

Interface Definition

M-Bus Protocol User Manual

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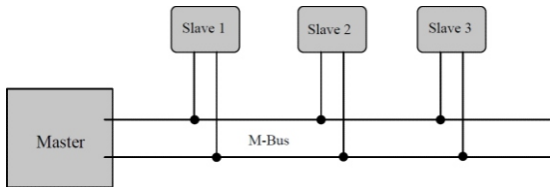
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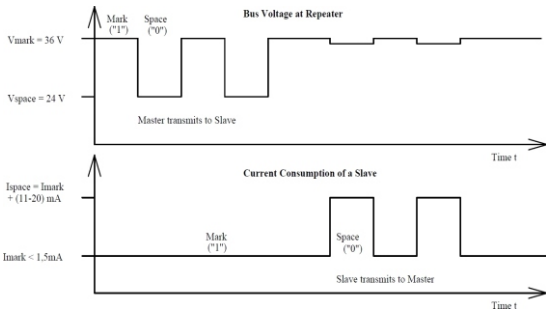
1.Introduction

1.1General Data

The M-Bus is a hierarchical system, with communication controlled by a master (Central Allocation Logic). The M-Bus consists of the master, a number of slaves (end-equipment meters) and a two-wire connecting cable. The slaves are connected in parallel to the transmission medium - the connecting cable.



The transfer of bits from master to slave is accomplished by means of voltage level shifts. A logical "1" (Mark) corresponds to a nominal voltage of +36 V at the output of the bus driver (repeater), which is a part of the master; when a logical "0" (Space) is sent, the repeater reduces the bus voltage by 12 V to a nominal +24 V at its output. Bits sent in the direction from slave to master are coded by modulating the current consumption of the slave. A logical "1" is represented by a constant (versus voltage, temperature and time) current of up to 1.5 mA, and a logical "0" (Space) by an increased current drain requirement by the slave of additional 11-20 mA. The mark state current can be used to power the interface and possibly the meter or sensor itself. The transmission of a space by a slave results in a slight reduction in the bus voltage at the repeater due to output impedance.



1.2 Protocol Description

1.2.1 Protocol Overview

The communication is carried out in two sub-parts; reading data from the meter and writing values in the meter. The measured data is read from the meter using REQ_UD2 request and the meter responds to it by sending a RSP_UD query. The setup parameter values are read and varied(write) using the SND_UD query and the meter responds by 'E5' for read operation and sends a SND_UD query back in response for write operations.

1.2.1.1 M-Bus Queries

The communication process uses two transmission services -

- i. Send/ Acknowledge - SND/ACK
- ii. Request/Response - REQ/RSP

Send/ Confirm Procedures

a) SND_NKE --> single control character

This procedure serves to start up after the interruption or beginning of communication. The slave responds to a correctly received SND_NKE with an acknowledgment consisting of a single character (E5h).

b)SND_UD --> single control character

With this procedure the master transfers user data to the slave. The slave can either confirm the correct receipt of data with a single character acknowledge ("E5"), or by omitting a confirmation signal that it did not receive the telegram correctly.

Request/ Respond Procedures

a)REQ_UD --> RSP_UD

The master requests data from the slave according to Class 2. The slave can either transfer its data with RSP_UD, or give no response indicating that the REQ_UD2 telegram has not been received correctly or that the address contained in the REQ_UD2 telegram does not match.

Minimum Communication

According to the European standard EN1434-3, as a minimum for communication the procedures REQ_UD2 / RSP_UD and SND_NKE / E5h are needed. All other functions are optional.

1.2.2 Telegram Formats

For data integrity and identification of faulty messages the the M-Bus protocol identifies several types of telegrams. The telegram consist of following types: Single Character, Short Frame, Control Frame and Long Frame. These frames are used to carry-out different service requests, and the formats are distinguished by the Start Character.

Single Character

This format consists of a single character, namely the E5h (decimal 229), and serves to acknowledge receipt of transmissions.

