# M-BUS
# Communication Protocol

for counters with integrated M-BUS interface

| | |
|---|---|
| **7E.64…0310** | 40A 1phase counter with integrated M-BUS interface |
| **7E.78…0312** | 80A 3phase counters with integrated M-BUS interface |
| **7E.86…0312** | 6A 3phase counters with integrated M-BUS interface. |

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**USER MANUAL**

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# 1. M-BUS DEVICE

## 1.1 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.

## 1.2 M-Bus Integrated

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

## 1.3 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 (2UL).
- The current consumption of energy meters with integrated M-Bus corresponds to 1 standard loads (1UL).
- The data transmission speed is selectable between 300, 600, 1200, 4800 and 9600 baud for all devices, exception for 7E.64 model, which has only 300, 2400, 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 byte.

| Byte | Single character (HEX) | Short Telegram (HEX) | Long Telegram (HEX) |
|---|---|---|---|
| 1 | E5 | 10 | 68 |
| 2 | - | C Field | L Field |
| 3 | - | A Field | L Field (Repetition) |
| 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 |

- 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 characters. 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 to 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.

### 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 |

C Field Bit Division

The Bit Nr 6 is set to 1 if the communication has the direction Master > Slave; vice versa 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.

With an ACD bit (access demand) with a value of 1, the slave shows that it wants to transmit Class 1 data. The master should then send it a command to request Class 1 data. Such Class 1 data is of higher priority, which (in contrast to Class 2 data) should be transmitted as soon as possible. The support of Class 1 data and the bits DFC and ADC is not required by the standard.

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 |

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 Participants in the M-BUS System |
| FF | 255 | Use to Transmit Information to All Participants in the M-BUS System |

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) | Description |
|---|---|
| 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 |
| 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 |

### 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 bytes 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

| Byte Nr. | Size (Byte) | Value (Hex) | Description |
|---|---|---|---|
| 1 – 4 | 4 | xx xx xx xx | M-BUS Interface Identification Number (secondary addr.) |
| 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) |
| 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) |

Record Header (FDH):

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 |

Data Records Structure

## 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).

| Bit | Name | Description |
|---|---|---|
| 7 | Extension Bit | Specifies if a DIFE Byte follows:<br>0 = No<br>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:<br>00 = Instantaneous Value |
| 3 - 0 | Data Field | Length and Coding of Data: 0001: 8 Bit Integer ($01)<br>0010: 16 Bit Integer ($02)<br>0011: 24 Bit Integer ($03)<br>0100: 32 Bit Integer ($04)<br>0110: 48 Bit Integer ($06)<br>0111: 64 Bit Integer ($07)<br>1100: 8 digit BCD ($0C)<br>1101: Variable Length ($0D) |

The coding of DIF for this protocol is:

Data Information Field Structure

$7F is a special DIF used for read out all data command. See page 21.

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

The coding of DIFE for this protocol is:

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.

## 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 (VIFE).

The coding of VIF is:

| Bit | Name | Description |
|---|---|---|
| 7 | Extension Bit | Specifies if a VIFE Byte follows:<br>0 = No<br>1 = Yes |
| 6 – 0 | Value Information | Contains Information on the single Value, such as Unit, Multiplier, etc… |

Value Information Field Structure

The coding of VIFE is:

| Bit | Name | Description |
|---|---|---|
| 7 | Extension Bit | Specifies if another VIFE Byte follows:<br>0 = No<br>1 = Yes |
| 6 – 0 | Value Information | Contains Information on the single Value, such as Unit, Multiplier, etc… |

Value Information Field Extension Structure

## Standard Value Information Field (VIF) Used

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

## 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(VIFE follows) | mV |
| 11011001 | D9 | Current(VIFE follows) | mA |
| 11111111 | FF | A further manufacturer specific VIFE follows | Dimensionless |

Manufacturer Specific Value Information Field Extension (VIFE) Used

| VIFE (BIN) | VIFE (HEX) | Description | Unit |
|---|---|---|---|
| 00000000 | 00 | 3-Phase or System value | 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 |
| 00010011 | 23 | Phase 3 Exported Inductive Energy | 0.1VAh or 0.1varh |
| 00100100 | 24 | 3-Phase Inductive Energy (for balance) | 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 (for balance) | 0.1VAh or 0.1varh |
| 01010000 | 50 | Frequency | mHz |
| 01010001 | 51 | Phase Order | Dimensionless |
| 01010010 | 52 | CT Ratio Value | Dimensionless |
| 01010011 | 53 | PT Ratio 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 | Dimensionless |
| 01110000 | 70 | Reset Partial Counter | Dimensionless |
| 01110001 | 71 | Start Partial Counter | Dimensionless |
| 01110010 | 72 | Stop Partial Counter | Dimensionless |
| 01110011 | 73 | Partial Counter Status | Dimensionless |
| 10000000 | 80 | Imported Active Energy | 0.1Wh |
| 10000001 | 81 | Exported Active Energy | 0.1Wh |
| 10000010 | 82 | Partial | Dimensionless |

| VIFE (BIN) | VIFE (HEX) | Description | Unit |
|---|---|---|---|
| 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 |

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.

# 3. COMMUNICATION PROCESS

The M-BUS communication 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:

| MASTER | | SLAVE |
|---|---|---|
| SND_NKE | > | E5h |
| SND_UD | > | E5h |
| REQ_UD2 | > | RSP_UD |

## 3.1 Send / confirm procedure

There're many differences between the communication with a 3 phase (3PH, e.g. 7E.86) device and 1 phase device (1PH e.g. 7E.64).

First of all, when there are different VIFE for 3PH device, the only one correct to be used for 1PH device's is $00 (3PH or sys value). Also for baud rate value there're differences between the devices: not all devices have the same baud rate. Also a lot of telegram regard tariff or balance, but not all devices have this function. For more info check the quick guide of the device.

For every device: every signed value is made with two's complement.

### 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<br>00 – FA: Valid Primary Address<br>FB, FC: Reserved for Future Use<br>FD: Transmission is by Secondary Address<br>FE: Transmission to All M-BUS Slave in the System (everyone sends E5h)<br>FF: Transmission to All M-BUS Slave in the System (no one sends E5h) |
| 4 | 1 | xx | CS Checksum, summed from C-Field to A Field included |
| 5 | 1 | 16 | Stop character |

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.

