socomec
Innovative Power Solutions

M-BUS

Communication Protocol

for energy meters with integrated M-BUS interface
COUNTIS P06, COUNTIS P36, COUNTIS P46

PROTOCOL MANUAL

Ed2509

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1. **M-Bus device**

1.1 M-Bus Integrated

Energy meters with integrated M-BUS interface allow to transmit data directly in M-BUS network, to manage the meter without need of external communication module.

1.2 Overview

- M-BUS interface in compliance with EN13757-2 and EN13757-3
- Connection by a cable with a twisted pair
- 2 screw terminals on energy meter with integrated M-BUS
- Meter current consumption corresponds to 1 standard load (1UL)

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 E5 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; viceversa it is set to 0.

In the Master > Slave direction, if the Frame Count Bit valid (FCV - Bit Nr 4) is set to 1, then the frame count bit (FCB – Bit Nr 5) has not to be ignored.

The FCB is used to indicate successful transmission procedure. A Master shall toggle the bit after a successful reception of a reply from the Slave. After this, if the Slave answer is multi-telegram, the Slave has to send the next telegram of the multi-telegram answer.

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
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 Record Header (FDH):

Byte Nr.	Size (Byte)	Value (Hex)	Description
1-4	4	XX XX XX XX	M-BUS Interface Identification Number (secondary addr.)
5-6	2	4D E3	Manufacturer ID
7	1	XX	M-BUS Interface Firmware Release ($00…$FF)
8	1	02	Medium: Electricity
9	1	XX	Access Number ($00…$FF)
10	1	XX	M-BUS Interface Status (20 = Energy Meter Unreachable, 00 = Energy Meter Reachable)
11-12	2	0000	Signature (always 0000, i.e. not used)

Fixed Data Record Header

The Identification Number is programmable by the customer, range: 00000000…99999999.

The Access Number has unsigned binary coding and is incremented (modulo 256) by one after each RSP_UD from the Slave.

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>	E5
SND_UD >	E5
REQ_UD2>	RSP_UD

3.1 Send / confirm procedure

Some parameters/functions are available according to the energy meter model.
If the parameter is not available, $7F or $7FFFFFFF will be replied instead of the value.

Signed values are represented with two's complement.

3.1.1 SND_NKE

This procedure is used 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 (E5) or omits the answer if it didn't receive the telegram correctly.

Here follows the structure of SND_NKE command:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	10	Start character - short telegram
2	1	40	C-Field
3	1	XX	A-Field, Primary Address 00-FA=Valid Primary Address FB, FC=Reserved FD=Transmission is by Secondary Address FE=Transmission to All M-BUS Slave in the System (everyone sends E5) FF=Transmission to All M-BUS Slave in the System (no one sends E5)
4	1	XX	CS Checksum, summed from C-Field to A Field included
5	1	16	Stop character

Answer of the Slave: E5

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 (E5) 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.

Enable SETUP by writing the password

Function available only for 3phase energy meter models.

This action enables the SETUP in the Slave interface. Here follows the command:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	68	Start character long telegram
2	1	05	L-Field
3	1	05	L-Field repetition
4	1	68	Start character long telegram repetition
5	1	53/73	C-Field
6	1	XX	A-Field, Primary Address
7	1	A0	CI-Field
8-9	1	LL HH	Set password to enable SETUP LL=LOW byte data HH=HIGH byte data Range: $0000…$270F (Dec 0000…9999) E.g.: Dec 1234 (as on HMI) ==> $04D2 ==> 04=HH, D2=LL ==> 680505685301A0D204CS16
10	1	XX	CS Checksum, summed from C-Field to A-Field included
11	1	16	Stop character

Answer of the Slave: E5

Change SETUP password

Function available only for 3phase energy meter models.

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

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	68	Start character long telegram
2	1	05	L-Field
3	1	05	L-Field repetition
4	1	68	Start character long telegram repetition
5	1	53/73	C-Field
6	1	XX	A-Field, Primary Address
7	1	A1	CI-Field
8-9	2	LL HH	Set new password LL=LOW byte data HH=HIGH byte data Range: $0000…$270F (Dec 0000…9999) E.g.: Dec 1234 (as on HMI) ==> $04D2 ==> 04=HH, D2=LL

Byte Nr.	Size (Byte)	Value (HEX)	Description
			==> 680505685301A1D204CS16
10	1	XX	CS Checksum, summed from C-Field to A-Field included
11	1	16	Stop character

Answer of the Slave: E5

Set M-Bus Primary Address

This action enables to set a new M-Bus 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	53/73	C-Field
6	1	XX	A-Field, Primary Address
7	1	51	CI-Field
8	1	01	DIF: 8 Bit Integer, 1 Byte
9	1	7A	VIF: Set Primary Address
10	1	XX	Set new Primary Address Range: $00…$FA (Dec 0…250) e.g.: Dec 250 (as on HMI) ==> $FA ==> 680606685351017AFACS16
11	1	XX	CS Checksum, summed from C-Field to A-Field included
12	1	16	Stop character

Answer of the Slave: E5

Set Identification Number (part of M-Bus Secondary Address)

This action enables to set a new Identification Number (part of M-Bus Secondary Address) in the Slave interface. The M-Bus Secondary Address has this structure:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1-4	4	XX XX XX XX	Identification Number
5-6	2	4D E3	Manufacturer ID
7	1	XX	Version Number
8	1	02	Device Type Identification 02: Electricity

Here follows the command:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	68	Start character long telegram
2	1	0D	L-Field
3	1	0D	L-Field repetition
4	1	68	Start character long telegram repetition
5	1	53/73	C-Field
6	1	XX	A-Field, Primary Address
7	1	51	CI-Field
8	1	07	DIF: 8 digits BCD, 4 Bytes data
9	1	79	VIF: Set Secondary Address

Byte Nr.	Size (Byte)	Value (HEX)	Description
10-13	4	LL XX XX HH	Set new Identification Number LL=LOW byte data HH=HIGH byte data Range: 00000000…99999999 E.g.: Dec 12345378 (as on HMI) ==> Dec 78533412 680D0D6853015107797853341287050602CS16
14-15	2	4D E3	Manufacturer ID
		06	Generation
		02	Medium
16	1	XX	CS Checksum, summed from C-Field to A-Field included
17	1	16	Stop character

Answer of the Slave: E5

Set Baud Rate

This action allows to change the Baud Rate in the Slave interface.