Short Frame

This format with a fixed length begins with the start character 10h, and besides the C and A fields includes the check sum (this is made up from the two last mentioned characters), and the stop character 16h.

Single Character

Start

Short Frame

Start
C-Field
A -Field
Check sum
Stop

Control Frame

Start
L-Field
L -Field
Start
C-Field
A -Field
CI-Field
Check sum
Stop

Long Frame

Start
L-Field
L -Field
Start
C-Field
A -Field
CI-Field
User Data
Check sum
Stop

Control Frame

The control sentence conforms to the long sentence without user data, with an L field from the contents of 3. The check sum is calculated at this point from the fields C, A and CI.

Long Frame

With the long frame, after the start character 68h, the length field (L field) is first transmitted twice, followed by the start character once again. After this, there follow the function field (C field), the address field (A field) and the control information field (CI field). The L field gives the quantity of the user data inputs plus 3 (for C, A, CI). After the user data inputs, the check sum is transmitted, and in conclusion the stop character 16h is transmitted.

1.2.2.1 Field Description

1.2.2.1.1 The C-field (Control/Function Field)

Bit Number	7	6	5	4	3	2	1	0
Calling Direction	0	1	FCB	FCV	F3	F2	F1	F0
Reply Direction	0	0	ACD	DFC	F3	F2	F1	F0

Bit 7 is reserved for future functions.

Bit 6 specified the direction of data flow. 1 - calling; 2 - replying. FCB (Frame Count Bit) indicates successful transmission procedures. FCV (Frame Count Valid Bit) sets if the FCB bit is used.

ACD (Access Demand) sets when it wants to transmit high priority data. DFC (Data Flow Control) if set, it can't accept any further data.

Bits 0-3 holds true function or action of the message.

The control codes of the basic M-Bus queries is shown in the following table.

Name	C Field Hex.	Telegram	Description
SND_NKE	40	Short Frame	Slave Initialization
SND_UD	53/73	Long/ControlFrame	Transmit user data to the slave
REQ_UD2	5B/7B	Short Frame	Requesting Class 2 data
REQ_UD1	5A/7A	Short Frame	Requesting Class 1 data
RSP_UD from	08/18/28/38	Long/Control Fram	Data transfer slave to master

1.2.2.1.2 The A-field

Size of this field is 1 byte (0-255). The addresses 1 to 250 can be allocated to the individual slaves.

The addresses 254 (FEh) and 255 (FFh) are used to Broadcast. With address 255 none of the slaves reply. With address 254 all slaves reply with their own addresses. Address 253 is reserved for secondary addresses. Address 251-252 is reserved for future use.

Address	Description
0	Restoring factory settings
1 -250	Meters can be assigned individual primary addresses either through the bus (secondary addressing) or directly using buttons on the meter
251-252	Reserved for future purposes
253	Utilized in the secondary addressing procedure (Fdh)
254	Utilized in point-to-point communication (Feh). The meter responds with its primary address
255	Utilized for broadcast transmissions to all meters (Ffh). No meters respond to a broadcast message.

1.2.2.1.3 The CI-field

The following table shows CI-Field codes used by the master

Mode 1	Mode 2	Application
51h	55h	Sending Data
52h	56h	Slave Selection
50h	-	Resetting the application
B8h	-	Configure baud rate to 300
B9h	-	Configure baud rate to 600
Bah	-	Configure baud rate to 1200
Bbh	-	Configure baud rate to 2400
Bch	-	Configure baud rate to 4800
Bdh	-	Configure baud rate to 9600

** Mode 1 will send LSB byte of the data first; Mode 2 will send MSB byte of the data first. The following table shows the CI-Field codes used by the slave

CI M=0	CI M=1	Application	Defined in
72 h	76 h	Responding with variable data	EN 1434-3
73 h	77 h	Responding with fixed data	EN 1434-3

1.2.2.1.4 Data Structure for long Telegram

1.2.2.1.4.1 Fixed Data Structure

Length is fixed. Transmission is limited to only two counter states of a predetermined length. Data type is binary or BCD. It can only be used in the reply direction.