#### 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 telegram |
| 2 | 1 | 06 | L-Field |
| 3 | 1 | 06 | L-Field repetition |
| 4 | 1 | 68 | Start character long telegram repetition |
| 5 | 1 | 73/53 | 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<br>Valid Range: 00 – FA (0 - 250)<br>Invalid Range: FB – FF |
| 11 | 1 | xx | CS Checksum, summed from C-Field to  A Field included |
| 12 | 1 | 16 | Stop character |

Answer of the Slave: E5h

#### 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<br>Range : 00000000 - 99999999 |
| 5 – 6 | 2 | xx xx | Manufacturer ID<br>Range: 0101/FFFF |
| 7 | 1 | xx | Version Number<br>Range: 01 - FF |
| 8 | 1 | 02 | Device Type Identification<br>02: Electricity |

Here follows the command:

| 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 | 73/53 | 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 Bytes data |
| 9 | 1 | 79 | VIF: Set Secondary Address |
| 10 | 1 | xx | Value: New Secondary Address digit 7 and 8<br>Range: 00 - 99 |
| 11 | 1 | xx | Value: New Secondary Address digit 5 and 6<br>Range: 00 – 99 |
| 12 | 1 | xx | Value: New Secondary Address digit 3 and 4<br>Range: 00 – 99 |
| 13 | 1 | xx | Value: New Secondary Address digit 1 and 2<br>Range: 00 - 99 |
| 14 | 1 | xx | CS Checksum, summed from C-Field to A Field included |
| 15 | 1 | 16 | Stop character |

Answer of the Slave: E5h

### Set Baud Rate

This action allows to change the Baud Rate of the M-BUS Interface.

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.

| 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 Baud Rate B8: Set Baud Rate to 300 baud<br>B9: Set Baud Rate to 600 baud<br>BA: Set Baud Rate to 1200 baud<br>BB: Set Baud Rate to 2400 baud<br>BC: Set Baud Rate to 4800 baud<br>BD: Set Baud Rate to 9600 baud |
| 8 | 1 | xx | CS Checksum, summed from C-Field to A Field included |
| 9 | 1 | 16 | Stop character |

Here follows the command:

Answer of the Slave: E5h

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

This action is permitted only if the Energy Counter is “NO MID” or “yes reset” type. Here follows the command:

| 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 |
| 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: Energy Counters to be reset<br>00: Reset Total EC<br>01: Reset Tariff 1 EC<br>02: Reset Tariff 2 EC<br>03: Reset ALL EC |
| 12 | 1 | xx | CS Checksum, summed from C-Field to A Field included |
| 13 | 1 | 16 | Stop character |

Answer of the Slave: E5h

### Reset Partial Energy Counters

| 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 |
| 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 specific VIFE |
| 12 | 1 | 70 | Manufacturer specific VIFE: Reset Partial Counter |
| 13 | 1 | xx | Value: Energy Counters to be reset<br>00: Imported Active Energy<br>01: Exported Active Energy<br>02: Imported Inductive Apparent Energy<br>03: Exported Inductive Apparent Energy<br>04: Imported Capacitive Apparent Energy<br>05: Exported Capacitive Apparent Energy<br>06: Imported Inductive Reactive Energy<br>07: Exported Inductive Reactive Energy<br>08: Imported Capacitive Reactive Energy<br>09: Exported Capacitive Reactive Energy<br>0A: ALL partial counters |
| 14 | 1 | xx | CS Checksum, summed from C-Field to A Field included |
| 15 | 1 | 16 | Stop character |

Here follows the command:

Answer of the Slave: E5h

### Start Partial Energy Counters

Here follows the command:

| 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 |
| 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 specific VIFE |
| 12 | 1 | 71 | Manufacturer specific VIFE: Start Counter |
| 13 | 1 | xx | Value: Partial Energy Counters to be reset<br>00: Imported Active Energy<br>01: Exported Active Energy<br>02: Imported Inductive Apparent Energy<br>03: Exported Inductive Apparent Energy<br>04: Imported Capacitive Apparent Energy<br>05: Exported Capacitive Apparent Energy<br>06: Imported Inductive Reactive Energy<br>07: Exported Inductive Reactive Energy<br>08: Imported Capacitive Reactive Energy<br>09: Exported Capacitive Reactive Energy<br>0A: ALL partial counters |
| 14 | 1 | xx | CS Checksum, summed from C-Field to A Field included |
| 15 | 1 | 16 | Stop character |

Answer of the Slave: E5h

### Stop Partial Energy Counters

Here follows the command:

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| 1 | 1 | 68 | Start character telegram query |
| 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 |
| 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 specific VIFE |
| 12 | 1 | 72 | Manufacturer specific VIFE: Stop Counter |
| 13 | 1 | xx | Value: Partial Energy Counters to be reset<br>00: Imported Active Energy<br>01: Exported Active Energy<br>02: Imported Inductive Apparent Energy<br>03: Exported Inductive Apparent Energy<br>04: Imported Capacitive Apparent Energy<br>05: Exported Capacitive Apparent Energy<br>06: Imported Inductive Reactive Energy<br>07: Exported Inductive Reactive Energy<br>08: Imported Capacitive Reactive Energy<br>09: Exported Capacitive Reactive Energy<br>0A: ALL partial counters |
| 14 | 1 | xx | CS Checksum, summed from C-Field to A Field included |
| 15 | 1 | 16 | Stop character |

Answer of the Slave: E5h

With 7E.64 device it can be used also: 68 06 06 68 73 xx 51 00 FF 70 CS 16 for reset total counter, 68 08 08 68 73 xx 51 00 FF 82 FF 70 CS 16 for reset active imported partial counter, 68 08 08 68 73 xx 51 00 F 82 FF 71 CS 16 for start active imported partial counter, and 68 08 08 68 73 xx 51 00 FF 82 FF 72 CS 16 for stop active imported partial counter.

xx= primary address cs= Checksum

### 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 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 = 253,<br>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 |
| 16 | 1 | xx | CS Checksum, summed from C-Field to A Field included |
| 17 | 1 | 16 | Stop character |

Answer of the Slave: E5h

### 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 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 |
| 8 | 1 | 7F | DIF: Global Readout Request |
| 9 | 1 | xx | CS Checksum, summed from C-Field to A Field included |
| 10 | 1 | 16 | Stop character |

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 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 |
| 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 |
| 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 A Field included |
| 20 | 1 | 16 | Stop character |

To set the Parameter Set from 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). See the Annex B for an example of a mask.

