition
4	1	68	Start character long query ripetition
5	1	73	C-Field SND_UD
6	1	FD	A-Field, Primary Address = 253, i.e. take the secondary address
7	1	52	CI-Field
8 – 15	8	xx xx xx xx xx xx xx xx	Secondary Address UD (See the relative paragraph)

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Byte Nr.	Size (Byte)	Value (HEX)	Description
16	1	xx	CS Checksum, summed from C-Field to Selected Parameter of Parameter Set 19 (byte 5 → byte 15)
17	1	16	Stop character

Table 3.10 – SND_UD command: Select a slave Using Secondary Address

Answer of the Slave: E5h

3.1.2.9 Set Parameters Masks

This action allows to select the data to read-out from the Slave.
It can be possible read-out all data, choose the desired data or choose a default mask that include various kind of data.

READ-OUT ALL DATA
Here follows the command:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	68	Start character long query
2	1	04	L-Field
3	1	04	L-Field Ripetition
4	1	68	Start character long query ripetition
5	1	73	C-Field SND_UD
6	1	xx	A-Field, Primary Address (00-FF = 0-255)
7	1	51	CI-Field
8	1	7F	DIF: Global Readout Request
9	1	xx	CS Checksum, summed from C-Field to Selected Parameter of Parameter Set 19 (byte 5 → byte 8)
10	1	16	Stop character

Table 3.11 – SND_UD command: Set Read-Out All Data Parameter Mask

Answer of the Slave: E5h

READ-OUT DESIRED DATA
Here follows the command:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	68	Start character long telegram
2	1	0E	L-Field
3	1	0E	L-Field Ripetition
4	1	68	Start character long query ripetition
5	1	73	C-Field SND_UD
6	1	xx	A-Field, Primary Address (00-FF = 0-255)
7	1	51	CI-Field
8	1	07	DIF: 64 Bit Integer, 8 Byte
9	1	FD	VIF: Followed by a standard VIFE
10	1	0B	VIFE: Parameter Set Identification
11	1	"PS0"	Selected Parameter of Parameter Set 0
12	1	"PS1"	Selected Parameter of Parameter Set 1
13	1	"PS2"	Selected Parameter of Parameter Set 2
14	1	"PS3"	Selected Parameter of Parameter Set 3
15	1	"PS4"	Selected Parameter of Parameter Set 4
16	1	"PS5"	Selected Parameter of Parameter Set 5

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Byte Nr.	Size (Byte)	Value (HEX)	Description
17	1	"PS6"	Selected Parameter of Parameter Set 6
18	1	"PS7"	Selected Parameter of Parameter Set 7
19	1	xx	CS Checksum, summed from C-Field to Selected Parameter of Parameter Set 19 (byte 5 → byte 18)
20	1	16	Stop character

Table 3.12 – SND_UD command: Set Read-Out Desired Data Parameter Mask

To set the Parameter Set to all M-BUS interface in the system is necessary use the primary address 255d (FFh) in the A-Field. In this case the M-BUS interface in the M-BUS system will not send an acknowledgement (no E5 will be sent by the M-BUS interfaces)

Answer of the Slave: E5h

See the Annex B for an example of a mask.

3.1.3 REQ_UD2

This procedure is used by the M-BUS Master to receive data to the M-BUS Slave. The Slave confirms a correct reception of the telegram with the RSP_UD answer or omits the answer if it didn't receive the telegram correctly.
The Slave sends the data requested by SND_UD command.
Here follows the structure of the REQ_UD2 command:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	10	Start character short telegram
2	1	7B / 5B	C-Field , Transmit Read-Out Data
3	1	xx	A Field – Primary Address 00 – FA: Valid Primary Address FB, FC: Reserved for Future Use FE: Transmission to All M-BUS Slave in the System (everyone sends E5h) FF: Transmission to All M-BUS Slave in the System (no one sends E5h) Out of Range: FD: Transmission is by Secondary Address
4	1	xx	CS Checksum, summed from C-Field to Selected Parameter of Parameter Set 19 (byte 2 → byte 3)
5	1	16	Stop character

Table 3.13 – REQ_UD2 command

Answer of the Slave: RSP_UD

3.1.4 RSP_UD

This procedure is used by the M-BUS Slave to send the requested data to the M-BUS Master.
The behavior of the multi-frame answer is explained in Annex A.
Here follows the structure of the RSP_UD telegram:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	68	Start character long telegram
2	1	xx	L-Field
3	1	xx	L-Field Ripetition
4	1	68	Start character long telegram ripetition
5	1	08 /18	C-Field RSP_UD
6	1	xx	A-Field, Primary Address (00 - FA = 0 - 250)
7	1	72	CI-Field
8 – 11	4	xx xx xx xx	M-BUS Interface Identification Number

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Byte Nr.	Size (Byte)	Value (HEX)	Description
12 – 13	2	xx xx	Manufacturer's Mark
14	1	xx	Version Number of M-BUS Interface Firmware (00 – FF)
15	1	02	Medium: Electricity
16	1	xx	Access Number (00 – FF → 00)
17	1	xx	M-BUS Interface Status (see error flags par.)
18 – 19	2	0000	Signature (always 0000, i.e. not used)
20 – YY	0 – EA	xx...xx	Read-out Data Parametrised (see the following paragraphs)
YY + 1	1	0F / 1F	DIF: 0F = no more data; 1F = other data to send
YY + 2	1	xx	CS Checksum, summed from C-Field to Selected Parameter of Parameter Set 19 (byte 5 → byte YY + 1)
YY + 3	1	16	Stop character

Table 3.14 – RSP_UD command

Here follows every possible Read-Out data, included in 20 – YY bytes of the RSP_UD table.

3.1.4.1 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Active Energy, Total

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	00	DIFE: Total
YY + 2	1	82	VIF: Energy, 0.1Wh; Followed by VIFE
YY + 3	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 4	1	80	VIFE: Imported Energy; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	0x	MANUFACTURER specific VIFE: 0: 3-Phase 1: Phase 1 2: Phase 2 3: Phase 3
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Active Energy, Total

Table 3.15 – 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Active Energy, Total

3.1.4.2 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Active Energy, Total

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	00	DIFE: Total
YY + 2	1	82	VIF: Energy, 0.1Wh; Followed by VIFE
YY + 3	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 4	1	81	VIFE: Exported Energy; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	0x	MANUFACTURER specific VIFE: 0: 3-Phase 1: Phase 1 2: Phase 2 3: Phase 3
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Active Energy, Total

Table 3.16 – 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Active Energy, Total

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3.1.4.3 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Apparent Energy, Total

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	91	VIFE: Apparent Energy, 0.1VAh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6 – YY + 11	1	1x	MANUFACTURER specific VIFE: 0: 3-Phase Imported Inductive 1: Phase 1 Imported Inductive 2: Phase 2 Imported Inductive 3: Phase 3 Imported Inductive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Apparent Energy, Total

Table 3.17 – 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Apparent Energy, Total

3.1.4.4 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Apparent Energy, Total

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	91	VIFE: Apparent Energy, 0.1VAh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	2x	MANUFACTURER specific VIFE: 0: 3-Phase Exported Inductive 1: Phase 1 Exported Inductive 2: Phase 2 Exported Inductive 3: Phase 3 Exported Inductive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Apparent Energy, Total

Table 3.18 – 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Apparent Energy, Total

3.1.4.5 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Apparent Energy, Total

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	91	VIFE: Apparent Energy, 0.1VAh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	3x	MANUFACTURER specific VIFE: 0: 3-Phase Imported Capacitive 1: Phase 1 Imported Capacitive 2: Phase 2 Imported Capacitive 3: Phase 3 Imported Capacitive

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Byte Nr.	Size (Byte)	Value (HEX)	Description
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Apparent Energy, Total

Table 3.19 – 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Apparent Energy, Total

3.1.4.6 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Apparent Energy, Total

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	91	VIFE: Apparent Energy, 0.1VAh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	4x	MANUFACTURER specific VIFE: 0: 3-Phase Exported Capacitive 1: Phase 1 Exported Capacitive 2: Phase 2 Exported Capacitive 3: Phase 3 Exported Capacitive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Apparent Energy, Total