Identification Number	Access No.	Status	Medium/ Unit	Counter 1	Counter 2
4 Bytes	1 Byte	1 Byte	2 Bytes	4 Bytes	4 Bytes

1.2.2.1.4.1 Variable Data Structure

It allows the transmission of more counter states in various codes and further useful information about the data. The number of bytes of the transmitted counter states is also variable. It can also be used in calling direction.

The CI-Field codes 72h/76h.

Fixed Data Header	Variable Data Block	MDH	Manufacturer Specific Data
12 bytes	variable	1 Byte	1 Byte

1.2.2.1.4.2.1 Fixed Data Header

Identification Number	Manufacturer	Version	Medium	Access No.	Status	Signature
4 Bytes	2 Byte	1 Byte	1 Bytes	1 Bytes	1 Bytes	2 Bytes

1.2.2.1.4.2.2 Variable Data Header

DIF	DIFE	VIF	VIFE	Data
1 Byte	0-10 (1 Byte each)	1 Byte	0-10 (1 Byte each)	0-N Bytes
DIB		VIB		
Data Record Header				

1.2.2.1.4.2.3 Data Information Block (DIB)

It consists of two fields: Data Information Field (DIF) and Data Information Field Extension (DIFE).

The bit-wise segregation of DIF is shown below.

Extension Bit	LSB of Storage No.	Function Field		Data Field			
7	6	5	4	3	2	1	0

The function field codes are given in the following table.

Function Field	Description
00b	Instantaneous Value
01b	Maximum Value
10b	Minimum Value
11b	Value during error state
0000b	No Data
0001b	8 bit Integer
0010b	16 bit Integer
0011b	24 bit Integer
0100b	32 bit Integer
0101b	32 bit Real
0110b	48 bit Integer

Function Field	Description
0111b	64 bit Integer
1000b	Selection for Read Out
1001b	2 digit BCD
1010b	4 digit BCD
1011b	6 digit BCD
1100b	8 digit BCD
1101b	variable length
1110b	12 digit BCD
1111b	Special Function

The bit-wise segregation of DIFE is shown below.

Extension Bit	Device/Unit	Tariff		Storage Number			
7	6	5	4	3	2	1	0

1.2.2.1.4.2.4 Value Information Block (VIB)

It consists of two fields: Value Information Field (VIF) and Value Information Field Extension (VIFE). The bit-wise segregation of VIF is shown below.

Extension Bit	Unit & Multiplier (value)						
7	6	5	4	3	2	1	0

Some VIFE codes are given by the meter-bus protocol, it can also be defined by the manufacturer using extension indicators 0xFB and 0xFD.

1.2.2.1.4.2.5 Manufacturer Data Header (MDH)

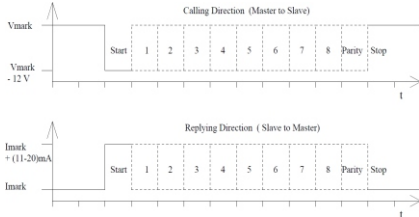
DIF	Function
0Fh	End of User Data
1Fh	More records will follow in the next Telegram

1.2.2.1.4.2.6 Manufacturer Specific Data

DIF	Function
0F	Start of manufacturer specific data structures to end of user data
1F	Same meaning as DIF = 0Fh + More records follow in next telegram
2F	Idle Filler (not to be interpreted), following byte = DIF
3F-6F	Reserved
7F	Global readout request (all storage#, units, tariffs, function fields)

1.2.3 Communication Process

This protocol uses asynchronous serial bit transmission, in which the synchronization is implemented with start and stop bits for each character. There must be no pauses within a telegram, not even after a stop bit. Since quiescence on the line corresponds to a 1 (Mark), the start bit must be a Space, and the stop bit a Mark. In between the eight data bits and the even parity bit are transmitted, ensuring that at least every eleventh bit is a Mark. The bits of data are transmitted in ascending order, i.e. the bit with the lowest value (LSB = least significant bit) is the first one to be found on the line. The transmission takes place in half duplex and with a data rate of at least 300 Baud. In Figure 12, the transmission of a byte in calling and replying direction is represented.