Answer of the Slave: E5h

### 3.1.3 REQ_UD2

This procedure is used by the M-BUS Master to receive data from 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<br>00 – FA: Valid Primary Address FB, FC: Reserved for Future Use<br>FE: Transmission to All M-BUS Slave in the System (everyone sends E5h)<br>FF: Transmission to All M-BUS Slave in the System (no one sends E5h)<br>FD: Transmission is by Secondary Address |
| 4 | 1 | xx | CS Checksum, summed from C-Field to A Field included |
| 5 | 1 | 16 | Stop character |

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 Repetition |
| 4 | 1 | 68 | Start character long telegram repetition |
| 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 |
| 12 – 13 | 2 | xx xx | Manufacturer's ID |
| 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 3.1.4.57 table) |
| 18 – 19 | 2 | 0000 | Signature (always 0000, i.e. not used) |
| 20 – YY | 0 – EA | xx…xx | Read-out Data Parameter (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 A Field included |
| YY + 3 | 1 | 16 | Stop character |

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

### Total 3-Phase, Phase 1, Phase 2 and Phase 3 imported Active Energy

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

When is read “active energy imported” with the default profile of 7E.64 the DIF value is equal to $06. For this reason the DIFE in this case doesn’t exist. The other part of telegram (VIF, VIFE, VALUE, etc) are equal to all devices.

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

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

### Total 3-Phase, Phase 1, Phase 2 and Phase 3 imported inductive Apparent Energy

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

### Total 3-Phase, Phase 1, Phase 2 and Phase 3 Exported inductive Apparent Energy

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

### Total 3-Phase, Phase 1, Phase 2 and Phase 3 imported Capacitive Apparent Energy

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 86 | DIF – 48 Bit Integer, 6 Byte; Followed by DIFE |
| NN + 1 | 1 | 80 | DIFE: Total; Followed by DIFE |
| NN + 2 | 1 | 40 | DIFE: Apparent Value |
| NN + 3 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 4 | 1 | 91 | VIFE: Apparent Energy, 0.1VAh; Followed by VIFE |
| NN + 5 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 6 | 1 | 3x | MANUFACTURER specific VIFE:<br>0: 3-Phase Imported Capacitive<br>1: Phase 1 Imported Capacitive<br>2: Phase 2 Imported Capacitive<br>3: Phase 3 Imported Capacitive |
| NN + 7 – NN + 12 | 6 | xx xx xx xx xx xx | Value: according to previous the VIFE |

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

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

### Total 3-Phase, Phase 1, Phase 2 and Phase 3 imported inductive Reactive Energy

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

### Total 3-Phase, Phase 1, Phase 2 and Phase 3 Exported inductive Reactive Energy

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 86 | DIF – 48 Bit Integer, 6 Byte; Followed by DIFE |
| NN + 1 | 1 | 80 | DIFE: Total; Followed by DIFE |
| NN + 2 | 1 | 00 | DIFE: Reactive Value |
| NN + 3 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 4 | 1 | 93 | VIFE: reactive Energy, 0.1varh; Followed by VIFE |
| NN + 5 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 6 | 1 | 2x | MANUFACTURER specific VIFE:<br>0: 3-Phase Exported Inductive<br>1: Phase 1 Exported Inductive<br>2: Phase 2 Exported Inductive<br>3: Phase 3 Exported Inductive |
| NN + 7 – NN + 12 | 6 | xx xx xx xx xx xx | Value: according to previous the VIFE |

### Total 3-Phase, Phase 1, Phase 2 and Phase 3 imported Capacitive Reactive Energy

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

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

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

### Tariff 1 3-Phase, Phase 1, Phase 2 and Phase 3 imported Active Energy

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

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

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

### Tariff 1 3-Phase, Phase 1, Phase 2 and Phase 3 imported inductive Apparent Energy

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 86 | DIF – 48 Bit Integer, 6 Byte; Followed by DIFE |
| NN + 1 | 1 | 90 | DIFE: Tariff 1; Followed by DIFE |
| NN + 2 | 1 | 40 | DIFE: Apparent Value |
| NN + 3 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 4 | 1 | 91 | VIFE: Apparent Energy, 0.1VAh; Followed by VIFE |
| NN + 5 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 6 | 1 | 1x | MANUFACTURER specific VIFE:<br>0: 3-Phase Imported Inductive<br>1: Phase 1 Imported Inductive<br>2: Phase 2 Imported Inductive<br>3: Phase 3 Imported Inductive |
| NN + 7 – NN + 12 | 6 | xx xx xx xx xx xx | Value: according to previous the VIFE |

### Tariff 1 3-Phase, Phase 1, Phase 2 and Phase 3 Exported inductive Apparent Energy

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

### Tariff 1 3-Phase, Phase 1, Phase 2 and Phase 3 imported Capacitive Apparent Energy

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

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

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 86 | DIF – 48 Bit Integer, 6 Byte; Followed by DIFE |
| NN + 1 | 1 | 90 | DIFE: Tariff 1; Followed by DIFE |
| NN + 2 | 1 | 40 | DIFE: Apparent Value |
| NN + 3 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 4 | 1 | 91 | VIFE: Apparent Energy, 0.1VAh; Followed by VIFE |
| NN + 5 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 6 | 1 | 4x | MANUFACTURER specific VIFE:<br>0: 3-Phase Exported Capacitive<br>1: Phase 1 Exported Capacitive<br>2: Phase 2 Exported Capacitive<br>3: Phase 3 Exported Capacitive |
| NN + 7 – NN + 12 | 6 | xx xx xx xx xx xx | Value: according to previous the VIFE |