The Slave answers with single character acknowledgement (E5) in the old baud rate. As soon as the ACK is transmitted, the Slave switches to the new baud rate. To make sure that the Slave has properly changed its baud rate, the Master, within 2 minutes has to send a command to the Slave in the new baud rate. If the Slave doesn't send the ACK after x retry, the Master has to return to the old baud rate.

Here follows the command:

Byte Nr.	Size (Byte)	Value (HEX)	Description
1	1	68	Start character long telegram
2	1	03	L-Field
3	1	03	L-Field repetition
4	1	68	Start character long telegram repetition
5	1	53/73	C-Field
6	1	XX	A-Field, Primary Address
7	1	XX	CI-Field Set new Baud Rate. Programmable values: $B9=600 bps $BA=1200 bps $BB=2400 bps $BC=4800 bps $BD=9600 bps E.g.: 9600 bps (as on HMI) ==> $BD 680303685301BDCS16
8	1	XX	CS Checksum, summed from C-Field to A-Field included
9	1	16	Stop character

Answer of the Slave: E5

Change Parity & Stop Bit

This action allows to change Parity & Stop Bit in the Slave interface. 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	53/73	C-Field
6	1	XX	A-Field, Primary Address
7	1	A2	CI-Field
8	1	XX	Set new Parity&Stop Bit. Programmable values: $00=None, 1 Stop Bit $01=Even, 1 Stop Bit $02=Odd, 1 Stop Bit $02=None, 2 Stop Bits E.g.: None, 1 Stop Bit (as on HMI) ==> $00 680404685301A200CS16
9	1	XX	CS Checksum, summed from C-Field to A-Field included
10	1	16	Stop character

Answer of the Slave: E5

Select Tariff in Use

This action allows to select the Tariff in use in the Slave interface. 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	53/73	C-Field
6	1	XX	A-Field, Primary Address
7	1	51	CI-Field
8	1	XX	Change Tariff in use. Programmable values: $01=Tariff 1 $02=Tariff 2 $03=Tariff 3 $04=Tariff 4 E.g.: Tariff 1 (as on HMI) ==> $01 6804046853015101CS16
9	1	XX	CS Checksum, summed from C-Field to A-Field included
10	1	16	Stop character

Answer of the Slave: E5

Set Demand Integration Time

This action allows to set the Demand Integration Time in the Slave interface. Here follows the

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	53/73	C-Field
6	1	XX	A-Field, Primary Address
7	1	A9	CI-Field
8	1	XX	Set Demand Integration Time. Programmable values: $05=5 minutes $08=8 minutes $0A=10 minutes $0F=15 minutes $14=20 minutes $1E=30 minutes $3C=60 minutes E.g.: 10 minutes (as on HMI) ==> $0A 680404685301A90ACS16
9	1	XX	CS Checksum, summed from C-Field to A-Field included
10	1	16	Stop character

command:

Answer of the Slave: E5

Set S01 Ouput Parameter

This action allows to set the S01 Output Parameter in the Slave interface. Here follows the

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	53/73	C-Field
6	1	XX	A-Field, Primary Address
7	1	AA	CI-Field
8	1	XX	Set S01 Output Parameter. Programmable parameters: $01=Imported Active Energy (+kWh) $02=Exported Active Energy (-kWh) $03=Imported Reactive Energy (+kvarh) $04=Exported Reactive Energy (-kvarh) E.g.: Imported Active Energy, +kWh (as on HMI) ==> $01 680404685301AA01CS16
9	1	XX	CS Checksum, summed from C-Field to A-Field included
10	1	16	Stop character

command:

Answer of the Slave: E5

Set S01 Ouput Rate

This action allows to set the S01 Output Parameter in the Slave interface. 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	53/73	C-Field
6	1	XX	A-Field, Primary Address
7	1	AB	CI-Field
8	1	XX	Set S01 Output Rate. Programmable values: $01=0.001 En/imp $02=0.01 En/imp $03=0.1 En/imp $04=1 En/imp $05=10 En/imp $06=100 En/imp E.g.: 0.001 En/imp (as on HMI) ==> $01 680404685301AB01CS16 where “En” has different meanings according to the model: 1phase: En=Wh or varh 3phase: En=kWh or kvarh
9	1	XX	CS Checksum, summed from C-Field to A-Field included
10	1	16	Stop character

Answer of the Slave: E5

Set S01 Ouput Duration

This action allows to set the S01 Output Duration in the Slave interface. 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	53/73	C-Field
6	1	XX	A-Field, Primary Address
7	1	AC	CI-Field
8	1	XX	Set S01 Output Duration. Programmable values: $3C=60 s $64=100 s $C8=200 s E.g.: 60 s (as on HMI) ==> $3C 680404685301AC3CCS16
9	1	XX	CS Checksum, summed from C-Field to A-Field included
10	1	16	Stop character

Answer of the Slave: E5

Set Backlight Time

Function available only for 3phase energy meter models. Backlight is always ON for 1phase energy models.

This action allows to set the Backlight Time in the Slave interface. 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	53/73	C-Field
6	1	XX	A-Field, Primary Address
7	1	AD	CI-Field
8	1	XX	Set Backlight Time. Programmable values: $00=Always ON $01=1 minute $05=5 minutes $0A=10 minutes $1E=30 minutes $3C=60 minutes $78=120 minutes E.g.: 10 minutes (as on HMI) ==> $0A 6804046853 01AD0ACS16
9	1	XX	CS Checksum, summed from C-Field to A-Field included
10	1	16	Stop character

Answer of the Slave: E5

Reset MAX DMD values and Partial counter values

This action allows to reset values in the Slave interface. 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	53/73	C-Field
6	1	XX	A-Field, Primary Address
7	1	AE	CI-Field
8	1	XX	$00=Reset all MAX DMD values $01=Reset all partial counters E.g.: Reset all partial counters (as on HMI) ==> $01 6804046853 01AE01CS16
9	1	XX	CS Checksum, summed from C-Field to A-Field included
10	1	16	Stop character