Table 3.20 – 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Apparent Energy, Total

3.1.4.7 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Reactive Energy, Total

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	93	VIFE: Reactive Energy, 0.1varh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	1x	MANUFACTURER specific VIFE: 0: 3-Phase Imported Inductive 1: Phase 1 Imported Inductive 2: Phase 2 Imported Inductive 3: Phase 3 Imported Inductive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Reactive Energy, Total

Table 3.21 – 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Reactive Energy, Total

3.1.4.8. 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Reactive Energy, Total

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	93	VIFE: reactive Energy, 0.1varh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE

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Byte Nr.	Size (Byte)	Value (HEX)	Description
YY + 6	1	2x	MANUFACTURER specific VIFE: 0: 3-Phase Exported Inductive 1: Phase 1 Exported Inductive 2: Phase 2 Exported Inductive 3: Phase 3 Exported Inductive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Reactive Energy, Total

Table 3.22 – 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Reactive Energy, Total

3.1.4.9 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Reactive Energy, Total

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	93	VIFE: Reactive Energy, 0.1varh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	3x	MANUFACTURER specific VIFE: 0: 3-Phase Imported Capacitive 1: Phase 1 Imported Capacitive 2: Phase 2 Imported Capacitive 3: Phase 3 Imported Capacitive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Reactive Energy, Total

Table 3.23 – 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Reactive Energy, Total

3.1.4.10 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Reactive Energy, Total

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	93	VIFE: Reactive Energy, 0.1varh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	4x	MANUFACTURER specific VIFE: 0: 3-Phase Exported Capacitive 1: Phase 1 Exported Capacitive 2: Phase 2 Exported Capacitive 3: Phase 3 Exported Capacitive
YY + 7– YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Reactive Energy, Total

Table 3.24 – 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Reactive Energy, Total

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3.1.4.11 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Active Energy, Tariff 1

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	10	DIFE: Tariff 1
YY + 2	1	82	VIF: Energy, 0.1Wh; Followed by VIFE
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	80	VIFE: Imported Energy; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	0x	MANUFACTURER specific VIFE: 0: 3-Phase 1: Phase 1 2: Phase 2 3: Phase 3
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Active Energy, Tariff 1

Table 3.25 – 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Active Energy, Tariff 1

3.1.4.12 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Active Energy, Tariff 1

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	10	DIFE: Tariff 1
YY + 2	1	82	VIF: Energy, 0.1Wh; Followed by VIFE
YY + 3	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 4	1	81	VIFE: Exported Energy; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	0x	MANUFACTURER specific VIFE: 0: 3-Phase 1: Phase 1 2: Phase 2 3: Phase 3
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Active Energy, Tariff 1

Table 3.26 – 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Active Energy, Tariff 1

3.1.4.13 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Apparent Energy, Tariff 1

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	90	DIFE: Tariff 1; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	91	VIFE: Apparent Energy, 0.1VAh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6 – YY + 11	1	1x	MANUFACTURER specific VIFE: 0: 3-Phase Imported Inductive 1: Phase 1 Imported Inductive 2: Phase 2 Imported Inductive 3: Phase 3 Imported Inductive

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Byte Nr.	Size (Byte)	Value (HEX)	Description
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Apparent Energy, Tariff 1

Table 3.27 – 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Apparent Energy, Tariff 1

3.1.4.14 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Apparent Energy, Tariff 1

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	90	DIFE: Tariff 1; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	91	VIFE: Apparent Energy, 0.1VAh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	2x	MANUFACTURER specific VIFE: 0: 3-Phase Exported Inductive 1: Phase 1 Exported Inductive 2: Phase 2 Exported Inductive 3: Phase 3 Exported Inductive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Apparent Energy, Tariff 1

Table 3.28 – 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Apparent Energy, Tariff 1

3.1.4.15 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Apparent Energy, Tariff 1

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	90	DIFE: Tariff 1; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	91	VIFE: Apparent Energy, 0.1VAh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	3x	MANUFACTURER specific VIFE: 0: 3-Phase Imported Capacitive 1: Phase 1 Imported Capacitive 2: Phase 2 Imported Capacitive 3: Phase 3 Imported Capacitive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Apparent Energy, Tariff 1

Table 3.29 – 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Apparent Energy, Tariff 1

3.1.4.16 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Apparent Energy, Tariff 1

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	90	DIFE: Tariff 1; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	91	VIFE: Apparent Energy, 0.1VAh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE

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Byte Nr.	Size (Byte)	Value (HEX)	Description
YY + 6	1	4x	MANUFACTURER specific VIFE: 0: 3-Phase Exported Capacitive 1: Phase 1 Exported Capacitive 2: Phase 2 Exported Capacitive 3: Phase 3 Exported Capacitive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Apparent Energy, Tariff 1

Table 3.30 – 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Apparent Energy, Tariff 1

3.1.4.17 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Reactive Energy, Tariff 1

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	90	DIFE: Tariff 1; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	93	VIFE: Reactive Energy, 0.1varh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	1x	MANUFACTURER specific VIFE: 0: 3-Phase Imported Inductive 1: Phase 1 Imported Inductive 2: Phase 2 Imported Inductive 3: Phase 3 Imported Inductive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Reactive Energy, Tariff 1

Table 3.31 – 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Reactive Energy, Tariff 1

3.1.4.18 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Reactive Energy, Tariff 1

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	90	DIFE: Tariff 1; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	93	VIFE: reactive Energy, 0.1varh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	2x	MANUFACTURER specific VIFE: 0: 3-Phase Exported Inductive 1: Phase 1 Exported Inductive 2: Phase 2 Exported Inductive 3: Phase 3 Exported Inductive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Reactive Energy, Tariff 1

Table 3.32 – 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Reactive Energy, Tariff 1

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3.1.4.19 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Reactive Energy, Tariff 1

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	90	DIFE: Tariff 1; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	93	VIFE: Reactive Energy, 0.1varh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	3x	MANUFACTURER specific VIFE: 0: 3-Phase Imported Capacitive 1: Phase 1 Imported Capacitive 2: Phase 2 Imported Capacitive 3: Phase 3 Imported Capacitive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Reactive Energy, Tariff 1

Table 3.33 – 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Reactive Energy, Tariff 1

3.1.4.20 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Reactive Energy, Tariff 1

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	90	DIFE: Tariff 1; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	93	VIFE: Reactive Energy, 0.1varh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	4x	MANUFACTURER specific VIFE: 0: 3-Phase Exported Capacitive 1: Phase 1 Exported Capacitive 2: Phase 2 Exported Capacitive 3: Phase 3 Exported Capacitive
YY + 7– YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Reactive Energy, Tariff 1

Table 3.34 – 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Reactive Energy, Tariff 1

3.1.4.21 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Active Energy, Tariff 2

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	20	DIFE: Tariff 2
YY + 2	1	82	VIF: Active Energy, 0.1Wh; Followed by VIFE
YY + 3	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 4	1	80	VIFE: Imported Energy; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	0x	MANUFACTURER specific VIFE: 0: 3-Phase 1: Phase 1 2: Phase 2 3: Phase 3

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Byte Nr.	Size (Byte)	Value (HEX)	Description
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Active Energy, Tariff 2

Table 3.35 – 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Active Energy, Tariff 2

3.1.4.22 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Active Energy, Tariff 2

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	20	DIFE: Tariff 2
YY + 2	1	82	VIF: Active Energy, 0.1Wh; Followed by VIFE
YY + 3	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 4	1	81	VIFE: Exported Energy; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	0x	MANUFACTURER specific VIFE: 0: 3-Phase 1: Phase 1 2: Phase 2 3: Phase 3
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Active Energy, Tariff 2

Table 3.36 – 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Active Energy, Tariff 2

3.1.4.23 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Apparent Energy, Tariff 2