### Tariff 1 3-Phase, Phase 1, Phase 2 and Phase 3 imported inductive Reactive Energy

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

### Tariff 1 3-Phase, Phase 1, Phase 2 and Phase 3 Exported inductive Reactive Energy

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

### Tariff 1 3-Phase, Phase 1, Phase 2 and Phase 3 imported Capacitive Reactive Energy

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

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

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

### Tariff 2 3-Phase, Phase 1, Phase 2 and Phase 3 imported Active Energy

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 86 | DIF – 48 Bit Integer, 6 Byte; Followed by DIFE |
| NN + 1 | 1 | 20 | DIFE: Tariff 2 |
| NN + 2 | 1 | 82 | VIF: Active Energy, 0.1Wh; Followed by VIFE |
| NN + 3 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 4 | 1 | 80 | VIFE: Imported Energy; Followed by VIFE |
| NN + 5 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 6 | 1 | 0x | MANUFACTURER specific VIFE:<br>0: 3-Phase<br>1: Phase 1<br>2: Phase 2<br>3: Phase 3 |
| NN + 7 – NN + 12 | 6 | xx xx xx xx xx xx | Value: according to previous the VIFE |

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

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

### Tariff 2 3-Phase, Phase 1, Phase 2 and Phase 3 imported inductive Apparent Energy

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

### Tariff 2 3-Phase, Phase 1, Phase 2 and Phase 3 Exported inductive Apparent Energy

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 86 | DIF – 48 Bit Integer, 6 Byte; Followed by DIFE |
| NN + 1 | 1 | A0 | DIFE: Tariff 2; Followed by DIFE |
| NN + 2 | 1 | 40 | DIFE: Apparent Value |
| NN + 3 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 4 | 1 | 91 | VIFE: Apparent Energy, 0.1VAh; Followed by VIFE |
| NN + 5 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 6 | 1 | 2x | MANUFACTURER specific VIFE:<br>0: 3-Phase Exported Inductive<br>1: Phase 1 Exported Inductive<br>2: Phase 2 Exported Inductive<br>3: Phase 3 Exported Inductive |
| NN + 7 – NN + 12 | 6 | xx xx xx xx xx xx | Value: according to previous the VIFE |

### Tariff 2 3-Phase, Phase 1, Phase 2 and Phase 3 imported Capacitive Apparent Energy

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

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

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

### Tariff 2 3-Phase, Phase 1, Phase 2 and Phase 3 imported inductive Reactive Energy

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

### 3-Phase, Phase 1, Phase 2 and Phase 3 Exported inductive Reactive Energy, Tariff 2

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

### Tariff 2 3-Phase, Phase 1, Phase 2 and Phase 3 imported Capacitive Reactive Energy

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 86 | DIF – 48 Bit Integer, 6 Byte; Followed by DIFE |
| NN + 1 | 1 | A0 | DIFE: Tariff 2; Followed by DIFE |
| NN + 2 | 1 | 00 | DIFE: Reactive Value |
| NN + 3 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 4 | 1 | 93 | MANUFACTURER specific VIFE: Reactive Energy, 0.1varh; Followed by VIFE |
| NN + 5 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 6 | 1 | 3x | MANUFACTURER specific VIFE:<br>0: 3-Phase Imported Capacitive<br>1: Phase 1 Imported Capacitive<br>2: Phase 2 Imported Capacitive<br>3: Phase 3 Imported Capacitive |
| NN + 7 – NN + 12 | 6 | xx xx xx xx xx xx | Value: according to previous the VIFE |

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

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

### 3-Phase, Phase 1, Phase 2 and Phase 3 voltage

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

### Line 12, Line 23 and Line 31 voltage

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 03 | DIF – 24 Bit Integer, 3 Byte |
| NN + 1 | 1 | FD | VIF: Followed by a standard VIFE |
| NN + 2 | 1 | C6 | VIFE: Instant Voltage (mV) followed by a VIFE |
| NN + 3 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 4 | 1 | 0x | MANUFACTURER specific VIFE:<br>5: Line 12<br>6: Line 23<br>7: Line 31 |
| NN + 5 – NN + 7 | 3 | xx xx xx | Value: according to previous the VIFE |

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

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 04 | DIF – 32 Bit Integer, 4 Byte |
| NN + 1 | 1 | FD | VIF: Followed by a standard VIFE |
| NN + 2 | 1 | D9 | VIFE: Current (mA) followed by a VIFE |
| NN + 3 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 4 | 1 | 0x | MANUFACTURER specific VIFE: 0: 3-Phase<br>1: Phase 1<br>2: Phase 2<br>3: Phase 3<br>4: Neutral |
| NN + 5 – NN + 8 | 4 | xx xx xx xx | Signed Value: according to previous the VIFE |

### Frequency

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

### Phase Order

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

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

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 02 | DIF – 16 Bit Integer, 2 Byte |
| NN + 1 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 2 | 1 | 84 | MANUFACTURER specific VIFE: Power Factor; Followed by VIFE |
| NN + 3 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 4 | 1 | 0x | MANUFACTURER specific VIFE:<br>0: 3-Phase<br>1: Phase 1<br>2: Phase 2<br>3: Phase 3 |
| NN + 5 – NN + 6 | 2 | xx xx | Signed Value: according to previous the VIFE |

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

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 06 | DIF – 48 Bit Integer, 6 Byte |
| NN + 1 | 1 | A8 | VIF: Active Power, mW; Followed by VIFE |
| NN + 2 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 3 | 1 | 0x | MANUFACTURER specific VIFE:<br>0: 3-Phase<br>1: Phase 1<br>2: Phase 2<br>3: Phase 3 |
| NN + 4 – NN + 9 | 6 | xx xx xx xx xx xx | Signed Value: according to previous the VIFE |

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

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

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

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

### 3-Phase imported and Exported Active Energy Partial

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 06 | DIF – 48 Bit Integer, 6 Byte |
| NN + 1 | 1 | 82 | VIF: Active Energy, 0.1Wh; Followed by VIFE |
| NN + 2 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 3 | 1 | 8x | MANUFACTURER specific VIFE:<br>0: Imported Energy<br>1: Exported Energy Followed by VIFE |
| NN + 4 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 5 | 1 | 82 | MANUFACTURER specific VIFE: Partial; Followed by VIFE |
| NN + 6 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 7 | 1 | 00 | MANUFACTURER specific VIFE: 3-Phase |
| NN + 8 – NN + 12 | 6 | xx xx xx xx xx xx | Value: according to previous the VIFE |