Answer of the Slave: E5

Select the SubTelegram to read-out data

This action allows to select the data to read-out from the Slave. The data to be read-out can be selected by choosing a SubTelegram that include various kind of 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	53/73	C-Field
6	1	XX	A-Field, Primary Address
7	1	50	CI-Field
8	1	XX	Select the SubTelegram to be read-out. Programmable values: $11=SubTelegram 1 $12=SubTelegram 2 $13=SubTelegram 3 $14=SubTelegram 4 $15=SubTelegram 5 $16=SubTelegram 6 $17=SubTelegram 7 E.g.: SubTelegram 1 (as on HMI) ==> $11 6804046853015011CS16
9	1	XX	CS Checksum, summed from C-Field to A-Field included
10	1	16	Stop character

Answer of the Slave: E5

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 00-FA=Valid Primary Address FB, FC=Reserved FE=Transmission to All M-BUS Slave in the System (everyone sends E5) FF=Transmission to All M-BUS Slave in the System (no one sends E5) 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. 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	C-Field
6	1	XX	A-Field, Primary Address
7	1	72	CI-Field
8-11	4	XX XX XX XX	Identification Number
12-13	2	4D E3	Manufacturer ID
14	1	XX	M-BUS Interface Firmware Release
15	1	02	Medium: Electricity
16	1	XX	Access Number
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 Parameter Data (see next 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

The communication process is the following:

MASTER		SLAVE
SND_NKE	>	E5
SND_UD	>	E5
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.

SUBTELEGRAM 1 (default) – 231 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
Header	1	68	Header of RSP_UD telegram
	1	XX	L-Field
	1	XX	L-Field Repetition
	1	68	Header of RSP_UD telegram repetition
	1	08	C-Field
	1	XX	A-Field, Primary Address
	1	72	CI-Field
	4	LL XX XX HH	Identification Number: LL=LOW byte data HH=HIGH byte data Range: 00000000…99999999 E.g.: Dec 78533412 ==> Dec 12345378
	2	4D E3	Manufacturer ID
	1	XX	M-BUS Interface Firmware Release ($00…$FF)
	1	02	Medium: Electricity
	1	XX	Access Number
	1	XX	M-BUS Interface Status
	2	0000	Signature (always 0000, i.e. not used)
System IMP Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
System IMP Reactive Energy	1	04	DIF: Data field = 32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value:

SUBTELEGRAM 1 (default) – 231 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
			LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
System EXP Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
System EXP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
Tariff in use	1	01	DIF: Data field=8 Bit Integer
	5	7C 03 72 61 74	VIF: $7C=ASCII String / $03=lenght / $746172="tar"
	1	XX	$01=Tariff 1 $02=Tariff 2 $03=Tariff 3 $04=Tariff 4
TARIFF 1 COUNTER: System IMP Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
TARIFF 2 COUNTER: System IMP Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
TARIFF 3 COUNTER: System IMP Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data

SUBTELEGRAM 1 (default) – 231 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
			E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
TARIFF 4 COUNTER: System IMP Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
TARIFF 1 COUNTER: System IMP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
TARIFF 2 COUNTER: System IMP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
TARIFF 3 COUNTER: System IMP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
TARIFF 4 COUNTER: System IMP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
System Active Power	1	04	DIF: Data field=32 Bit Integer
	1	2C	VIF: Active Power 10xW

SUBTELEGRAM 1 (default) – 231 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
(+/-)	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $0C000000 ==> $0000000C = 12 10xW
Phase 1 Active Power (+/-)	1	04	DIF: Data field=32 Bit Integer
	3	AC FC 01	VIF: ExtBit=1, Active Power 10xW VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $0C000000 ==> $0000000C = 12 10xW
Phase 2 Active Power (+/-)	1	04	DIF: Data field = 32 Bit Integer
	3	AC FC 02	VIF: ExtBit=1, Active Power 10xW VIFE=At Phase L2
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $0C000000 ==> $0000000C = 12 10xW
Phase 3 Active Power (+/-)	1	04	DIF: Data field=32 Bit Integer
	3	AC FC 03	VIF: ExtBit=1, Active Power 10xW VIFE=At Phase L3
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $0C000000 ==> $0000000C = 12 10xW
CT primary	1	02	DIF: Data field=16 Bit Integer
	2	FD 67	VIF: FD=VIF extension, 67=Special supplier info
	2	LL HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $1027 ==> $2710 = 10000
Phase 1 to Phase 2 Voltage	1	04	DIF: Data field=32 Bit Integer
	4	FD C7 FC 05	VIF: ExtBit=1, Voltage 0.01xV VIFE=Between Phase L1 and L2
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $A2800000 ==> $000080A2 = 329.30 V
Phase 2 to Phase 3 Voltage	1	04	DIF: Data field=32 Bit Integer
	4	FD C7 FC 06	VIF: ExtBit=1, Voltage 0.01xV VIFE=Between Phase L2 and L3
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $A2800000 ==> $000080A2 = 329.30 V

SUBTELEGRAM 1 (default) – 231 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
Phase 3 to Phase 1 Voltage	1	04	DIF: Data field=32 Bit Integer
	4	FD C7 FC 07	VIF: ExtBit=1, Voltage 0.01xV VIFE=Between Phase L3 and L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $A2800000 ==> $000080A2 = 329.30 V
Phase 1 to Neutral Voltage	1	04	DIF: Data field=32 Bit Integer
	4	FD C7 FC 01	VIF: ExtBit=1, Voltage 0.01xV VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $A2800000 ==> $000080A2 = 329.30 V
Phase 2 to Neutral Voltage	1	04	DIF: Data field=32 Bit Integer
	4	FD C7 FC 02	VIF: ExtBit=1, Voltage 0.01xV VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $A2800000 ==> $000080A2 = 329.30 V
Phase 3 to Neutral Voltage	1	04	DIF: Data field=32 Bit Integer
	4	FD C7 FC 03	VIF: ExtBit=1, Voltage 0.01xV VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $A2800000 ==> $000080A2 = 329.30 V
Phase 1 Current	1	04	DIF: Data field = 32 Bit Integer
	4	FD D9 FC 01	VIF: ExtBit=1, Current 0.001xA VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
Phase 2 Current	1	04	DIF: Data field = 32 Bit Integer
	4	FD D9 FC 02	VIF: ExtBit=1, Current 0.001xA VIFE=At Phase L2
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
Phase 3 Current	1	04	DIF: Data field = 32 Bit Integer
	4	FD D9 FC 03	VIF: ExtBit=1, Current 0.001xA VIFE=At Phase L3