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	A0	DIFE: Tariff 2; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	91	VIFE: Apparent Energy, 0.1VAh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	1x	MANUFACTURER specific VIFE: 0: 3-Phase Imported Inductive 1: Phase 1 Imported Inductive 2: Phase 2 Imported Inductive 3: Phase 3 Imported Inductive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Apparent Energy, Tariff 2

Table 3.37 – 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Apparent Energy, Tariff 2

3.1.4.24 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Apparent Energy, Tariff 2

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	A0	DIFE: Tariff 2; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	91	VIFE: Apparent Energy, 0.1VAh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE

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Byte Nr.	Size (Byte)	Value (HEX)	Description
YY + 6	1	2x	MANUFACTURER specific VIFE: 0: 3-Phase Exported Inductive 1: Phase 1 Exported Inductive 2: Phase 2 Exported Inductive 3: Phase 3 Exported Inductive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Apparent Energy, Tariff 2

Table 3.38 – 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Apparent Energy, Tariff 2

3.1.4.25 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Apparent Energy, Tariff 2

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	A0	DIFE: Tariff 2; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	91	VIFE: Apparent Energy, 0.1VAh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	3x	MANUFACTURER specific VIFE: 0: 3-Phase Imported Capacitive 1: Phase 1 Imported Capacitive 2: Phase 2 Imported Capacitive 3: Phase 3 Imported Capacitive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Apparent Energy, Tariff 2

Table 3.39 – 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Apparent Energy, Tariff 2

3.1.4.26 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Apparent Energy, Tariff 2

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	A0	DIFE: Tariff 2; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	91	VIFE: Apparent Energy, 0.1VAh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	4x	MANUFACTURER specific VIFE: 0: 3-Phase Exported Capacitive 1: Phase 1 Exported Capacitive 2: Phase 2 Exported Capacitive 3: Phase 3 Exported Capacitive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Apparent Energy, Tariff 2

Table 3.40 – 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Apparent Energy, Tariff 2

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3.1.4.27 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Reactive Energy, Tariff 2

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	A0	DIFE: Tariff 2; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	93	VIFE: Reactive Energy, 0.1varh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	1x	MANUFACTURER specific VIFE: 0: 3-Phase Imported Inductive 1: Phase 1 Imported Inductive 2: Phase 2 Imported Inductive 3: Phase 3 Imported Inductive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Reactive Energy, Tariff 2

Table 3.41 – 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Inductive Reactive Energy, Tariff 2

3.1.4.28 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Reactive Energy, Tariff 2

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	A0	DIFE: Tariff 2; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	93	VIFE: Reactive Energy, 0.1varh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	2x	MANUFACTURER specific VIFE: 0: 3-Phase Exported Inductive 1: Phase 1 Exported Inductive 2: Phase 2 Exported Inductive 3: Phase 3 Exported Inductive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Reactive Energy, Tariff 2

Table 3.42 – 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Inductive Reactive Energy, Tariff 2

3.1.4.29 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Reactive Energy, Tariff 2

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	A0	DIFE: Tariff 2; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	93	MANUFACTURER specific VIFE: Reactive Energy, 0.1varh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	3x	MANUFACTURER specific VIFE: 0: 3-Phase Imported Capacitive 1: Phase 1 Imported Capacitive 2: Phase 2 Imported Capacitive 3: Phase 3 Imported Capacitive

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Byte Nr.	Size (Byte)	Value (HEX)	Description
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Reactive Energy, Tariff 2

Table 3.43 – 3-Phase, Phase 1, Phase 2 and Phase 3 Imported Capacitive Reactive Energy, Tariff 2

3.1.4.30 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Reactive Energy, Tariff 2

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	A0	DIFE: Tariff 2; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	93	MANUFACTURER specific VIFE: Reactive Energy,0.1varh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	4x	MANUFACTURER specific VIFE: 0: 3-Phase Exported Capacitive 1: Phase 1 Exported Capacitive 2: Phase 2 Exported Capacitive 3: Phase 3 Exported Capacitive
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Reactive Energy, Tariff 2

Table 3.44 – 3-Phase, Phase 1, Phase 2 and Phase 3 Exported Capacitive Reactive Energy, Tariff 2

3.1.4.31 3-Phase, Phase 1, Phase 2 and Phase 3 Voltage

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	03	DIF – 24 Bit Integer, 3 Byte
YY + 1	1	FD	VIF: Followed by a standard VIFE
YY + 2	1	C6	VIFE: Instant Voltage (mV) followed by a VIFE
YY + 3	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 4	1	0x	MANUFACTURER specific VIFE: 0: 3-Phase 1: Phase 1 2: Phase 2 3: Phase 3
YY + 5 – YY + 7	3	xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Voltage

Table 3.45 – 3-Phase, Phase 1, Phase 2 and Phase 3 Voltage

3.1.4.32 Line 12, Line 23 and Line 31 Voltage

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	03	DIF – 24 Bit Integer, 3 Byte
YY + 1	1	FD	VIF: Followed by a standard VIFE
YY + 2	1	C6	VIFE: Instant Voltage (mV) followed by a VIFE
YY + 3	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 4	1	0x	MANUFACTURER specific VIFE: 5: Line 12 6: Line 23 7: Line 31

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Byte Nr.	Size (Byte)	Value (HEX)	Description
YY + 5 – YY + 7	3	xx xx xx	Value: Line 12, Line 23, Line 31 Voltage

Table 3.46 – Line 12. Line 23 and Line 31 Voltage

3.1.4.33 3-Phase, Phase 1, Phase 2, Phase 3 and Neutral Current

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	04	DIF – 32 Bit Integer, 4 Byte
YY + 1	1	FD	VIF: Followed by a standard VIFE
YY + 2	1	D9	VIFE: Current (mA) followed by a VIFE
YY + 3	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 4	1	0x	MANUFACTURER specific VIFE: 0: 3-Phase 1: Phase 1 2: Phase 2 3: Phase 3 4: Neutral
YY + 5 – YY + 7	4	xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2, Phase 3 and Nuetral Current

Table 3.47 – 3-Phase, Phase 1, Phase 2, Phase 3 and Neutral Current

3.1.4.34 Frequency

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	02	DIF – 16 Bit Integer, 2 Byte
YY + 1	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 2	1	94	MANUFACTURER specific VIFE: mHz
YY + 3	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 4	1	50	MANUFACTURER specific VIFE: Frequency (mHz)
YY + 5 – YY + 6	2	xx xx	Value: Frequency

Table 3.48 – Frequency

3.1.4.35 Phase Order

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	01	DIF – 8 Bit Integer, 1 Byte
YY + 1	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 2	1	51	MANUFACTURER specific VIFE: Phase Order
YY + 3	1	xx	Value: Phase Order 00: No Phase Order 7B: 123 84: 132

Table 3.49 – Phase Order

3.1.4.36 3-Phase, Phase 1, Phase 2 and Phase 3 Power Factor

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	02	DIF – 16 Bit Integer, 2 Byte
YY + 1	1	FF	VIF followed by MANUFACTURER specific VIFE

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Byte Nr.	Size (Byte)	Value (HEX)	Description
YY + 2	1	84	MANUFACTURER specific VIFE: Power Factor; Followed by VIFE
YY + 3	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 4	1	0x	MANUFACTURER specific VIFE: 0: 3-Phase 1: Phase 1 2: Phase 2 3: Phase 3
YY + 5 – YY + 6	2	xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Power Factor

Table 3.50 – 3-Phase, Phase 1, Phase 2 and Phase 3 Power Factor

3.1.4.37 3-Phase, Phase 1, Phase 2 and Phase 3 Active Power

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	06	DIF – 48 Bit Integer, 6 Byte
YY + 1	1	A8	VIF: Active Power, mW; Followed by VIFE
YY + 2	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 3	1	0x	MANUFACTURER specific VIFE: 0: 3-Phase 1: Phase 1 2: Phase 2 3: Phase 3
YY + 4 – YY + 9	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Active Power

Table 3.51 – 3-Phase, Phase 1, Phase 2 and Phase 3 Active Power

3.1.4.38 3-Phase, Phase 1, Phase 2 and Phase 3 Apparent Power

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Power
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	90	VIFE: Apparent Power, mVa; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	0x	MANUFACTURER specific VIFE: 0: 3-Phase 1: Phase 1 2: Phase 2 3: Phase 3
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Apparent Power