### 3-Phase imported and Exported inductive Apparent Energy  Partial

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

### 3-Phase imported and Exported Capacitive Apparent Energy Partial

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

### 3-Phase imported and Exported inductive Reactive Energy Partial

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

### 3-Phase imported and Exported Capacitive Reactive Energy Partial

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

### 3-Phase Active Energy Balance

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 06 | DIF – 48 Bit Integer, 6 Byte |
| NN + 1 | 1 | 82 | VIF: Active Energy, 0.1Wh; Followed by VIFE |
| NN + 2 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 3 | 1 | 83 | MANUFACTURER specific VIFE: Balance; Followed by VIFE |
| NN + 4 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 5 | 1 | 00 | MANUFACTURER specific VIFE: 3-Phase |
| NN + 6 – NN + 11 | 6 | xx xx xx xx xx xx | Value: according to previous the VIFE |

### 3-Phase inductive and Capacitive Apparent Energy Balance

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

### 3-Phase inductive and Capacitive Reactive Energy Balance

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

### CT value

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

### Actual Tariff

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

### Serial Number

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

### Model

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 01 | DIF – 8 Bit Integer, 1 Byte |
| NN + 1 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 2 | 1 | 56 | MANUFACTURER specific VIFE: Model |
| NN + 3 | 1 | xx | Value: Model Code<br>03 = 3Phase, 4Wire, 6\|\|1A<br>06 = 3Phase, 3Wire, 6\|\|1A<br>08 = 3Phase, 4Wire, 80A<br>10 = 3Phase, 3Wire, 80A<br>12 = 1Phase, 80A<br>16 = 1Phase, 40A |

### Type

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 01 | DIF – 8 Bit Integer, 1 Byte |
| NN + 1 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 2 | 1 | 57 | MANUFACTURER specific VIFE: Type |
| NN + 3 | 1 | xx | Value: Type<br>00: no MID, yes reset<br>01: no MID, no reset<br>02: MID<br>03: no MID, no reset, Wiring SET<br>04: no MID, no reset<br>05: MID, no REACTIVE<br>06: no MID, no reset, no Wiring<br>07: MID, Wiring<br>08: MID, no Wiring |

### Energy Counter Firmware Release 1

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 02 | DIF – 16 Bit Integer, 2 Byte |
| NN + 1 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 2 | 1 | 58 | MANUFACTURER specific VIFE: Firmware EC Release 1 |
| NN + 3 – NN + 4 | 2 | xx xx | Value: EC Firmware Release, e.g. 01.10 |

### Energy Counter Firmware Release 2

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 02 | DIF – 16 Bit Integer, 2 Byte |
| NN + 1 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 2 | 1 | 65 | MANUFACTURER specific VIFE: Firmware EC Release 2 |
| NN + 3 – NN + 4 | 2 | xx xx | Value: EC Firmware Release, e.g. 01.10 |

### Energy Counter Hardware Release

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 02 | DIF – 16 Bit Integer, 2 Byte |
| NN + 1 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 2 | 1 | 59 | MANUFACTURER specific VIFE: Hardware EC Release |
| NN + 3 – NN + 4 | 2 | xx xx | Value: EC Hardware Version Number, e.g. 01.10 |

### Primary or Secondary value

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

### Error Code

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

### Out Of Range

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

### Fabrication Number

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 0C | DIF – 8 digit BCD, 4 Byte |
| NN + 1 | 1 | 78 | VIF: Fabrication No |
| NN + 2 – NN 5 | 4 | xx xx xx xx | Value: Fabrication Number |

### M-BUS Module Firmware Release

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 02 | DIF – 16 Bit Integer, 2 Byte |
| NN + 1 | 1 | FD | VIF: Followed by a standard VIFE |
| NN + 2 | 1 | 0C | VIFE: Version |
| NN + 3 – NN 4 | 2 | xx xx | Value: Module Firmware Release, e.g. 01.10 |

### M-BUS Module Hardware Release

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 02 | DIF – 16 Bit Integer, 2 Byte |
| NN + 1 | 1 | FD | VIF: Followed by a standard VIFE |
| NN + 2 | 1 | 0D | VIFE: Hardware Version |
| NN + 3 – NN 4 | 2 | xx xx | Value: Module Hardware Version Number, e.g. 01.10 |

### Partial Counter Status

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 02 | DIF – 16 Bit Integer, 2 Byte |
| NN + 1 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 2 | 1 | 73 | MANUFACTURER specific VIFE: Partial Counters Status |
| NN + 3 – NN + 4 | 2 | xx xx | Every byte is divided in bit. If the bit is high the partial is in “start”. There’re the bit with the followed partial of every byte:<br>byte: (MSB)-kvarhSYS-L-PAR\|+kvarhSYS-L-PAR\|-kVAhSYS-C-PAR\|+kVAhSYS-C-PAR\|-kVAhSYS-L-PAR\|+kVAhSYS-L-PAR\|-kWhSYS-PAR\|+kWhSYS-PAR\|<br>byte: (MSB)res\|res\|res\|res\|res\|res\|-kvarhSYS-C-PAR\|+kvarhSYS-C-PAR\| |

### FSA value

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 01 | DIF – 8 Bit Integer, 1 Byte |
| NN + 1 | 1 | FD | VIF: Followed by a standard VIFE |
| NN + 2 | 1 | DC | VIFE: Current followed by a VIFE |
| NN + 3 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 4 | 1 | 64 | MANUFACTURER specific VIFE: FSA Value |
| NN + 5 | 1 | xx | Value: FSA Value<br>00: 1 A<br>01: 5 A<br>02: 80 A<br>03: 40 A |

# 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 equal 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 equal to 0F.

## ANNEX B

Here follows the bit division of every Parameter Set byte:

| Bit Nr. | Bit value | Measure Unit | Bit | Parameter Set |
|---|---|---|---|---|
| 01 | From Bit 39 To Bit 50 - Reactive (0b) or Apparent (1b) | - | xxxx xxx1b | PS0 |
| 02 | From Bit 51 To Bit 64 - Reactive (0b) or Apparent (1b) | - | xxxx xx1xb | |
| 03 | All Apparent and Reactive Energy Tariff 1 | 0.1varh & 0.1VAh | xxxx x1xxb | |
| 04 | All Apparent and Reactive Energy Total | 0.1varh & 0.1VAh | xxxx 1xxxb | |
| 05 | All Apparent and Reactive Energy Balance | 0.1varh & 0.1VAh | xxx1 xxxxb | |
| 06 | All Apparent and Reactive Energy Partial | 0.1varh & 0.1VAh | xx1x xxxxb | |
| 07 | All Apparent and Reactive Energy Tariff 2 | 0.1varh & 0.1VAh | x1xx xxxxb | |
| 08 | Phase 1, 2, 3, Sys Active Power | mW | 1xxx xxxxb | |
| 09 | 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, Wiring Mode | - | 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, Fabrication Number | - | x1xx xxxxb | |
| 24 | FW Release, HW Version and Fabrication Number of external 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 | |

| Bit Nr. | Bit value | Measure Unit | Bit | Parameter Set |
|---|---|---|---|---|
| 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 | |
| 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 | |

# ANNEX C

A profile is a specific Parameter Set combination. All profiles are the same for every device.