2. Service Requests

2.1 Readout of Measurement Parameter from the Meter

Measured parameters consists of all the energy parameters and other electrical parameters like voltage, current, active power, reactive power, power factor and frequency.

Initialize a slave with known primary address (SND_NKE)

Before initiating communication with a slave, it is required to initialize the slave using its primary address. If the slave sends 'E5' as a response, it tells that the slave with particular primary address is ready to perform further communication.

Start	C Field	A Field	Check sum	Stop
10	40	xx	xx	16

Response - E5

Read using Primary Address (REQ_UD2)

Read using Primary Address (REQ_UD2)	Read using Primary Address (REQ_UD2)	Read using Primary Address (REQ_UD2)	Read using Primary Address (REQ_UD2)	Read using Primary Address (REQ_UD2)
Read using Primary Address (REQ_UD2)	Read using Primary Address (REQ_UD2)	Read using Primary Address (REQ_UD2)	Read using Primary Address (REQ_UD2)	Read using Primary Address (REQ_UD2)

Response - (RSP_UD)

The read response is put together in two telegrams.

Telegrams for EX11XX & EX21XX models

Telegram 1 is shown below :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	EE
3	3	L-Field	EE
4	4	Start	68
5	5	C-Field	08
6	6	A-Field	xx
7	7	Cl-Field	72
8	8 - 11	Identification number	xxxxxxx
9	12 - 13	Manufacturer's ID (RIL)	2C 49
10	14	Version	01
11	15	Medium	02
12	16	Access number	01
13	17	Status	00
14	18 - 19	Signature	00 00
15	20	DIF (32 bit integer)	04
16	21	VIF (unit kWh with resolution 0.001)	83
17	22	VIFE (manufacturer specific)	FF
18	23	VIFE(Import)	2A
19	24 - 27	Active import energy	xxxxxxx
20	28	DIF (32 bit integer)	04
21	29	VIF (unit kWh with resolution 0.001)	83
22	30	VIFE (manufacturer specific)	FF
23	31	VIFE(Export)	2B
24	32 - 35	Active export energy	xxxxxxx
25	36	DIF(32 bit integer)	04
26	37	VIF (unit kWh with resolution 0.001)	83
27	38	VIFE (manufacturer specific)	FF
28	39	VIFE(Total Energy)	00
29	40 - 43	Total Active energy	xxxxxxx
30	44	DIF (32 bit integer)	84
31	45	DIFE (Reactive)	40
32	46	VIF (unit kvarh with resolution 0.001)	83
33	47	VIFE (manufacturer specific)	FF
34	48	VIFE(Import)	2A
35	49 - 52	Reactive import energy	xxxxxxx
36	53	DIF (32 bit integer)	84
37	54	DIFE (Reactive)	40
38	55	VIF (unit kvarh with resolution 0.001)	83
39	56	VIFE (manufacturer specific)	FF

40	57	VIFE(Export)	2B
41	58 - 61	Reactive export energy	xxxxxxxx
42	62	DIF (32 bit integer)	84
43	63	DIFE (Reactive)	40
44	64	VIF (unit kvarh with resolution 0.001)	83
45	65	VIFE (manufacturer specific)	FF
46	66	VIFE(Total)	00
47	67 - 70	Total Reactive energy	xxxxxxxx
48	71	DIF (32 bit integer)	84
49	72	DIFE(T1, Active)	10
50	73	VIF (unit kWh with resolution 0.001)	83
51	74	VIFE (manufacturer specific)	FF
52	75	VIFE(Import)	2A
53	76 - 79	T1 Active import energy	xxxxxxxx
54	80	DIF (End of data record)	1F
55	81	Check Sum	xx
56	82	Stop	16