Table 3.52 – 3-Phase, Phase 1, Phase 2 and Phase 3 Apparent Power

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3.1.4.39 3-Phase, Phase 1, Phase 2 and Phase 3 Reactive Power

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Power
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	92	VIFE: Reactive Power, mvar; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	0x	MANUFACTURER specific VIFE: 0: 3-Phase 1: Phase 1 2: Phase 2 3: Phase 3
YY + 7 – YY + 12	6	xx xx xx xx xx xx	Value: 3-Phase, Phase 1, Phase 2 and Phase 3 Reactive Power

Table 3.53 – 3-Phase, Phase 1, Phase 2 and Phase 3 Reactive Power

3.1.4.40 3-Phase Imported and Exported Active Energy Partial

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	06	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	82	VIF: Active Energy, 0.1Wh; Followed by VIFE
YY + 2	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 3	1	8x	MANUFACTURER specific VIFE: 0: Imported Energy 1: Exported Energy Followed by VIFE
YY + 4	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 5	1	82	MANUFACTURER specific VIFE: Partial; Followed by VIFE
YY + 6	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 7	1	00	MANUFACTURER specific VIFE: 3-Phase
YY + 8 – YY + 13	6	xx xx xx xx xx xx	Value: 3-Phase Imported and Exported Active Energy Partial

Table 3.54 – 3-Phase Imported and Exported Active Energy Partial

3.1.4.41 3-Phase Imported and Exported Inductive Apparent Energy Partial

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	91	VIFE: Apparent Energy, 0.1VAh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	82	MANUFACTURER specific VIFE: Partial; Followed by VIFE
YY + 7	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 8	1	x0	MANUFACTURER specific VIFE: 1: 3-Phase Imported Inductive 2: 3-Phase Exported Inductive
YY + 9 – YY + 14	6	xx xx xx xx xx xx	Value: 3-Phase Imported and Exported Inductive Apparent Energy Partial

Table 3.55 – 3-Phase Imported and Exported Inductive Apparent Energy Partial

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3.1.4.42 3-Phase Imported and Exported Capacitive Apparent Energy Partial

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	91	VIFE: Apparent Energy, 0.1VAh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	82	MANUFACTURER specific VIFE: Partial; Followed by VIFE
YY + 7	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 8	1	x0	MANUFACTURER specific VIFE: 3: 3-Phase Imported Capacitive 4: 3-Phase Exported Capacitive
YY + 9 – YY + 14	6	xx xx xx xx xx xx	Value: 3-Phase Imported and Exported Capacitive Apparent Energy Partial

Table 3.56 – 3-Phase Imported and Exported Capacitive Apparent Energy Partial

3.1.4.43 3-Phase Imported and Exported Inductive Reactive Energy Partial

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	93	VIFE: Reactive Energy, 0.1varh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	82	MANUFACTURER specific VIFE: Partial; Followed by VIFE
YY + 7	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 8	1	x0	MANUFACTURER specific VIFE: 1: 3-Phase Imported Inductive 2: 3-Phase Exported Inductive
YY + 9 – YY + 14	6	xx xx xx xx xx xx	Value: 3-Phase Imported and Exported Inductive Reactive Energy Partial

Table 3.57 – 3-Phase Imported and Exported Inductive Reactive Energy Partial

3.1.4.44 3-Phase Imported and Exported Capacitive Reactive Energy Partial

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	93	VIFE: Reactive Energy, 0.1varh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	82	MANUFACTURER specific VIFE: Partial; Followed by VIFE
YY + 7	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 8	1	x0	MANUFACTURER specific VIFE: 3: 3-Phase Imported Inductive 4: 3-Phase Exported Inductive

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Byte Nr.	Size (Byte)	Value (HEX)	Description
YY + 9 – YY + 14	6	xx xx xx xx xx xx	Value: 3-Phase Imported and Exported Capacitive Reactive Energy Partial

Table 3.58 – 3-Phase Imported and Exported Capacitive Reactive Energy Partial

3.1.4.45 3-Phase Active Energy Balance

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	06	DIF – 48 Bit Integer, 6 Byte
YY + 1	1	82	VIF: Active Energy, 0.1Wh; Followed by VIFE
YY + 2	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 3	1	83	MANUFACTURER specific VIFE: Balance; Followed by VIFE
YY + 4	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 7	1	00	MANUFACTURER specific VIFE: 3-Phase
YY + 8 – YY + 13	6	xx xx xx xx xx xx	Value: 3-Phase Active Energy Balance

Table 3.59 – 3-Phase Active Energy Balance

3.1.4.46 3-Phase Inductive and Capacitive Apparent Energy Balance

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	40	DIFE: Apparent Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	91	VIFE: Apparent Energy, 0.1VAh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	83	MANUFACTURER specific VIFE: Balance; Followed by VIFE
YY + 7	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 8	1	x4	MANUFACTURER specific VIFE: 2: 3-Phase Inductive 4: 3-Phase Capacitive
YY + 9 – YY + 14	6	xx xx xx xx xx xx	Value: 3-Phase Inductive and Capacitive Apparent Energy Balance

Table 3.60 – 3-Phase Inductive and Capacitive Apparent Energy Balance

3.1.4.47 3-Phase Inductive and Capacitive Reactive Energy Balance

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	86	DIF – 48 Bit Integer, 6 Byte; Followed by DIFE
YY + 1	1	80	DIFE: Total; Followed by DIFE
YY + 2	1	00	DIFE: Reactive Value
YY + 3	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 4	1	93	VIFE: Reactive Energy, 0.1varh; Followed by VIFE
YY + 5	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 6	1	83	MANUFACTURER specific VIFE: Balance; Followed by VIFE
YY + 7	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 8	1	x4	MANUFACTURER specific VIFE: 2: 3-Phase Inductive 4: 3-Phase Capacitive
YY + 9 – YY + 14	6	xx xx xx xx xx xx	Value: 3-Phase Inductive and Capacitive Reactive Energy Balance

Table 3.61 – 3-Phase Inductive and Capacitive Reactive Energy Balance

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3.1.4.48 CT Value

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	02	DIF – 16 Bit Integer, 2 Byte
YY + 1	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 2	1	52	MANUFACTURER specific VIFE: CT Value
YY + 3 – YY + 4	2	xx xx	Value: CT Value

Table 3.62 – CT Value

3.1.4.49 Actual Tariff

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	01	DIF – 8 Bit Integer, 1 Byte
YY + 1	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 2	1	54	MANUFACTURER specific VIFE: Actual Tariff
YY + 3	1	xx	Value: Tariff 01: Tariff 1 02: Tariff 2

Table 3.64 – Actual Tariff

3.1.4.50 Serial Number

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	0D	DIF – Variable Length
YY + 1	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 2	1	55	MANUFACTURER specific VIFE: Serial Number
YY + 3 – YY + 13	1	0A	Value: Serial Number First Byte is LVAR: i.e. 10 ASCII char follows
YY + 4 – YY + 13	10	xx xx xx xx xx xx xx xx xx xx	Value: Serial Number (ASCII char), transmitted "Least significant byte first"

Table 3.65 – Serial Number

3.1.4.51 Model

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	01	DIF – 8 Bit Integer, 1 Byte
YY + 1	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 2	1	56	MANUFACTURER specific VIFE: Model
YY + 3	1	xx	Value: Model 02 = 46U, 3Phase,4Wire,6||1Amp,USA 03 = 46E, 3Phase,4Wire,6||1Amp,Europe 05 = 36U, 3Phase,3Wire,6||1Amp,USA 06 = 36E, 3Phase,3Wire,6||1Amp,Europe 07 = 48U, 3Phase,4Wire,80Amp,USA 08 = 48E, 3Phase,4Wire,80Amp,Europe 09 = 38U, 3Phase,3Wire,80Amp,USA 10 = 38E, 3Phase,3Wire,80Amp,Europe 11 = 18U, 1Phase,80Amp,USA 12 = 18E, 1Phase,80Amp,Europe