-Setting the DEFAULT mask Profile for all the device (excluded 7E.64 model; see below description for this model):

| Parameter Set | Value (BIN) | Value (HEX) | Description |
|---|---|---|---|
| PS0 | 00000000 | 00 | From Bit 39 to Bit 50 Reactive Values has to be taken<br>From Bit 51 to Bit 64 Reactive Values has to be taken |
| PS1 | 00000000 | 00 | No One Value |
| PS2 | 00011111 | 1F | Actual Tariff<br>CT Value, FSA Value, Wiring Mode<br>Pri/Sec Value, Error Code<br>Out Of range |
| PS3 | 10100000 | A0 | 3-Phase Imported Active Energy Tariff 1<br>3-Phase Exported Active Energy Tariff 1 |
| PS4 | 00001010 | 0A | 3-Phase Imported Active Energy Tariff 2<br>3-Phase Exported Active Energy Tariff 2 |
| PS5 | 10101000 | A8 | 3-Phase Imported Inductive Energy Tariff 1 (Reactive from PS0 bit 0)<br>3-Phase Exported Inductive Energy Tariff 1 (Reactive from PS0 bit 0)<br>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)<br>3-Phase Imported Capacitive Energy Tariff 1 (Reactive from PS0 bit 1) |
| PS7 | 00101010 | 2A | 3-Phase Exported Capacitive Energy Tariff 1 (Reactive from PS0 bit 1)<br>3-Phase Imported Capacitive Energy Tariff 2 (Reactive from PS0 bit 1)<br>3-Phase Exported Capacitive Energy Tariff 2 (Reactive from PS0 bit 1) |

And so the Profile Default mask in HEX will be: 00 00 1F A0 0A A8 82 2A

Case of 7E.64 model, for Default Profile all PS must be set to 0 values. In this case, this model will provide a specific telegram containing the following parameters: Voltage [mV], Current [mA], Power factor [x0.001], Active power [mW], Frequency [mHz], Imported Active Energy [kWh], Imported Active Energy partial [kWh], Serial Number, Model, Type, Firmware Release Number, Hardware Version Number, Error Code, Partial Counter status, OEM code.

Here follow the decode frame of the answer in default profile (7E.64).

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN | 1 | 03 | DIF – 24 Bit Integer, 3 Byte |
| NN + 1 | 1 | FD | VIF followed by STANDARD specific VIFE |
| NN + 2 | 1 | C6 | STANDARD specific VIFE: Voltage |
| NN + 3 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 4 | 1 | 00 | MANUFACTURER specific VIFE: Monophase |
| NN + 5...NN + 7 | 3 | xx xx xx | Value: Voltage |
| NN + 8 | 1 | 04 | DIF – 32 Bit Integer, 4 Byte |
| NN + 9 | 1 | FD | VIF followed by STANDARD specific VIFE |
| NN + 10 | 1 | D9 | STANDARD specific VIFE: Current |
| NN + 11 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 12 | 1 | 00 | MANUFACTURER specific VIFE: Monophase |
| NN+13-...NN+16 | 4 | xx xx xx xx | Value: Current |

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| NN + 17 | 1 | 02 | DIF – 16 Bit Integer, 2 Byte |
| NN + 18 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 19 | 1 | 84 | STANDARD specific VIFE: Power factor |
| NN + 20 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 21 | 1 | 00 | MANUFACTURER specific VIFE: Monophase |
| NN + 22…NN + 23 | 2 | xx xx | Value: Power factor (PF x 1000 "2's complement": positive if inductive, negative if capacitive) |
| NN + 24 | 1 | 06 | DIF – 48 Bit Integer, 6 Byte |
| NN + 25 | 1 | A8 | VIF: Power |
| NN + 26 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 27 | 1 | 00 | MANUFACTURER specific VIFE: Monophase |
| NN + 28….NN + 33 | 6 | xx xx xx xx xx xx | Value: Power |
| NN + 34 | 1 | 02 | DIF – 16 Bit Integer, 2 Byte |
| NN + 35 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 36 | 1 | 94 | MANUFACTURER specific VIFE: 0.1Hz |
| NN + 37 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 38 | 1 | 50 | MANUFACTURER specific VIFE: Frequency (0.1Hz) |
| NN + 39 NN + 40 | 2 | xx xx | Value: Frequency |
| NN + 41 | 1 | 06 | DIF – 48 Bit Integer, 6 Byte |
| NN + 42 | 1 | 82 | VIF: Active Energy |
| NN + 43 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 44 | 1 | 80 | MANUFACTURER specific VIFE: Imported Energy |
| NN + 45 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 46 | 1 | 00 | MANUFACTURER specific VIFE: System value |
| NN + 47…NN + 52 | 6 | xx xx xx xx xx xx | Value: energy |
| NN + 53 | 1 | 06 | DIF – 8 Bit Integer, 1 Byte |
| N + 54 | 1 | 82 | VIF: Energy |
| NN + 55 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 56 | 1 | 80 | MANUFACTURER specific VIFE: Imported Energy |
| NN + 57 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 58 | 1 | 82 | MANUFACTURER specific VIFE: Partial |
| NN + 59 | 1 | FF | VIFE followed by MANUFACTURER specific VIFE |
| NN + 60 | 1 | 00 | MANUFACTURER specific VIFE: Monophase |
| NN + 61…..NN + 67 | 6 | xx xx xx xx xx xx | Value: Imported partial energy |
| NN + 68 | 1 | OD | DIF – Variable Length |
| NN + 69 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 70 | 1 | 55 | MANUFACTURER specific VIFE: Serial Number |
| NN + 71 | 1 | 0A | Value: Serial Number First Byte is LVAR: i.e. 10 ASCII char follows |
| NN + 72…NN + 82 | 10 | xx xx xx xx xx xx xx xx xx xx | Value: Serial Number (ASCII char), transmitted "Least significant byte first" |
| NN + 83 | 1 | 01 | DIF - 8 Bit Integer, 1 Byte |
| NN + 84 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 85 | 1 | 56 | MANUFACTURER specific VIFE: Model |
| NN + 86 | 1 | xx | Value: Model: $10 (europe) |
| NN + 87 | 1 | 01 | DIF - 8 Bit Integer, 1 Byte |
| NN + 88 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 89 | 1 | 57 | MANUFACTURER specific VIFE: Type |
| NN + 90 | 1 | xx | Value: Type: $00= with RESET, NO MID, $02=MID, $05=MID |