Telegram 2 is shown below :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	EE
3	3	L-Field	EE
4	4	Start	68
5	5	C-Field	08
6	6	A-Field	xx
7	7	CI-Field	72
8	8 - 11	Identification number	xxxxxxxx
9	12 - 13	Manufacturer's ID (RIL)	2C 49
10	14	Version	01
11	15	Medium	02
12	16	Access number	01
13	17	Status	00
14	18 - 19	Signature	00 00
15	20	DIF (32 bit integer)	84
16	21	DIFE (T1, Active)	10
17	22	VIF (unit kWh with resolution 0.001)	83
18	23	VIFE (manufacturer specific)	FF
19	24	VIFE (Export)	2B
20	25-28	T1 Active Export Energy	xxxxxxxx

21	29	DIF (32 bit integer)	84
22	30	DIFE(T1, Active)	10
23	31	VIF (unit kWh with resolution 0.001)	83
24	32	VIFE (manufacturer specific)	FF
25	33	VIFE(Total)	00
26	34-37	T1 Total Active Energy	xxxxxxxx
27	38	DIF (32 bit integer)	84
28	39	DIFE (T1, Reactive)	50
29	40	VIF (unit kvarh with resolution 0.001)	83
30	41	VIFE (manufacturer specific)	FF
31	42	VIFE(Import)	2A
32	43-46	T1 Reactive import energy	xxxxxxxx
33	47	DIF (32 bit integer)	84
34	48	DIFE (T1, Reactive)	50
35	49	VIF (unit kvarh with resolution 0.001)	83
36	50	VIFE(manufacturer specific)	FF
37	51	VIFE (Export)	2B
38	52-55	T1 Reactive Export energy	xxxxxxxx
39	56	DIF (32 bit integer)	84
40	57	DIFE(T1, Reactive)	50
41	58	VIF (unit kvarh with resolution 0.001)	83
42	59	VIFE (manufacturer specific)	FF
43	60	VIFE (Total)	00
44	61-64	T1 Total Reactive Energy	xxxxxxxx
45	65	DIF (32 bit integer)	84
46	66	DIFE (T2, Active)	20
47	67	VIF (unit kWh with resolution 0.001)	83
48	68	VIFE (manufacturer specific)	FF
49	69	VIFE (Import)	2A
50	70-73	T2 Active Import Energy	xxxxxxxx
51	74	DIF (32 bit integer)	84
52	75	DIFE (T2, Active)	20
53	76	VIF (unit kWh with resolution 0.001)	83
54	77	VIFE (manufacturer specific)	FF
55	78	VIFE (Export)	2B
56	79-82	T2 Active Export Energy	xxxxxxxx
57	83	DIF (End of data record)	1F
58	84	Check Sum	xx
59	85	Stop	16

Telegram 3 is shown below :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	EE
3	3	L-Field	EE
4	4	Start	68
5	5	C-Field	08
6	6	A-Field	xx
7	7	CI-Field	72
8	8 - 11	Identification number	xxxxxxxx
9	12 - 13	Manufacturer's ID (RIL)	2C 49
10	14	Version	01
11	15	Medium	02
12	16	Access number	01
13	17	Status	00
14	18 - 19	Signature	00 00
15	20	DIF (32 bit integer)	84
16	21	DIFE (T2, Active)	20
17	22	VIF (unit kWh with resolution 0.001)	83
18	23	VIFE (manufacturer specific)	FF
19	24	VIFE (Total)	00
20	25-28	T2 Total Active Energy	xxxxxxxx
21	29	DIF (32 bit integer)	84
22	30	DIFE (T2, Reactive)	60
23	31	VIF (unit kvarh with resolution 0.001)	83
24	32	VIFE (manufacturer specific)	FF
25	33	VIFE (Import)	2A
26	34-37	T2 Reactive Import Energy	xxxxxxxx
27	38	DIF (32 bit integer)	84
28	39	DIFE (T2, Reactive)	60
29	40	VIF (unit kvarh with resolution 0.001)	83
30	41	VIFE (manufacturer specific)	FF
31	42	VIFE(Export)	2B
32	43-46	T2 Reactive Export Energy	xxxxxxxx