Table 3.66 – Model

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3.1.4.52 Type

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	01	DIF – 8 Bit Integer, 1 Byte
YY + 1	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 2	1	57	MANUFACTURER specific VIFE: Type
YY + 3	1	xx	Value: Type 00: no MID, yes reset 01: no MID, no reset 02: MID 03: no MID, NO RESET, Wiring SET 04: no MID, NO RESET, DProfiles 05: MID, NO REACTIVE 06: no MID, NO RESET, DProfiles, no Wiring 07: MID, DProfile, Wiring 08: MID, DProfiled, no Wiring

Table 3.67 – Type

3.1.4.53 Energy Counter Firmware Release 1

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	02	DIF – 16 Bit Integer, 2 Byte
YY + 1	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 2	1	58	MANUFACTURER specific VIFE: Firmware EC Release 1
YY + 3 – YY + 4	2	xx xx	Value: Firmware EC Release, e.g. xx.xx

Table 3.68 – Energy Counter Firmware Release 1

3.1.4.54 Energy Counter Firmware Release 2

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	02	DIF – 16 Bit Integer, 2 Byte
YY + 1	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 2	1	65	MANUFACTURER specific VIFE: Firmware EC Release 2
YY + 3 – YY + 4	2	xx xx	Value: Firmware EC Release, e.g. xx.xx

Table 3.68 – Energy Counter Firmware Release 2

3.1.4.55 Energy Counter Hardware Release

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	02	DIF – 16 Bit Integer, 2 Byte
YY + 1	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 2	1	59	MANUFACTURER specific VIFE: Hardware EC Release
YY + 3 – YY + 4	2	xx xx	Value: Hardware EC Release, e.g. xx.xx

Table 3.69 – Energy Counter Hardware Release

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3.1.4.56 Primary or Secondary Value

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	01	DIF – 8 Bit Integer, 1 Byte
YY + 1	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 2	1	61	MANUFACTURER specific VIFE: Primary or Secondary Value
YY + 3	1	xx	Value: Primary or Secondary Value 00: Primary Values 01: Secondary Values

Table 3.70 – Primary or Secondary Value

3.1.4.57 Error Code

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	01	DIF – 8 Bit Integer, 1 Byte
YY + 1	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 2	1	62	MANUFACTURER specific VIFE: Error Code Value
YY + 3	1	xx	Value: Error Code 00: No Error 01: Phase Sequence Error 02: Memory Error

Table 3.71 – Error Code

3.1.4.58 Out Of Range

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	06	DIF – 68 Bit Integer, 6 Byte
YY + 1	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 2	1	63	MANUFACTURER specific VIFE: Out Of Range Value
YY + 3	1	xx	Value: Out Of Range Frequency 00: No Out of Range 01: Frequency Out of Range
YY + 4 – YY + 5	2	xx xx	Value: Out Of Range Low/High Phase Current 1 byte: 00 → FF – LORI2|LORI1|LORISYS|HORIN|HORI3| HORI2|HORI1|HORISYS 2 byte: 00 → 03 – res| res| res| res| res| res|LORIN|LORI3
YY + 6	1	xx	Value: Out of Range Low/High Line Voltage 00 → 3F – res|res|LORVL23| LORVL13| LORVL12| HORVL23| HORVL13| HORVL12|
YY + 7	1	xx	Value: Out of Range Low/High Phase Voltage 00 → FF – LORV3N|LORV2N|LORV1N|LORVSYS| HORV3N|HORV2N|HORV1N|HORVSYS|
YY + 8	1	00	Empty Byte

Table 3.72 – Out Of Range

3.1.4.59 Fabrication Number

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	0C	DIF – 8 digit BCD, 4 Byte
YY + 1	1	78	VIF: Fabrication No

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Byte Nr.	Size (Byte)	Value (HEX)	Description
YY + 2 – YY 5	4	xx xx xx xx	Value: Fabrication Number

Table 3.73 –Fabrication Number

3.1.4.60 M-BUS Module Firmware Release

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	02	DIF – 16 Bit Integer, 2 Byte
YY + 1	1	FD	VIF: Followed by a standard VIFE
YY + 2	1	0C	VIFE: Version
YY + 3 – YY 4	2	xx xx	Value: Firmware Version Release

Table 3.74 – M-BUS Module Firmware Release

3.1.4.61 M-BUS Module Hardware Release

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	02	DIF – 16 Bit Integer, 2 Byte
YY + 1	1	FD	VIF: Followed by a standard VIFE
YY + 2	1	0D	VIFE: Hardware Version
YY + 3 – YY 4	2	xx xx	Value: Hardware Version Release

Table 3.75 – M-BUS Module Hardware Release

3.1.4.62 Partial Counter Status

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	02	DIF – 16 Bit Integer, 2 Byte
YY + 1	1	FF	VIF followed by MANUFACTURER specific VIFE
YY + 2	1	73	MANUFACTURER specific VIFE: Partial Counters Status
YY + 3 – YY + 4	2	xx xx	Value: Out Of Range Low/High Phase Current 1 byte: -kvarhSYS-L-PAR |+kvarhSYS-L-PAR | -kVAhSYS-C-PAR | +kVAhSYS-C-PAR | -kVAhSYS-L-PAR | +kVAhSYS-L-PAR | -kWhSYS-PAR | +kWhSYS-PAR 2 byte: res| res| res| res| res| res| -kvarhSYS-C-PAR | +kvarhSYS-C-PAR

Table 3.76 – Partial Counter Status

3.1.4.63 FSA Value

Byte Nr.	Size (Byte)	Value (HEX)	Description
YY	1	01	DIF – 8 Bit Integer, 1 Byte
YY + 1	1	FD	VIF: Followed by a standard VIFE
YY + 2	1	DC	VIFE: Current (A) followed by a VIFE
YY + 3	1	FF	VIFE followed by MANUFACTURER specific VIFE
YY + 5	1	xx	Value: FSA Value 00: 1 A 01: 5 A 02: 80 A

Table 3.77 – FSA Value

ANNEX A

In case of single-frame RSP_UD answer from the Slave, the communication process is the following:

MASTER		SLAVE
SND_NKE	→	E5h
SND_UD	→	E5h
REQ_UD2 with C Field = 7Bh i.e. FCB = 1 & FCV = 1	→	RSP_UD with C Field = 08h DIF = 0Fh as last data block

This means that, if the FCB is handled (i.e. FCV = 1), when the RSP_UD answer has a single-frame of data, the Slave has to send a RSP_UD answer with the last data block egual to 0F.

In case of multi-frame RSP_UD answer from the Slave (for example 2 frames), the communication process is the following:

MASTER		SLAVE
SND_NKE	→	E5h
SND_UD	→	E5h
REQ_UD2 with C Field = 7Bh i.e. FCB = 1 & FCV = 1	→	RSP_UD with C Field = 18h i.e. DFC = 1 DIF = 1Fh as last data block
REQ_UD2 with C Field = 5B i.e. FCB = 0 & FCV = 1	→	RSP_UD with C Field = 08 i.e. DFC = 0 DIF = 0Fh as last data block

This means that, if the FCB is handled (i.e. FCV = 1), when the RSP_UD answer has a single-frame of data, the Slave has to send a RSP_UD answer with the last data block egual to 0F.