SUBTELEGRAM 1 (default) – 231 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
Neutral Current	1	04	DIF: Data field = 32 Bit Integer
	4	FD D9 FC 04	VIF: ExtBit=1, Current 0.001xA VIFE=At Neutral (N)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
Checksum	1	XX	CS Checksum, summed from C-Field to A-Field included
End	1	16	Stop character

SUBTELEGRAM 2 (TARIFF counters) – 153 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
Header	1	68	Header of RSP_UD telegram
	1	XX	L-Field
	1	XX	L-Field Repetition
	1	68	Header of RSP_UD telegram repetition
	1	08	C-Field
	1	XX	A-Field, Primary Address
	1	72	CI-Field
	4	LL XX XX HH	Identification Number: LL=LOW byte data HH=HIGH byte data Range: 00000000…99999999 E.g.: Dec 78533412 ==> Dec 12345378
	2	4D E3	Manufacturer ID
	1	XX	M-BUS Interface Firmware Release ($00…$FF)
	1	02	Medium: Electricity
	1	XX	Access Number
	1	XX	M-BUS Interface Status
	2	0000	Signature (always 0000, i.e. not used)
TARIFF 1 COUNTER: System IMP Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data

SUBTELEGRAM 2 (TARIFF counters) – 153 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
			E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
TARIFF 2 COUNTER: System IMP Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
TARIFF 3 COUNTER: System IMP Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
TARIFF 4 COUNTER: System IMP Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
TARIFF 1 COUNTER: System EXP Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
TARIFF 2 COUNTER: System EXP Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
TARIFF 3 COUNTER: System EXP Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
TARIFF 4 COUNTER:	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)

SUBTELEGRAM 2 (TARIFF counters) – 153 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
System EXP Active Energy	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
TARIFF 1 COUNTER: System IMP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
TARIFF 2 COUNTER: System IMP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
TARIFF 3 COUNTER: System IMP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
TARIFF 4 COUNTER: System IMP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
TARIFF 1 COUNTER: System EXP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data

SUBTELEGRAM 2 (TARIFF counters) – 153 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
			HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
TARIFF 2 COUNTER: System EXP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
TARIFF 3 COUNTER: System EXP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
TARIFF 4 COUNTER: System EXP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
TARIFF 1 COUNTER: System Apparent Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 04	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Apparent Energy in kVAh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kVAh
TARIFF 2 COUNTER: System Apparent Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 04	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Apparent Energy in kVAh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data

SUBTELEGRAM 2 (TARIFF counters) – 153 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
			E.g. $4B460000 ==> $0000464B = 17995 kVAh
TARIFF 3 COUNTER: System Apparent Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 04	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Apparent Energy in kVAh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kVAh
TARIFF 4 COUNTER: System Apparent Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 04	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Apparent Energy in kVAh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kVAh
Checksum	1	XX	CS Checksum, summed from C-Field to A-Field included
End	1	16	Stop character

SUBTELEGRAM 3 (TOTAL/PARTIAL/BALANCE counters) – 202 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
Header	1	68	Header of RSP_UD telegram
	1	XX	L-Field
	1	XX	L-Field Repetition
	1	68	Header of RSP_UD telegram repetition
	1	08	C-Field
	1	XX	A-Field, Primary Address
	1	72	CI-Field
	4	LL XX XX HH	Identification Number: LL=LOW byte data HH=HIGH byte data Range: 00000000…99999999 E.g.: Dec 78533412 ==> Dec 12345378
	2	4D E3	Manufacturer ID
	1	XX	M-BUS Interface Firmware Release ($00…$FF)
	1	02	Medium: Electricity

SUBTELEGRAM 3 (TOTAL/PARTIAL/BALANCE counters) – 202 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
	1	XX	Access Number
	1	XX	M-BUS Interface Status
	2	0000	Signature (always 0000, i.e. not used)
Phase 1 IMP Active Energy	1	04	DIF: Data field=32 Bit Integer
	3	86 FC 01	VIF: ExtBit=1, Active Energy in kWh VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
Phase 2 IMP Active Energy	1	04	DIF: Data field=32 Bit Integer
	3	86 FC 02	VIF: ExtBit=1, Active Energy in kWh VIFE=At Phase L2
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
Phase 3 IMP Active Energy	1	04	DIF: Data field=32 Bit Integer
	3	86 FC 03	VIF: ExtBit=1, Active Energy in kWh VIFE=At Phase L3
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
System IMP Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
Phase 1 EXP Active Energy	1	04	DIF: Data field=32 Bit Integer
	3	86 FC 01	VIF: ExtBit=1, Active Energy in kWh VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
Phase 2 EXP Active Energy	1	04	DIF: Data field=32 Bit Integer
	3	86 FC 02	VIF: ExtBit=1, Active Energy in kWh VIFE=At Phase L2
	4	LL XX XX HH	Value:

SUBTELEGRAM 3 (TOTAL/PARTIAL/BALANCE counters) – 202 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
			LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
Phase 3 EXP Active Energy	1	04	DIF: Data field=32 Bit Integer
	3	86 FC 03	VIF: ExtBit=1, Active Energy in kWh VIFE=At Phase L3
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
System EXP Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
Phase 1 IMP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	4	FB 82 FC 01	VIF: ExtBit=1, Reactive Energy in kvarh VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
Phase 2 IMP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	4	FB 82 FC 02	VIF: ExtBit=1, Reactive Energy in kvarh VIFE=At Phase L2
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
Phase 3 IMP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	4	FB 82 FC 03	VIF: ExtBit=1, Reactive Energy in kvarh VIFE=At Phase L3
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
System IMP Reactive Energy	1	04	DIF: Data field = 32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh

SUBTELEGRAM 3 (TOTAL/PARTIAL/BALANCE counters) – 202 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
Phase 1 EXP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	4	FB 82 FC 01	VIF: ExtBit=1, Reactive Energy in kvarh VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
Phase 2 EXP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	4	FB 82 FC 02	VIF: ExtBit=1, Reactive Energy in kvarh VIFE=At Phase L2
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
Phase 3 EXP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	4	FB 82 FC 03	VIF: ExtBit=1, Reactive Energy in kvarh VIFE=At Phase L3
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
System EXP Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
System Apparent Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 04	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Apparent Energy in kVAh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kVAh