33	47	DIF (32 bit integer)	84
34	48	DIFE (T2, Reactive)	60
35	49	VIF (unit kvarh with resolution 0.001)	83
36	50	VIFE (manufacturer specific)	FF
37	51	VIFE(Total)	00
38	52-55	T2 Total Reactive Energy	xxxxxxxx
39	56	DIF (32 bit integer)	04
40	57	VIF (unit kWh with resolution 0.001)	83
41	58	VIFE (manufacturer specific)	FF
42	59	VIFE (Import)	2A
43	60	VIFE (manufacturer specific)	FF
44	61	VIFE (Partial)	2C
45	62-65	Partial Active Import Energy	xxxxxxxx
46	66	DIF (32 bit integer)	04
47	67	VIF (unit kWh with resolution 0.001)	83
48	68	VIFE (manufacturer specific)	FF
49	69	VIFE (Export)	2B
50	70	VIFE (manufacturer specific)	FF
51	71	VIFE (Partial)	2C
52	72-75	Partial Active Export Energy	xxxxxxxx
53	76	DIF (32 bit integer)	04
54	77	VIF (unit kWh with resolution 0.001)	83
55	78	VIFE (manufacturer specific)	FF
56	79	VIFE(Total)	00
57	80	VIFE (manufacturer specific)	FF
58	81	VIFE (Partial)	2C
59	82-85	Partial Total Active Energy	xxxxxxxx
60	86	DIF (End of data record)	1F
61	87	Check Sum	xx
62	88	Stop	16

Telegram 4 is shown below :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	EE
3	3	L-Field	EE
4	4	Start	68
5	5	C-Field	08
6	6	A-Field	xx
7	7	CI-Field	72
8	8 - 11	Identification number	xxxxxxx
9	12 - 13	Manufacturer's ID (RIL)	2C 49
10	14	Version	01
11	15	Medium	02
12	16	Access number	01
13	17	Status	00
14	18 - 19	Signature	00 00
15	20	DIF (32 bit integer)	84
16	21	DIFE (Reactive)	40
17	22	VIF (unit kvarh with resolution 0.001)	83
18	23	VIFE (manufacturer specific)	FF
19	24	VIFE (Import)	2A
20	25	VIFE (manufacturer specific)	FF
21	26	VIFE (Partial)	2C
22	27-30	Partial Reactive Import Energy	xxxxxxx
23	31	DIF (32 bit integer)	84
24	32	DIFE (Reactive)	40
25	33	VIF (unit kvarh with resolution 0.001)	83
26	34	VIFE (manufacturer specific)	FF
27	35	VIFE (Export)	2B
28	36	VIFE (manufacturer specific)	FF
29	37	VIFE (Partial)	2C
30	38-41	Partial Reactive Export Energy	xxxxxxx
31	42	DIF (32 bit integer)	84
32	43	DIFE (Reactive)	40
33	44	VIF (unit kvarh with resolution 0.001)	83