| Byte Nr. | Size (Byte) | Value (HEX) | Description |
|---|---|---|---|
| | | | no varh, $0C=NO MID, no varh, RESET |
| NN + 91 | 1 | 02 | DIF – 16 Bit Integer, 2 Byte |
| NN + 92 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 93 | 1 | 58 | MANUFACTURER specific VIFE: Firmware EC Release |
| NN + 94 - NN + 95 | 2 | xx xx | Value: Firmware EC Release, e.g. xx.xx |
| NN + 96 | 1 | 02 | DIF – 16 Bit Integer, 2 Byte |
| NN + 97 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 98 | 1 | 59 | MANUFACTURER specific VIFE: Hardware EC Release |
| NN + 99 - NN + 100 | 2 | xx xx | Value: Hardware EC Release, e.g. xx.xx |
| NN + 101 | 1 | 01 | DIF – 8 Bit Integer, 1 Byte |
| NN + 102 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 103 | 1 | 62 | MANUFACTURER specific VIFE: Error Code Value |
| NN + 104 | 1 | xx | Value: bit 0 - EEPROM ERROR bit 1 - RAM ERROR-bit 2 - CS(FW) ERROR |
| NN + 105 | 1 | 02 | DIF – 16 Bit Integer, 2 Byte |
| NN + 106 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 107 | 1 | 73 | MANUFACTURER specific VIFE: Partial Counter Status |
| NN + 108 - NN + 109 | 2 | xx xx | Every byte is divided in bit. If the bit is high the partial is in "start". There're the bit with the followed partial of every byte:<br>1byte: (MSB)-kvarhSYS-L-PAR \|+kvarhSYS-L-PAR \| -kVAhSYS-C- PAR \| +kVAhSYS-C-PAR \| -kVAhSYS-L-PAR \| +kVAhSYS-L-PAR \|-kWhSYS-PAR \| +kWhSYS-PAR<br>2 byte: (MSB) res\| res\| res\| res\| res\| res\| -kvarhSYS-C-PAR \| +kvarhSYS- C-PAR |
| NN + 110 | 1 | 0D | DIF – Variable Length |
| NN + 111 | 1 | FF | VIF followed by MANUFACTURER specific VIFE |
| NN + 112 | 1 | 65 | MANUFACTURER specific VIFE: OEM code |
| NN + 113 | 1 | 04 | Value: following 4 bytes |
| NN + 114...NN + 118 | 4 | xx xx xx xx | Value: OEM code |

And so the Parameter set of Profile Default mask in HEX will be: 00 00 00 00 00 00 00 00

-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<br>3-Phase Imported Active Energy Total<br>Phase 1, 2, 3 Exported Active Energy Total<br>3-Phase Exported Active Energy Total<br>Phase 1, 2, 3 Imported Active Energy Tariff 1<br>3-Phase Imported Active Energy Tariff 1<br>Phase 1, 2, 3 Exported Active Energy Tariff 1<br>3-Phase Exported Active Energy Tariff 1 |
| PS4 | 11001111 | CF | Phase 1, 2, 3 Imported Active Energy Tariff 2<br>3-Phase Imported Active Energy Tariff 2<br>Phase 1, 2, 3 Exported Active Energy Tariff 2<br>3-Phase Exported Active Energy Tariff 2<br>Phase 1, 2, 3 Imported Inductive Energy Total (Reactive from PS0 bit 0)<br>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)<br>3-Phase Exported Inductive Energy Total (Reactive from PS0 bit 0)<br>Phase 1, 2, 3 Imported Inductive Energy Tariff 1 (Reactive from PS0 bit 0)<br>3-Phase Imported Inductive Energy Tariff 1 (Reactive from PS0 bit 0)<br>Phase 1, 2, 3 Exported Inductive Energy Tariff 1 (Reactive from PS0 bit 0)<br>3-Phase Exported Inductive Energy Tariff 1 (Reactive from PS0 bit 0)<br>Phase 1, 2, 3 Imported Inductive Energy Tariff 2 (Reactive from PS0 bit 0)<br>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)<br>3-Phase Exported Inductive Energy Tariff 2 (Reactive from PS0 bit 0)<br>Phase 1, 2, 3 Imported Capacitive Energy Total (Reactive from PS0 bit 0)<br>3-Phase Imported Capacitive Energy Total (Reactive from PS0 bit 0)<br>Phase 1, 2, 3 Exported Capacitive Energy Total (Reactive from PS0 bit 0)<br>3-Phase Exported Capacitive Energy Total (Reactive from PS0 bit 0)<br>Phase 1, 2, 3 Imported Capacitive Energy Tariff 1 (Reactive from PS0 bit 0)<br>3-Phase Imported Capacitive Energy Tariff 1 (Reactive from PS0 bit 0) |
| PS7 | 00111111 | 3F | Phase 1, 2, 3 Exported Capacitive Energy Tariff 1 (Reactive from PS0 bit 0)<br>3-Phase Exported Capacitive Energy Tariff 1 (Reactive from PS0 bit 0)<br>Phase 1, 2, 3 Imported Capacitive Energy Tariff 2(Reactive from PS0 bit 0)<br>3-Phase Imported Capacitive Energy Tariff 2 (Reactive from PS0 bit 0)<br>Phase 1, 2, 3 Exported Capacitive Energy Tariff 2 (Reactive from PS0 bit 0)<br>3-Phase Exported Capacitive Energy Tariff 2 (Reactive from PS0 bit 0) |