SUBTELEGRAM 3 (TOTAL/PARTIAL/BALANCE counters) – 202 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
PARTIAL COUNTER: IMP System Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
PARTIAL COUNTER: EXP System Active Energy	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
PARTIAL COUNTER: IMP System Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
PARTIAL COUNTER: EXP System Reactive Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
PARTIAL COUNTER: System Apparent Energy	1	04	DIF: Data field=32 Bit Integer
	2	FB 04	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Apparent Energy in kVAh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kVAh
BALANCE COUNTER: System Active Energy (+/-)	1	04	DIF: Data field=32 Bit Integer
	1	06	VIF: Measuring Unit & Multiple (kWh)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data

SUBTELEGRAM 3 (TOTAL/PARTIAL/BALANCE counters) – 202 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
			E.g. $DA2D0000 ==> $00002DDA = 11738 kWh
BALANCE COUNTER: System Reactive Energy (+/-)	1	04	DIF: Data field=32 Bit Integer
	2	FB 02	VIF: ExtBit=1, Measuring Unit & Multiple in VIFE VIFE: Reactive Energy in kvarh
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4B460000 ==> $0000464B = 17995 kvarh
Checksum	1	XX	CS Checksum, summed from C-Field to A-Field included
End	1	16	Stop character

SUBTELEGRAM 4 (REALTIME 1: Voltages, Currents, Frequency, Phase Rotation) – 156 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
Header	1	68	Header of RSP_UD telegram
	1	XX	L-Field
	1	XX	L-Field Repetition
	1	68	Header of RSP_UD telegram repetition
	1	08	C-Field
	1	XX	A-Field, Primary Address
	1	72	CI-Field
	4	LL XX XX HH	Identification Number: LL=LOW byte data HH=HIGH byte data Range: 00000000…99999999 E.g.: Dec 78533412 ==> Dec 12345378
	2	4D E3	Manufacturer ID
	1	XX	M-BUS Interface Firmware Release ($00…$FF)
	1	02	Medium: Electricity
	1	XX	Access Number
	1	XX	M-BUS Interface Status
	2	0000	Signature (always 0000, i.e. not used)
Phase 1 to Neutral Voltage	1	04	DIF: Data field=32 Bit Integer
	4	FD C7 FC 01	VIF: ExtBit=1, Voltage 0.01xV VIFE=At Phase L1

SUBTELEGRAM 4 (REALTIME 1: Voltages, Currents, Frequency, Phase Rotation) – 156 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $A2800000 ==> $000080A2 = 329.30 V
Phase 2 to Neutral Voltage	1	04	DIF: Data field=32 Bit Integer
	4	FD C7 FC 02	VIF: ExtBit=1, Voltage 0.01xV VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $A2800000 ==> $000080A2 = 329.30 V
Phase 3 to Neutral Voltage	1	04	DIF: Data field=32 Bit Integer
	4	FD C7 FC 03	VIF: ExtBit=1, Voltage 0.01xV VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $A2800000 ==> $000080A2 = 329.30 V
Phase 1 to Phase 2 Voltage	1	04	DIF: Data field=32 Bit Integer
	4	FD C7 FC 05	VIF: ExtBit=1, Voltage 0.01xV VIFE=Between Phase L1 and L2
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $A2800000 ==> $000080A2 = 329.30 V
Phase 2 to Phase 3 Voltage	1	04	DIF: Data field=32 Bit Integer
	4	FD C7 FC 06	VIF: ExtBit=1, Voltage 0.01xV VIFE=Between Phase L2 and L3
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $A2800000 ==> $000080A2 = 329.30 V
Phase 3 to Phase 1 Voltage	1	04	DIF: Data field=32 Bit Integer
	4	FD C7 FC 07	VIF: ExtBit=1, Voltage 0.01xV VIFE=Between Phase L3 and L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $A2800000 ==> $000080A2 = 329.30 V
Phase to Phase Voltage Average	1	04	DIF: Data field=32 Bit Integer
	4	FD C7 FC 08	VIF: ExtBit=1, Voltage 0.01xV VIFE=Reserved
	4	LL XX XX HH	Value: LL=LOW byte data

SUBTELEGRAM 4 (REALTIME 1: Voltages, Currents, Frequency, Phase Rotation) – 156 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
			HH=HIGH byte data E.g. $A1800000 ==> $000080A1 = 329.29 V
Phase 1 Current	1	04	DIF: Data field=32 Bit Integer
	4	FD D9 FC 01	VIF: ExtBit=1, Current 0.001xA VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
Phase 2 Current	1	04	DIF: Data field=32 Bit Integer
	4	FD D9 FC 02	VIF: ExtBit=1, Current 0.001xA VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
Phase 3 Current	1	04	DIF: Data field=32 Bit Integer
	4	FD D9 FC 03	VIF: ExtBit=1, Current 0.001xA VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
Neutral Current	1	04	DIF: Data field = 32 Bit Integer
	4	FD D9 FC 04	VIF: ExtBit=1, Current 0.001xA VIFE=At Neutral (N)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
Phase Currents Average (System Current)	1	04	DIF: Data field=32 Bit Integer
	4	FD D9 FC 08	VIF: ExtBit=1, Current 0.001xA VIFE=Reserved
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
Frequency	1	02	DIF: Data field=16 Bit Integer
	4	FF 94 FF 50	VIF: ExtBit=1, Frequency 0.001xHz
	2	LL HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $50C30000 ==> $0000C350 = 50 Hz
Phase Rotation	1	01	DIF: Data field=8 Bit Integer

SUBTELEGRAM 4 (REALTIME 1: Voltages, Currents, Frequency, Phase Rotation) – 156 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
Sequence on Voltages	2	FF 51	VIF, Dimensionless
	1	XX	Data: $00=No Phase Order $7B=123 $84=132
Phase to Neutral Voltage Average	1	04	DIF: Data field=32 Bit Integer
	4	FD C7 FC 09	VIF: ExtBit=1, Voltage 0.01xV VIFE=Reserved
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $A1800000 ==> $000080A1 = 329.29 V
Phase Current Sum	1	04	DIF: Data field=32 Bit Integer
	4	FD D9 FC 05	VIF: ExtBit=1, Current 0.001xA VIFE=Reserved
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
Checksum	1	XX	CS Checksum, summed from C-Field to A-Field included
End	1	16	Stop character

SUBTELEGRAM 5 (REALTIME 2: Powers, PF) – 157 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
Header	1	68	Header of RSP_UD telegram
	1	XX	L-Field
	1	XX	L-Field Repetition
	1	68	Header of RSP_UD telegram repetition
	1	08	C-Field
	1	XX	A-Field, Primary Address
	1	72	CI-Field
	4	LL XX XX HH	Identification Number: LL=LOW byte data HH=HIGH byte data Range: 00000000…99999999 E.g.: Dec 78533412 ==> Dec 12345378
	2	4D E3	Manufacturer ID
	1	XX	M-BUS Interface Firmware Release ($00…$FF)