34	45	VIFE (manufacturer specific)	FF
35	46	VIFE (Total)	00
36	47	VIFE (manufacturer specific)	FF
37	48	VIFE (Partial)	2C
38	49-52	Partial Total Reactive Energy	xxxxxxxx
39	53	VIFE (Import)	2A
40	54-57	Active Import Demand	xxxxxxxx
41	58	DIF (32 bit integer)	84
42	59	DIFE	80
43	60	DIFE (Demand)	40
44	61	VIF(unit kW with resolution 1W)	AA
45	62	VIFE (manufacturer specific)	FF
46	63	VIFE (Export)	2B
47	64-67	Active Export Demand	xxxxxxxx
48	68	DIF (32 bit integer)	84
49	69	DIFE (Reactive)	C0
50	70	DIFE (Demand)	40
51	71	VIF(unit kW with resolution 1W)	AA
52	72	VIFE (manufacturer specific)	FF
53	73	VIFE(Import)	2A
54	74-77	Reactive Import Demand	xxxxxxxx
55	78	DIF (32 bit integer)	84
56	79	DIFE (Reactive)	C0
57	80	DIFE (Demand)	40
58	81	VIF(unit kW with resolution 1W)	AA
59	82	VIFE (manufacturer specific)	FF
60	83	VIFE (Export)	2B
61	84-87	Reactive Export Demand	xxxxxxxx
62	88	DIF (End of data record)	1F
63	89	Check Sum	xx
64	90	Stop	16

Telegram 5 is shown below :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	EE
3	3	L-Field	EE
4	4	Start	68
5	5	C-Field	08
6	6	A-Field	xx
7	7	Cl-Field	72
8	8 - 11	Identification number	xxxxxxx
9	12 - 13	Manufacturer's ID (RIL)	2C 49
10	14	Version	01
11	15	Medium	02
12	16	Access number	01
13	17	Status	00
14	18 - 19	Signature	00 00
15	20	DIF (32 bit integer)	84
16	21	DIFE	80
17	22	DIFE	40
18	23	VIF (VIF in next byte)	FD
19	24	VIF(unit A with resolution 0.001A)	D9
20	25	VIFE (manufacturer specific)	FF
21	26	VIFE (Import)	2A
22	27-30	Current Import Demand	xxxxxxx
23	31	DIF (32 bit integer)	04
24	32	VIF	FD
25	33	VIFE	47
26	34-37	Voltage	xxxxxxx
27	38	DIF(32 bit integer)	04
28	39	VIF	FD
29	40	VIFE	59
30	41-44	Current	xxxxxxx
31	45	DIF (32 bit integer)	04
32	46	VIF	2A
33	47-50	Active Power	xxxxxxx

34	51	DIF (32 bit integer)	84
35	52	DIFE(Reactive)	40
36	53	VIF	2A
37	54-57	Reactive Power	xxxxxxx
38	58	DIF (32 bit integer)	04
39	59	VIF	FD
40	60	VIFE	BA
41	61	VIFE(manufacturer specific)	FF
42	62	VIFE	0A
43	63-66	Power Factor	xxxxxxx
44	67	DIF (32 bit integer)	04
45	68	VIF	FF
46	69	VIFE	2E
47	70-73	Frequency	xxxxxxx
48	74	DIF (End of data record)	1F
49	75	Check Sum	xx
50	76	Stop	16

Telegram 6 is shown below :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	EE
3	3	L-Field	EE
4	4	Start	68
5	5	C-Field	08
6	6	A-Field	xx
7	7	CI-Field	72
8	8 - 11	Identification number	xxxxxxx
9	12 - 13	Manufacturer's ID (RIL)	2C 49
10	14	Version	01
11	15	Medium	02
12	16	Access number	01
13	17	Status	00
14	18 - 19	Signature	00 00

15	20	DIF (32 bit integer)	04
16	21	VIF (seconds)	A1
17	22	VIFE (manufacturer specific)	FF
18	23	VIF	29
19	24-27	DIT	xxxxxxx
20	28	DIF (32 bit integer)	04
21	29	VIF (seconds)	A0
22	30	VIF (manufacturer specific)	FF
23	31	VIF	36
24	32-35	Autoscroll	xxxxxxx
25	36	DIF (32 bit integer)	04
26	37	VIF (manufacturer specific)	FF
27	38	VIF	37
28	39-42	Tariff Configuration	xxxxxxx
29	43	DIF (32 bit integer)	3A
30	44	VIF (manufacturer specific)	FF
31	45	VIF	32
32	46-49	Pulse Width	xxxxxxx
33	50	DIF (32 bit integer)	04
34	51	VIF (manufacturer specific)	FF
35	52	VIFE	31
36	53-56	Pulse Divisor	xxxxxxx
37	57	DIF (32 bit integer)	04
38	58	VIF (manufacturer specific)	FF
39	59	VIFE	B3
40	60	VIF (manufacturer specific)	FF
41	61	VIFE	01
42	62-65	Pulse para 1	xxxxxxx
43	66	DIF (32 bit integer)	04
44	67	VIF (manufacturer specific)	FF
45	68	VIFE	B3
46	69	VIF (manufacturer specific)	FF
47	70	VIFE	02
48	71-74	Pulse para 2	xxxxxxx
49	75	DIF (End of data record)	0F
50	76	Check sum	xx
51	77	Stop	16