ANNEX B

Here follows the bit division of every Parameter Set byte:

Bit Nr.	Bit Value	Measure Unit	Bit	Parameter Set
1	From Bit 39 To Bit 50 - Reactive (0b) or Apparent (1b)	-	xxxx xxx1b	PS0
2	From Bit 51 To Bit 64 - Reactive (0b) or Apparent (1b)	-	xxxx xx1xb	
3	All Apparent and Reactive Energy Tariff 1	0.1varh & 0.1VAh	xxxx x1xxb	
4	All Apparent and Reactive Energy Total	0.1varh & 0.1VAh	xxxx 1xxxb	
5	All Apparent and Reactive Energy Balance	0.1varh & 0.1VAh	xxx1 xxxxb	
6	All Apparent and Reactive Energy Partial	0.1varh & 0.1VAh	xx1x xxxxb	
7	All Apparent and Reactive Energy Tariff 2	0.1varh & 0.1VAh	x1xx xxxxb	
8	Phase 1, 2, 3, Sys Active Power	mW	1xxx xxxxb	

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Bit Nr.	Bit Value	Measure Unit	Bit	Parameter Set
9	Phase 1, 2, 3, Sys Apparent Power	mVA	xxxx xxx1b	PS1
10	Phase 1, 2, 3, Sys Reactive Power	mvar	xxxx xx1xb	
11	Phase 1, 2, 3, Sys Voltage	mV	xxxx x1xxb	
12	Line 12, 23, 31 Voltage	mV	xxxx 1xxxb	
13	Phase 1, 2, 3, N, Sys Current	mA	xxx1 xxxxb	
14	Phase 1, 2, 3, Sys Power Factor	-	xx1x xxxxb	
15	Frequency	mHz	x1xx xxxxb	
16	Phase Order	-	1xxx xxxxb	
17	Actual Tariff	-	xxxx xxx1b	PS2
18	CT Value, FSA Value	-	xxxx xx1xb	
19	Pri/Sec Value	-	xxxx x1xxb	
20	Error Code	-	xxxx 1xxxb	
21	Out Of Range	-	xxx1 xxxxb	
22	Partial Counter Status	-	xx1x xxxxb	
23	Serial Number, FW Release EC, HW Version EC, Model, Type	-	x1xx xxxxb	
24	FW Release, HW Version and Fabrication Number of M-BUS Module	-	1xxx xxxxb	
25	Phase 1, 2, 3 Imported Active Energy Total	0.1Wh	xxxx xxx1b	PS3
26	3-Phase Imported Active Energy Total	0.1Wh	xxxx xx1xb	
27	Phase 1, 2, 3 Exported Active Energy Total	0.1Wh	xxxx x1xxb	
28	3-Phase Exported Active Energy Total	0.1Wh	xxxx 1xxxb	
29	Phase 1, 2, 3 Imported Active Energy Tariff 1	0.1Wh	xxx1 xxxxb	
30	3-Phase Imported Active Energy Tariff 1	0.1Wh	xx1x xxxxb	
31	Phase 1, 2, 3 Exported Active Energy Tariff 1	0.1Wh	x1xx xxxxb	
32	3-Phase Exported Active Energy Tariff 1	0.1Wh	1xxx xxxxb	
33	Phase 1, 2, 3 Imported Active Energy Tariff 2	0.1Wh	xxxx xxx1b	PS4
34	3-Phase Imported Active Energy Tariff 2	0.1Wh	xxxx xx1xb	
35	Phase 1, 2, 3 Exported Active Energy Tariff 2	0.1Wh	xxxx x1xxb	
36	3-Phase Exported Active Energy Tariff 2	0.1Wh	xxxx 1xxxb	
37	All Active Energy Balance	0.1Wh	xxx1 xxxxb	
38	All Active Energy Partial	0.1Wh	xx1x xxxxb	
39	Phase 1, 2, 3 Imported Inductive Energy Total (Reactive or Apparent)	0.1varh/0.1VAh	x1xx xxxxb	
40	3-Phase Imported Inductive Energy Total (Reactive or Apparent)	0.1varh/0.1VAh	1xxx xxxxb	
41	Phase 1, 2, 3 Exported Inductive Energy Total (Reactive or Apparent)	0.1varh/0.1VAh	xxxx xxx1b	PS5
42	3-Phase Exported Inductive Energy Total (Reactive or Apparent)	0.1varh/0.1VAh	xxxx xx1xb	
43	Phase 1, 2, 3 Imported Inductive Energy Tariff 1 (Reactive or Apparent)	0.1varh/0.1VAh	xxxx x1xxb	
44	3-Phase Imported Inductive Energy Tariff 1 (Reactive or Apparent)	0.1varh/0.1VAh	xxxx 1xxxb	
45	Phase 1, 2, 3 Exported Inductive Energy Tariff 1 (Reactive or Apparent)	0.1varh/0.1VAh	xxx1 xxxxb	
46	3-Phase Exported Inductive Energy Tariff 1 (Reactive or Apparent)	0.1varh/0.1VAh	xx1x xxxxb	
47	Phase 1, 2, 3 Imported Inductive Energy Tariff 2 (Reactive or Apparent)	0.1varh/0.1VAh	x1xx xxxxb	
48	3-Phase Imported Inductive Energy Tariff 2 (Reactive or Apparent)	0.1varh/0.1VAh	1xxx xxxxb	

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Bit Nr.	Bit Value	Measure Unit	Bit	Parameter Set
49	Phase 1, 2, 3 Exported Inductive Energy Tariff 2 (Reactive or Apparent)	0.1varh/0.1VAh	xxxx xxx1b	PS6
50	3-Phase Exported Inductive Energy Tariff 2 (Reactive or Apparent)	0.1varh/0.1VAh	xxxx xx1xb	
51	Phase 1, 2, 3 Imported Capacitive Energy Total (Reactive or Apparent)	0.1varh/0.1VAh	xxxx x1xxb	
52	3-Phase Imported Capacitive Energy Total (Reactive or Apparent)	0.1varh/0.1VAh	xxxx 1xxxb	
53	Phase 1, 2, 3 Exported Capacitive Energy Total (Reactive or Apparent)	0.1varh/0.1VAh	xxx1 xxxxb	
54	3-Phase Exported Capacitive Energy Total (Reactive or Apparent)	0.1varh/0.1VAh	xx1x xxxxb	
55	Phase 1, 2, 3 Imported Capacitive Energy Tariff 1 (Reactive or Apparent)	0.1varh/0.1VAh	x1xx xxxxb	
56	3-Phase Imported Capacitive Energy Tariff 1 (Reactive or Apparent)	0.1varh/0.1VAh	1xxx xxxxb	
57	Phase 1, 2, 3 Exported Capacitive Energy Tariff 1 (Reactive or Apparent)	0.1varh/0.1VAh	xxxx xxx1b	PS7
58	3-Phase Exported Capacitive Energy Tariff 1 (Reactive or Apparent)	0.1varh/0.1VAh	xxxx xx1xb	
59	Phase 1, 2, 3 Imported Capacitive Energy Tariff 2 (Reactive or Apparent)	0.1varh/0.1VAh	xxxx x1xxb	
60	3-Phase Imported Capacitive Energy Tariff 2 (Reactive or Apparent)	0.1varh/0.1VAh	xxxx 1xxxb	
61	Phase 1, 2, 3 Exported Capacitive Energy Tariff 2 (Reactive or Apparent)	0.1varh/0.1VAh	xxx1 xxxxb	
62	3-Phase Exported Capacitive Energy Tariff 2 (Reactive or Apparent)	0.1varh/0.1VAh	xx1x xxxxb	
63	All Energy Balance (Reactive or Apparent)	0.1varh/0.1VAh	x1xx xxxxb	
64	All Energy Partial (Reactive or Apparent)	0.1varh/0.1VAh	1xxx xxxxb	

Table B1 –Bit Division of Every Parameter Set Byte

ANNEX C

Here follows the structure of every default mask.