SUBTELEGRAM 5 (REALTIME 2: Powers, PF) – 157 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
	1	02	Medium: Electricity
	1	XX	Access Number
	1	XX	M-BUS Interface Status
	2	0000	Signature (always 0000, i.e. not used)
Phase 1 Power Factor (+/-)	1	04	DIF: Data field=32 Bit Integer
	5	FD BA F3 FC 01	VIF: ExtBit=1, dimensionless/NoVIF, PF 0.001 VIFE: "At Phase L1"
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $C2020000 ==> $000002C2 = 0.706
Phase 2 Power Factor (+/-)	1	04	DIF: Data field=32 Bit Integer
	5	FD BA F3 FC 02	VIF: ExtBit=1, dimensionless/NoVIF, PF 0.001 VIFE: "At Phase L2"
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $C2020000 ==> $000002C2 = 0.706
Phase 3 Power Factor (+/-)	1	04	DIF: Data field=32 Bit Integer
	5	FD BA F3 FC 03	VIF: ExtBit=1, dimensionless/NoVIF, PF 0.001 VIFE: "At Phase L3"
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $C2020000 ==> $000002C2 = 0.706
System Power Factor (+/-)	1	04	DIF: Data field=32 Bit Integer
	3	FD BA F3	VIF: ExtBit=1, dimensionless/NoVIF, PF 0.001
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $C2020000 ==> $000002C2 = 0.706
Phase 1 Active Power (+/-)	1	04	DIF: Data field=32 Bit Integer
	3	AC FC 01	VIF: ExtBit=1, Active Power 10xW VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $0C000000 ==> $0000000C = 12 10xW
Phase 2 Active Power (+/-)	1	04	DIF: Data field = 32 Bit Integer
	3	AC FC 02	VIF: ExtBit=1, Active Power 10xW VIFE=At Phase L2
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $0C000000 ==> $0000000C = 12 10xW

SUBTELEGRAM 5 (REALTIME 2: Powers, PF) – 157 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
Phase 3 Active Power (+/-)	1	04	DIF: Data field=32 Bit Integer
	3	AC FC 03	VIF: ExtBit=1, Active Power 10xW VIFE=At Phase L3
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $0C000000 ==> $0000000C = 12 10xW
System Active Power (+/-)	1	04	DIF: Data field=32 Bit Integer
	1	2C	VIF: Active Power 10xW
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $0C000000 ==> $0000000C = 12 10xW
Phase 1 Reactive Power (+/-)	1	04	DIF: Data field=32 Bit Integer
	4	FB 95 FC 01	VIF: ExtBit=1, Reactive Power 0.01xkvar VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $1C000000 ==> $0000001C = 0.28 kvar
Phase 2 Reactive Power (+/-)	1	04	DIF: Data field = 32 Bit Integer
	4	FB 95 FC 02	VIF: ExtBit=1, Reactive Power 0.01xkvar VIFE=At Phase L2
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $1C000000 ==> $0000001C = 0.28 kvar
Phase 3 Reactive Power (+/-)	1	04	DIF: Data field=32 Bit Integer
	4	FB 95 FC 03	VIF: ExtBit=1, Reactive Power 0.01xkvar VIFE=At Phase L3
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $1C000000 ==> $0000001C = 0.28 kvar
System Reactive Power (+/-)	1	04	DIF: Data field=32 Bit Integer
	2	FB 15	VIF: Reactive Power 0.01xkvar
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $1C000000 ==> $0000001C = 0.28 kvar
Phase 1 Apparent Power	1	04	DIF: Data field=32 Bit Integer
	4	FB B5 FC 01	VIF: ExtBit=1, Apparent Power 0.01xkVA VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data

SUBTELEGRAM 5 (REALTIME 2: Powers, PF) – 157 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
			HH=HIGH byte data E.g.: $7E000000 ==> $0000007E = 1.26 kVA
Phase 2 Apparent Power	1	04	DIF: Data field = 32 Bit Integer
	4	FB B5 FC 02	VIF: ExtBit=1, Apparent Power 0.01xkVA VIFE=At Phase L2
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $7E000000 ==> $0000007E = 1.26 kVA
Phase 3 Apparent Power	1	04	DIF: Data field=32 Bit Integer
	4	FB B5 FC 03	VIF: ExtBit=1, Apparent Power 0.01xkVA VIFE=At Phase L3
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $7E000000 ==> $0000007E = 1.26 kVA
System Apparent Power	1	04	DIF: Data field=32 Bit Integer
	2	FB 35	VIF: Apparent Power 0.01xkVA
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $7E000000 ==> $0000007E = 1.26 kVA
Checksum	1	XX	CS Checksum, summed from C-Field to A-Field included
End	1	16	Stop character

SUBTELEGRAM 6 (THD, Phase Angle, DMD) – 190 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
Header	1	68	Header of RSP_UD telegram
	1	XX	L-Field
	1	XX	L-Field Repetition
	1	68	Header of RSP_UD telegram repetition
	1	08	C-Field
	1	XX	A-Field, Primary Address
	1	72	CI-Field
	4	LL XX XX HH	Identification Number: LL=LOW byte data HH=HIGH byte data Range: 00000000…99999999