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<br>3-Phase Imported Active Energy Tariff 1<br>Phase 1, 2, 3 Exported Active Energy Tariff 1<br>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 |

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<br>3-Phase Imported Active Energy Tariff 2<br>Phase 1, 2, 3 Exported Active Energy Tariff 2<br>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 |

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<br>3-Phase Imported Active Energy Total<br>Phase 1, 2, 3 Exported Active Energy Total<br>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 |

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<br>Phase 1, 2, 3 Active Power |
| PS1 | 11111111 | FF | Phase 1, 2, 3, Sys Apparent Power<br>Phase 1, 2, 3 Sys Reactive Power<br>Phase 1, 2, 3, Sys Voltage<br>Line 12, 23, 31 Voltage<br>Phase 1, 2, 3, N, Sys Current<br>Phase 1, 2, 3, Sys Power Factor<br>Frequency<br>Phase Order<br>ActiveEnergyTariff1 |
| PS2 | 11011111 | DF | Actual Tariff<br>CT Value, FSA Value Pri/Sec Value<br>Error Code<br>Out Of range<br>Serial Number, FW Release EC, HW Version EC, Model, Type<br>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 |

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<br>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 |

And so the Profile Partial mask in HEX will be: 20 00 38 00 20 00 00 00

-Setting the Profile ACTIVE ENERGY mask:

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

And so the Profile Active mask in HEX will be: 80 40 18 FF 1F 00 00 00

-Setting the Profile REACTIVE ENERGY mask:

| Parameter Set | Value (BIN) | Value (HEX) | Description |
|---|---|---|---|
| PS0 | 00000000 | 00 | From Bit 39 to Bit 50 Reactive Values has to be taken<br>From Bit 51 to Bit 64 Reactive Values has to be taken |
| PS1 | 01000010 | 42 | Phase 1, 2, 3 Sys Reactive Power<br>Frequency |
| PS2 | 00011000 | 18 | Error Code<br>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)<br>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)<br>Phase 1, 2, 3 Imported Inductive Energy Tariff 1 (Reactive from PS0 bit 0)<br>3-Phase Imported Inductive Energy Tariff 1 (Reactive from PS0 bit 0)<br>Phase 1, 2, 3 Exported Inductive Energy Tariff 1 (Reactive from PS0 bit 0)<br>3-Phase Exported Inductive Energy Tariff 1 (Reactive from PS0 bit 0)<br>Phase 1, 2, 3 Imported Inductive Energy Tariff 2 (Reactive from PS0 bit 0)<br>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)<br>3-Phase Exported Inductive Energy Tariff 2 (Reactive from PS0 bit 0)<br>Phase 1, 2, 3 Imported Capacitive Energy Total (Reactive from PS0 bit 1)<br>3-Phase Imported Capacitive Energy Total (Reactive from PS0 bit 1)<br>Phase 1, 2, 3 Exported Capacitive Energy Total (Reactive from PS0 bit 1)<br>3-Phase Exported Capacitive Energy Total (Reactive from PS0 bit 1)<br>Phase 1, 2, 3 Imported Capacitive Energy Tariff 1 (Reactive from PS0 bit 1)<br>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)<br>3-Phase Exported Capacitive Energy Tariff 1 (Reactive from PS0 bit 1)<br>Phase 1, 2, 3 Imported Capacitive Energy Tariff 2 (Reactive from PS0 bit 1)<br>3-Phase Imported Capacitive Energy Tariff 2 (Reactive from PS0 bit 1)<br>Phase 1, 2, 3 Exported Capacitive Energy Tariff 2 (Reactive from PS0 bit 1)<br>3-Phase Exported Capacitive Energy Tariff 2 (Reactive from PS0 bit 1)<br>All Energy Balance (Reactive from PS0 bit 1) |

And so the Profile Reactive mask in HEX will be: 00 42 18 00 C0 FF FF 7F

-Setting the Profile APPARENT ENERGY mask:

| Parameter Set | Value (BIN) | Value (HEX) | Description |
|---|---|---|---|
| PS0 | 00000011 | 03 | From Bit 39 to Bit 50 Apparent Values has to be taken<br>From Bit 51 to Bit 64 Apparent Values has to be taken |
| PS1 | 01000001 | 41 | Phase 1, 2, 3 Sys Apparent Power<br>Frequency |
| PS2 | 00011000 | 18 | Error Code<br>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)<br>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)<br>3-Phase Exported Inductive Energy Total (Apparent from PS0 bit 0)<br>Phase 1, 2, 3 Imported Inductive Energy Tariff 1 (Apparent from PS0 bit 0)<br>3-Phase Imported Inductive Energy Tariff 1 (Apparent from PS0 bit 0)<br>Phase 1, 2, 3 Exported Inductive Energy Tariff 1 (Apparent from PS0 bit 0)<br>3-Phase Exported Inductive Energy Tariff 1 (Apparent from PS0 bit 0)<br>Phase 1, 2, 3 Imported Inductive Energy Tariff 2 (Apparent from PS0 bit 0)<br>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)<br>3-Phase Exported Inductive Energy Tariff 2 (Apparent from PS0 bit 0)<br>Phase 1, 2, 3 Imported Capacitive Energy Total (Apparent from PS0 bit 1)<br>3-Phase Imported Capacitive Energy Total (Apparent from PS0 bit 1)<br>Phase 1, 2, 3 Exported Capacitive Energy Total (Apparent from PS0 bit 1)<br>3-Phase Exported Capacitive Energy Total (Apparent from PS0 bit 1)<br>Phase 1, 2, 3 Imported Capacitive Energy Tariff 1 (Apparent from PS0 bit 1)<br>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)<br>3-Phase Exported Capacitive Energy Tariff 1 (Apparent from PS0 bit 1)<br>Phase 1, 2, 3 Imported Capacitive Energy Tariff 2 (Apparent from PS0 bit 1)<br>3-Phase Imported Capacitive Energy Tariff 2 (Apparent from PS0 bit 1)<br>Phase 1, 2, 3 Exported Capacitive Energy Tariff 2 (Apparent from PS0 bit 1)<br>3-Phase Exported Capacitive Energy Tariff 2 (Apparent from PS0 bit 1)<br>All Energy Balance (Apparent from PS0 bit 1) |

And so the Profile Apparent mask in HEX will be: 03 41 18 00 C0 FF FF 7F