- Setting the Profile DEFAULT mask:

Parameter Set	Value (BIN)	Value (HEX)	Description
PS0	00000000	00	From Bit 39 to Bit 50 Reactive Values has to be taken From Bit 51 to Bit 64 Reactive Values has to be taken
PS1	00000000	00	No One Value
PS2	00011111	1F	Actual Tariff CT Value, FSA Value Pri/Sec Value Error Code Out Of range
PS3	10100000	A0	3-Phase Imported Active Energy Tariff 1 3-Phase Exported Active Energy Tariff 1
PS4	00001010	0A	3-Phase Imported Active Energy Tariff 2 3-Phase Exported Active Energy Tariff 2
PS5	10101000	A8	3-Phase Imported Inductive Energy Tariff 1 (Reactive from PS0 bit 0) 3-Phase Exported Inductive Energy Tariff 1 (Reactive from PS0 bit 0) 3-Phase Imported Inductive Energy Tariff 2 (Reactive from PS0 bit 0)
PS6	10000010	82	3-Phase Exported Inductive Energy Tariff 2 (Reactive from PS0 bit 0) 3-Phase Imported Capacitive Energy Tariff 1 (Reactive from PS0 bit 1)

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Parameter Set	Value (BIN)	Value (HEX)	Description
PS7	00101010	2A	3-Phase Exported Capacitive Energy Tariff 1 (Reactive from PS0 bit 1) 3-Phase Imported Capacitive Energy Tariff 2 (Reactive from PS0 bit 1) 3-Phase Exported Capacitive Energy Tariff 2 (Reactive from PS0 bit 1)

Table C1 – Default Mask Profile

And so the Profile Default mask in HEX will be:

00 00 1F A0 0A A8 82 2A

- Setting the Profile ENERGY T1 e T2 mask:

Parameter Set	Value (BIN)	Value (HEX)	Description
PS0	00000000	00	From Bit 39 to Bit 50 Reactive Values has to be taken From Bit 51 to Bit 64 Reactive Values has to be taken
PS1	00000000	00	No one value
PS2	00011000	18	Error Code Out Of range
PS3	11111111	FF	Phase 1, 2, 3 Imported Active Energy Total 3-Phase Imported Active Energy Total Phase 1, 2, 3 Exported Active Energy Total 3-Phase Exported Active Energy Total Phase 1, 2, 3 Imported Active Energy Tariff 1 3-Phase Imported Active Energy Tariff 1 Phase 1, 2, 3 Exported Active Energy Tariff 1 3-Phase Exported Active Energy Tariff 1
PS4	11001111	CF	Phase 1, 2, 3 Imported Active Energy Tariff 2 3-Phase Imported Active Energy Tariff 2 Phase 1, 2, 3 Exported Active Energy Tariff 2 3-Phase Exported Active Energy Tariff 2 Phase 1, 2, 3 Imported Inductive Energy Total (Reactive from PS0 bit 0) 3-Phase Imported Inductive Energy Total (Reactive from PS0 bit 0)
PS5	11111111	FF	Phase 1, 2, 3 Exported Inductive Energy Total (Reactive from PS0 bit 0) 3-Phase Exported Inductive Energy Total (Reactive from PS0 bit 0) Phase 1, 2, 3 Imported Inductive Energy Tariff 1 (Reactive from PS0 bit 0) 3-Phase Imported Inductive Energy Tariff 1 (Reactive from PS0 bit 0) Phase 1, 2, 3 Exported Inductive Energy Tariff 1 (Reactive from PS0 bit 0) 3-Phase Exported Inductive Energy Tariff 1 (Reactive from PS0 bit 0) Phase 1, 2, 3 Imported Inductive Energy Tariff 2 (Reactive from PS0 bit 0) 3-Phase Imported Inductive Energy Tariff 2 (Reactive from PS0 bit 0)
PS6	11111111	FF	Phase 1, 2, 3 Exported Inductive Energy Tariff 2 (Reactive from PS0 bit 0) 3-Phase Exported Inductive Energy Tariff 2 (Reactive from PS0 bit 0) Phase 1, 2, 3 Imported Capacitive Energy Total (Reactive from PS0 bit 0) 3-Phase Imported Capacitive Energy Total (Reactive from PS0 bit 0) Phase 1, 2, 3 Exported Capacitive Energy Total (Reactive from PS0 bit 0) 3-Phase Exported Capacitive Energy Total (Reactive from PS0 bit 0) Phase 1, 2, 3 Imported Capacitive Energy Tariff 1 (Reactive from PS0 bit 0) 3-Phase Imported Capacitive Energy Tariff 1 (Reactive from PS0 bit 0)

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Parameter Set	Value (BIN)	Value (HEX)	Description
PS7	00111111	3F	Phase 1, 2, 3 Exported Capacitive Energy Tariff 1 (Reactive from PS0 bit 0) 3-Phase Exported Capacitive Energy Tariff 1 (Reactive from PS0 bit 0) Phase 1, 2, 3 Imported Capacitive Energy Tariff 2(Reactive from PS0 bit 0) 3-Phase Imported Capacitive Energy Tariff 2 (Reactive from PS0 bit 0) Phase 1, 2, 3 Exported Capacitive Energy Tariff 2 (Reactive from PS0 bit 0) 3-Phase Exported Capacitive Energy Tariff 2 (Reactive from PS0 bit 0)

Table C2 – Energy T1 & T2 Mask Profile

And so the Profile Energy T1 e T2 mask in HEX will be:

00 00 18 FF CF FF FF 3F

- Setting the Profile TARIFF 1 mask:

Parameter Set	Value (BIN)	Value (HEX)	Description
PS0	00000100	04	All Apparent and Reactive Energy Tariff 1
PS1	00000000	00	No one value
PS2	00011000	18	Error Code Out Of range
PS3	11110000	F0	Phase 1, 2, 3 Imported Active Energy Tariff 1 3-Phase Imported Active Energy Tariff 1 Phase 1, 2, 3 Exported Active Energy Tariff 1 3-Phase Exported Active Energy Tariff 1
PS4	00000000	00	No one value
PS5	00000000	00	No one value
PS6	00000000	00	No one value
PS7	00000000	00	No one value

Table C3 – Tariff 1 Mask Profile

And so the Profile Tariff 1 mask in HEX will be:

04 00 18 F0 00 00 00 00

- Setting the Profile TARIFF 2 mask:

Parameter Set	Value (BIN)	Value (HEX)	Description
PS0	01000000	40	All Apparent and Reactive Energy Tariff 2
PS1	00000000	00	No one value
PS2	00011000	18	Error Code Out Of range
PS3	00000000	00	No one value
PS4	00001111	0F	Phase 1, 2, 3 Imported Active Energy Tariff 2 3-Phase Imported Active Energy Tariff 2 Phase 1, 2, 3 Exported Active Energy Tariff 2 3-Phase Exported Active Energy Tariff 2
PS5	00000000	00	No one value
PS6	00000000	00	No one value
PS7	00000000	00	No one value

Table C4 – Tariff 2 Mask Profile

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And so the Profile Tariff 2 mask in HEX will be:

40 00 18 00 F0 00 00 00

- Setting the Profile TOTAL ENERGY mask:

Parameter Set	Value (BIN)	Value (HEX)	Description
PS0	00001000	08	All Apparent and Reactive Energy Total
PS1	00000000	00	No one value
PS2	00011000	18	Error Code Out Of range
PS3	00001111	0F	Phase 1, 2, 3 Imported Active Energy Total 3-Phase Imported Active Energy Total Phase 1, 2, 3 Exported Active Energy Total 3-Phase Exported Active Energy Total
PS4	00000000	00	No one value
PS5	00000000	00	No one value
PS6	00000000	00	No one value
PS7	00000000	00	No one value

Table C5 – Total Energy Mask Profile

And so the Profile Total Energy mask in HEX will be:

08 00 18 0F 00 00 00 00

- Setting the Profile REAL TIME mask:

Parameter Set	Value (BIN)	Value (HEX)	Description
PS0	10010000	90	All Apparent and Reactive Energy Balance Phase 1, 2, 3 Active Power
PS1	11111111	FF	Phase 1, 2, 3 Apparent Power Phase 1, 2, 3 Reactive Power Phase 1, 2, 3, Sys Voltage Line 12, 23, 31 Voltage Phase 1, 2, 3, N, Sys Current Phase 1, 2, 3, Sys Power Factor Frequency Phase Order
PS2	11011111	DF	Actual Tariff CT Value, FSA Value Pri/Sec Value Error Code Out Of range Serial Number, FW Release EC, HW Version EC, Model, Type FW Release and HW Version M-BUS Module
PS3	00000000	00	No one value
PS4	00010000	10	All Active Energy Balance
PS5	00000000	00	No one value
PS6	00000000	00	No one value
PS7	00000000	00	No one value

Table C6 – Real Time Mask Profile

And so the Profile Real Time mask in HEX will be:

90 FF DF 00 10 00 00 00

- Setting the Profile PARTIAL mask:

Parameter Set	Value (BIN)	Value (HEX)	Description
PS0	00100000	20	All Apparent and Reactive Energy Partial
PS1	00000000	00	No one value
PS2	00111000	38	Error Code Out Of range Partial Counters Status
PS3	00000000	00	No one value
PS4	00100000	20	All Active Energy Partial
PS5	00000000	00	No one value
PS6	00000000	00	No one value
PS7	00000000	00	No one value

Table C7 – Partial Mask Profile

And so the Profile Partial mask in HEX will be:

20 00 38 00 20 00 00 00

- Setting the Profile ACTIVE mask:

Parameter Set	Value (BIN)	Value (HEX)	Description
PS0	10000000	80	Phase 1, 2, 3 Active Power
PS1	01000000	40	Frequency
PS2	00011000	18	Error Code Out Of range
PS3	11111111	FF	Phase 1, 2, 3 Imported Active Energy Total 3-Phase Imported Active Energy Total Phase 1, 2, 3 Exported Active Energy Total 3-Phase Exported Active Energy Total Phase 1, 2, 3 Imported Active Energy Tariff 1 3-Phase Imported Active Energy Tariff 1 Phase 1, 2, 3 Exported Active Energy Tariff 1 3-Phase Exported Active Energy Tariff 1
PS4	00011111	1F	Phase 1, 2, 3 Imported Active Energy Tariff 2 3-Phase Imported Active Energy Tariff 2 Phase 1, 2, 3 Exported Active Energy Tariff 2 3-Phase Exported Active Energy Tariff 2 All Active Energy Balance
PS5	00000000	00	No one value
PS6	00000000	00	No one value
PS7	00000000	00	No one value

Table C8 – Active Mask Profile

And so the Profile Active mask in HEX will be:

80 40 18 FF 1F 00 00 00

- Setting the Profile REACTIVE mask:

Parameter Set	Value (BIN)	Value (HEX)	Description
PS0	00000000	00	From Bit 39 to Bit 50 Reactive Values has to be taken From Bit 51 to Bit 64 Reactive Values has to be taken
PS1	01000010	42	Phase 1, 2, 3 Reactive Power Frequency
PS2	00011000	18	Error Code Out Of range
PS3	00000000	00	No one value
PS4	11000000	C0	Phase 1, 2, 3 Imported Inductive Energy Total (Reactive from PS0 bit 0) 3-Phase Imported Inductive Energy Total (Reactive from PS0 bit 0)
PS5	11111111	FF	Phase 1, 2, 3 Exported Inductive Energy Total (Reactive from PS0 bit 0) 3-Phase Exported Inductive Energy Total (Reactive from PS0 bit 0) Phase 1, 2, 3 Imported Inductive Energy Tariff 1 (Reactive from PS0 bit 0) 3-Phase Imported Inductive Energy Tariff 1 (Reactive from PS0 bit 0) Phase 1, 2, 3 Exported Inductive Energy Tariff 1 (Reactive from PS0 bit 0) 3-Phase Exported Inductive Energy Tariff 1 (Reactive from PS0 bit 0) Phase 1, 2, 3 Imported Inductive Energy Tariff 2 (Reactive from PS0 bit 0) 3-Phase Imported Inductive Energy Tariff 2 (Reactive from PS0 bit 0)
PS6	11111111	FF	Phase 1, 2, 3 Exported Inductive Energy Tariff 2 (Reactive from PS0 bit 0) 3-Phase Exported Inductive Energy Tariff 2 (Reactive from PS0 bit 0) Phase 1, 2, 3 Imported Capacitive Energy Total (Reactive from PS0 bit 1) 3-Phase Imported Capacitive Energy Total (Reactive from PS0 bit 1) Phase 1, 2, 3 Exported Capacitive Energy Total (Reactive from PS0 bit 1) 3-Phase Exported Capacitive Energy Total (Reactive from PS0 bit 1) Phase 1, 2, 3 Imported Capacitive Energy Tariff 1 (Reactive from PS0 bit 1) 3-Phase Imported Capacitive Energy Tariff 1 (Reactive from PS0 bit 1)
PS7	01111111	7F	Phase 1, 2, 3 Exported Capacitive Energy Tariff 1 (Reactive from PS0 bit 1) 3-Phase Exported Capacitive Energy Tariff 1 (Reactive from PS0 bit 1) Phase 1, 2, 3 Imported Capacitive Energy Tariff 2 (Reactive from PS0 bit 1) 3-Phase Imported Capacitive Energy Tariff 2 (Reactive from PS0 bit 1) Phase 1, 2, 3 Exported Capacitive Energy Tariff 2 (Reactive from PS0 bit 1) 3-Phase Exported Capacitive Energy Tariff 2 (Reactive from PS0 bit 1) All Energy Balance (Reactive from PS0 bit 1)

Table C9 – Reactive Mask Profile

And so the Profile Reactive mask in HEX will be:

00 42 18 00 C0 FF FF 7F

- Setting the Profile APPARENT mask:

Parameter Set	Value (BIN)	Value (HEX)	Description
PS0	00000011	03	From Bit 39 to Bit 50 Apparent Values has to be taken From Bit 51 to Bit 64 Apparent Values has to be taken
PS1	01000001	41	Phase 1, 2, 3 Apparent Power Frequency
PS2	00011000	18	Error Code Out Of range
PS3	00000000	00	No one value
PS4	11000000	C0	Phase 1, 2, 3 Imported Inductive Energy Total (Apparent from PS0 bit 0) 3-Phase Imported Inductive Energy Total (Apparent from PS0 bit 0)
PS5	11111111	FF	Phase 1, 2, 3 Exported Inductive Energy Total (Apparent from PS0 bit 0) 3-Phase Exported Inductive Energy Total (Apparent from PS0 bit 0) Phase 1, 2, 3 Imported Inductive Energy Tariff 1 (Apparent from PS0 bit 0) 3-Phase Imported Inductive Energy Tariff 1 (Apparent from PS0 bit 0) Phase 1, 2, 3 Exported Inductive Energy Tariff 1 (Apparent from PS0 bit 0) 3-Phase Exported Inductive Energy Tariff 1 (Apparent from PS0 bit 0) Phase 1, 2, 3 Imported Inductive Energy Tariff 2 (Apparent from PS0 bit 0) 3-Phase Imported Inductive Energy Tariff 2 (Apparent from PS0 bit 0)
PS6	11111111	FF	Phase 1, 2, 3 Exported Inductive Energy Tariff 2 (Apparent from PS0 bit 0) 3-Phase Exported Inductive Energy Tariff 2 (Apparent from PS0 bit 0) Phase 1, 2, 3 Imported Capacitive Energy Total (Apparent from PS0 bit 1) 3-Phase Imported Capacitive Energy Total (Apparent from PS0 bit 1) Phase 1, 2, 3 Exported Capacitive Energy Total (Apparent from PS0 bit 1) 3-Phase Exported Capacitive Energy Total (Apparent from PS0 bit 1) Phase 1, 2, 3 Imported Capacitive Energy Tariff 1 (Apparent from PS0 bit 1) 3-Phase Imported Capacitive Energy Tariff 1 (Apparent from PS0 bit 1)
PS7	01111111	7F	Phase 1, 2, 3 Exported Capacitive Energy Tariff 1 (Apparent from PS0 bit 1) 3-Phase Exported Capacitive Energy Tariff 1 (Apparent from PS0 bit 1) Phase 1, 2, 3 Imported Capacitive Energy Tariff 2 (Apparent from PS0 bit 1) 3-Phase Imported Capacitive Energy Tariff 2 (Apparent from PS0 bit 1) Phase 1, 2, 3 Exported Capacitive Energy Tariff 2 (Apparent from PS0 bit 1) 3-Phase Exported Capacitive Energy Tariff 2 (Apparent from PS0 bit 1) All Energy Balance (Apparent from PS0 bit 1)

Table C10 – Apparent Mask Profile

And so the Profile Apparent mask in HEX will be:

03 41 18 00 C0 FF FF 7F

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