SUBTELEGRAM 6 (THD, Phase Angle, DMD) – 190 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
			E.g.: Dec 78533412 ==> Dec 12345378
	2	4D E3	Manufacturer ID
	1	XX	M-BUS Interface Firmware Release ($00…$FF)
	1	02	Medium: Electricity
	1	XX	Access Number
	1	XX	M-BUS Interface Status
	2	0000	Signature (always 0000, i.e. not used)
3P4W: Phase 1 to Neutral Voltage THD 3P3W: Phase 1 to Phase 2 Voltage THD	1	01	DIF: Data field=8 Bit Integer
	3	7C 01 25	VIF: $7C=ASCII String / $01=lenght / $25= "%"
	1	FF	Value fixed to $FF
3P4W: Phase 2 to Neutral Voltage THD 3P3W: Phase 2 to Phase 3 Voltage THD	1	01	DIF: Data field=8 Bit Integer
	3	7C 01 25	VIF: $7C=ASCII String / $01=lenght / $25= "%"
	1	FF	Value fixed to $FF
3P4W: Phase 3 to Neutral Voltage THD	1	01	DIF: Data field=8 Bit Integer
	3	7C 01 25	VIF: $7C=ASCII String / $01=lenght / $25= "%"
	1	FF	Value fixed to $FF
Phase 1 Current THD	1	01	DIF: Data field = 8 Bit Integer
	3	7C 01 25	VIF: $7C=ASCII String / $01=lenght / $25= "%"
	1	FF	Value fixed to $FF
Phase 2 Current THD	1	01	DIF: Data field = 8 Bit Integer
	3	7C 01 25	VIF: $7C=ASCII String / $01=lenght / $25= "%"
	1	FF	Value fixed to $FF
Phase 3 Current THD	1	01	DIF: Data field = 8 Bit Integer
	3	7C 01 25	VIF: $7C=ASCII String / $01=lenght / $25= "%"
	1	FF	Value fixed to $FF
3P4W: Phase to Neutral Voltage Average THD 3P3W: Phase to Phase Voltage Average THD	1	01	DIF: Data field = 8 Bit Integer
	3	7C 01 25	VIF: $7C=ASCII String / $01=lenght / $25= "%"
	1	FF	Value fixed to $FF
System Current THD	1	01	DIF: Data field = 8 Bit Integer
	3	7C 01 25	VIF: $7C=ASCII String / $01=lenght / $25= "%"
	1	FF	Value fixed to $FF
Phase 1	1	02	DIF: Data field=16 Bit Integer

SUBTELEGRAM 6 (THD, Phase Angle, DMD) – 190 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
Voltage-Current Angle	4	FB AB FC 01	VIF: ExtBit=1, Phase U-I 0.1° VIFE=At Phase L1
	2	LL HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $C201 ==> $01C2 = 45°
Phase 2 Voltage-Current Angle	1	02	DIF: Data field=16 Bit Integer
	4	FB AB FC 02	VIF: ExtBit=1, Phase U-I 0.1° VIFE=At Phase L2
	2	LL HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $C201 ==> $01C2 = 45°
Phase 3 Voltage-Current Angle	1	02	DIF: Data field=16 Bit Integer
	4	FB AB FC 03	VIF: ExtBit=1, Phase U-I 0.1° VIFE=At Phase L3
	2	LL HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $C201 ==> $01C2 = 45°
Phase Voltage-Current Angles Average	1	02	DIF: Data field=16 Bit Integer
	2	FB 2B	VIF: ExtBit=1, Phase U-I 0.1°
	2	LL HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $C201 ==> $01C2 = 45°
Phase 1 Current DMD	1	04	DIF: Data field = 32 Bit Integer
	4	FD D9 FC 01	VIF: ExtBit=1, Current 0.001xA VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
Phase 2 Current DMD	1	04	DIF: Data field = 32 Bit Integer
	4	FD D9 FC 02	VIF: ExtBit=1, Current 0.001xA VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
Phase 3 Current DMD	1	04	DIF: Data field = 32 Bit Integer
	4	FD D9 FC 03	VIF: ExtBit=1, Current 0.001xA VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data

SUBTELEGRAM 6 (THD, Phase Angle, DMD) – 190 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
			HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
Neutral Current DMD	1	04	DIF: Data field = 32 Bit Integer
	4	FD D9 FC 04	VIF: ExtBit=1, Current 0.001xA VIFE=At Neutral (N)
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
System Active Power DMD (+/-)	1	04	DIF: Data field=32 Bit Integer
	1	2C	VIF: Active Power 10xW
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $0C000000 ==> $0000000C = 12 10xW
System Apparent Power DMD	1	04	DIF: Data field=32 Bit Integer
	2	FB 35	VIF: Apparent Power 0.01xkVA
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $7E000000 ==> $0000007E = 1.26 kVA
System Reactive Power DMD (+/-)	1	04	DIF: Data field=32 Bit Integer
	2	FB 15	VIF: Reactive Power 0.01xkvar
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $1C000000 ==> $0000001C = 0.28 kvar
Phase 1 Current DMD MAX	1	04	DIF: Data field = 32 Bit Integer
	4	FD D9 FC 01	VIF: ExtBit=1, Current 0.001xA VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
Phase 2 Current DMD MAX	1	04	DIF: Data field = 32 Bit Integer
	4	FD D9 FC 02	VIF: ExtBit=1, Current 0.001xA VIFE=At Phase L1
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
Phase 3 Current DMD MAX	1	04	DIF: Data field = 32 Bit Integer
	4	FD D9 FC 03	VIF: ExtBit=1, Current 0.001xA VIFE=At Phase L1
	4	LL XX XX HH	Value:

SUBTELEGRAM 6 (THD, Phase Angle, DMD) – 190 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
			LL=LOW byte data HH=HIGH byte data E.g. $82010000 ==> $00000182 = 0.386 A
System Active Power DMD MAX (+/-)	1	04	DIF: Data field=32 Bit Integer
	1	2C	VIF: Active Power 10xW
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $0C000000 ==> $0000000C = 12 10xW
System Apparent Power DMD MAX	1	04	DIF: Data field=32 Bit Integer
	2	FB 35	VIF: Apparent Power 0.01xkVA
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $7E000000 ==> $0000007E = 1.26 kVA
System Reactive Power DMD MAX (+/-)	1	04	DIF: Data field=32 Bit Integer
	2	FB 15	VIF: Reactive Power 0.01xkvar
	4	LL XX XX HH	Value: LL=LOW byte data HH=HIGH byte data E.g.: $1C000000 ==> $0000001C = 0.28 kvar
Checksum	1	XX	CS Checksum, summed from C-Field to A-Field included
End	1	16	Stop character

SUBTELEGRAM 7 (INFO & SETUP) – 118 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
Header	1	68	Header of RSP_UD telegram
	1	XX	L-Field
	1	XX	L-Field Repetition
	1	68	Header of RSP_UD telegram repetition
	1	08	C-Field
	1	XX	A-Field, Primary Address
	1	72	CI-Field
	4	LL XX XX HH	Identification Number: LL=LOW byte data HH=HIGH byte data Range: 00000000…99999999 E.g.: Dec 78533412 ==> Dec 12345378
	2	4D E3	Manufacturer ID

SUBTELEGRAM 7 (INFO & SETUP) – 118 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
	1	XX	M-BUS Interface Firmware Release ($00…$FF)
	1	02	Medium: Electricity
	1	XX	Access Number
	1	XX	M-BUS Interface Status
	2	0000	Signature (always 0000, i.e. not used)
Product Order ID	1	02	DIF: Data field=16 Bit Integer
	2	FD 0C	VIF: ExtBit=1 VIFE=Model/Version
	2	64 00	Value fixed to $0064
Model	1	02	DIF: Data field=16 Bit Integer
	2	FD 0C	VIF: ExtBit=1 VIFE=Model/Version
	2	LL HH	LL=LOW byte data HH=HIGH byte data $96=COUNTIS P06 $97=COUNTIS P36 $98=COUNTIS P46 E.g. $9600 ==> $0096 = COUNTIS P06
Firmware Release	1	02	DIF: Data field=16 Bit Integer
	2	FD 0F	VIF: ExtBit=1 VIFE=Other Software Version Number
	2	80 0D	Major & minor version of Firmware release. LL=LOW byte data HH=HIGH byte data E.g. $800D ==> $0D80 = 3456 major FW=34, minor FW=56 => 12.34.56 FW on display
Firmware Checksum	1	04	DIF: Data field=32 Bit Integer
	2	FD 0F	VIF: ExtBit=1 VIFE=Other Software Version Number
	4	01 EF CD AB	Value: LL=LOW byte data HH=HIGH byte data E.g. $01EFCDAB ==> $ABCDEF01
Serial Number FIRST word	1	02	DIF: Data field=16 Bit Integer
	1	79	VIF: ExtBit=0 / Identification
	2	LL HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $4E0E ==> $0E4E = 3662
Serial Number SECOND word	1	02	DIF: Data field=16 Bit Integer
	1	79	VIF: ExtBit=0 / Identification

SUBTELEGRAM 7 (INFO & SETUP) – 118 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
	2	LL HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $FF1B ==> $1BFF = 7167
Lot Number FIRST word	1	02	DIF: Data field=16 Bit Integer
	1	79	VIF: ExtBit=0 / Identification
	2	07 00	Value fixed to $0700
Lot Number SECOND word	1	04	DIF: Data field=32 Bit Integer
	1	79	VIF: ExtBit=0 / Identification
	4	00 00 20 A1	Value fixed to $000020A1
Wiring Mode	1	02	DIF: Data field=16 Bit Integer
	2	FD 67	VIF: FD=VIF extension, 67=Special supplier info
	2	LL HH	LL=LOW byte data HH=HIGH byte data $00=1phase, 2 wires, 1 current $02=3phases, 3 wires, 2 currents $03=3phases, 3 wires, 3 currents $05=3phases, 4 wires, 3 currents E.g. $0500 ==> $0005 = 3phases, 4 wires, 3 currents
CT secondary	1	02	DIF: Data field=16 Bit Integer
	2	FD 67	VIF: FD=VIF extension, 67=Special supplier info
	2	LL HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $0500 ==> $0005 = 5 A
CT primary	1	02	DIF: Data field=16 Bit Integer
	2	FD 67	VIF: ExtBit=1 VIFE=Special supplier information
	2	LL HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $1027 ==> $2710 = 10000 A
Tariff in use	1	01	DIF: Data field=8 Bit Integer
	5	7C 03 72 61 74	VIF: $7C=ASCII String / $03=lenght / $746172="tar"
	1	XX	$01=Tariff 1 $02=Tariff 2 $03=Tariff 3 $04=Tariff 4
PT primary	1	02	DIF: Data field=16 Bit Integer
	2	FD 67	VIF: FD=VIF extension, 67=Special supplier info
	2	LL HH	Value: LL=LOW byte data HH=HIGH byte data

SUBTELEGRAM 7 (INFO & SETUP) – 118 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
			E.g. $F401 ==> $01F4 = 500 V
PT secondary	1	02	DIF: Data field=16 Bit Integer
	2	FD 67	VIF: FD=VIF extension, 67=Special supplier info
	2	LL HH	Value: LL=LOW byte data HH=HIGH byte data E.g. $F401 ==> $01F4 = 500 V
Current Direction	1	01	DIF: Data field=8 Bit Integer
	2	FD 67	VIF: FD=VIF extension, 67=Special supplier info
	1	XX	Bit field coding: bit7(MSb)...bit3 not used, always 0 bit2=I3 bit1=I2 bit0(LSb)=I1 Bit=0 means Forward current (FWD) Bit=1 means Reverse current (REV) E.g. $05 ==> 0000 0101 ==> I3 and I1 reversed
DMD Integration Time	1	01	DIF: Data field=8 Bit Integer
	2	FD 67	VIF: FD=VIF extension, 67=Special supplier info
	1	XX	$05=5 minutes $08=8 minutes $0A=10 minutes $0F=15 minutes $14=20 minutes $1E=30 minutes $3C=60 minutes
Pulse Output 1 Parameter	1	01	DIF: Data field=8 Bit Integer
	2	FD 67	VIF: FD=VIF extension, 67=Special supplier info
	1	XX	$01=+kWhΣ $02=-kWhΣ $03=+kvarhΣ $04=-kvarhΣ
Pulse Output 1 Rate	1	01	DIF: Data field=8 Bit Integer
	2	FD 67	VIF: FD=VIF extension, 67=Special supplier info
	1	XX	$01=0.001 En/imp $02=0.01 En/imp $03=0.1 En/imp $04=1 En/imp $05=10 En/imp $06=100 En/imp $07=1000 En/imp
Pulse Output 1 Duration	1	01	DIF: Data field=8 Bit Integer
	2	FD 67	VIF: FD=VIF extension, 67=Special supplier info
	1	XX	$3C=60 s $64=100 s

SUBTELEGRAM 7 (INFO & SETUP) – 118 Bytes			
Parameter	**Size (Byte)**	**Value (HEX)**	**Description**
			$C8=200 s
Backlight Time	1	01	DIF: Data field=8 Bit Integer
	2	FD 67	VIF: FD=VIF extension, 67=Special supplier info
	1	XX	$00=always ON $01=1 minute $05=5 minutes $0A=10 minutes $1E=30 minutes $3C=60 minutes $78=120 minutes
Checksum	1	XX	CS Checksum, summed from C-Field to A-Field included
End	1	16	Stop character