Telegrams For EC43XX & ER43XX MBUS model

Telegram 1 :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	EC
3	3	L-Field	EC
4	4	Start	68
5	5	C-Field	08
6	6	A-Field	01
7	7	CI-Field	72
8	08-11	Identification number	xxxxxxx
9	12-13	Manufacturer's ID (RIL)	2C 49
10	14	Version	02
11	15	Medium	02
12	16	Access number	00
13	17	Status	00
14	18 - 19	Signature	00 00
15	20	DIF (32 bit integer)	07
16	21	VIF (unit kWh with resolution 0.001)	83
17	22	VIFE (manufacturer specific)	FF
18	23	VIFE(Total)	00
19	24-31	Total Active energy	xxxxxxxxxxxxxxxx
20	32	DIF (32 bit integer)	87
21	33	DIFE (Reactive)	40
22	34	VIF (unit kvarh with resolution 0.001)	83
23	35	VIFE (manufacturer specific)	FF
24	36	VIFE(Total)	00
25	37-44	Total Reactive energy	xxxxxxxxxxxxxxxx
26	45	DIF (32 bit integer)	07
27	46	VIF (unit kWh with resolution 0.001)	83
28	47	VIFE (manufacturer specific)	FF
29	48	VIFE(Import)	2A
30	49-56	Active import energy	xxxxxxxxxxxxxxxx
31	57	DIF(32 bit integer)	07
32	58	VIF (unit kWh with resolution 0.001)	83
33	59	VIFE (manufacturer specific)	FF

33	59	VIFE (manufacturer specific)	FF
34	60	VIFE(Export)	2B
35	61-68	Active export energy	xxxxxxxxxxxxxxxxxxx
36	69	DIF (32 bit integer)	87
37	70	DIFE (Reactive)	40
38	71	VIF (unit kvarh with resolution 0.001)	83
39	72	VIFE (manufacturer specific)	FF
40	73	VIFE(Import)	2A
41	74-82	Reactive import energy	xxxxxxxxxxxxxxxxxxx
42	83	DIF (32 bit integer)	87
43	84	DIFE (Reactive)	40
44	85	VIF (unit kvarh with resolution 0.001)	83
45	86	VIFE (manufacturer specific)	FF
46	87	VIFE(Export)	2B
47	88-95	Reactive export energy	xxxxxxxxxxxxxxxxxxx
48	96	DIF (32 bit integer)	07
49	97	VIF (unit kWh with resolution 0.001)	83
50	98	VIFE (manufacturer specific)	FF
51	99	VIFE(Import)	AA
52	100	VIFE (manufacturer specific)	FF
53	101	VIFE (Partial)	2C
54	102-109	Partial Active Import Energy	xxxxxxxxxxxxxxxxxxx
55	110	DIF (32 bit integer)	07
56	111	VIF (unit kWh with resolution 0.001)	83
57	112	VIFE (manufacturer specific)	FF
58	113	VIFE(Import)	AB
59	114	VIFE (manufacturer specific)	FF
60	115	VIFE (Partial)	2C
61	116-123	Partial Active Export Energy	xxxxxxxxxxxxxxxxxxx
62	124	DIF (32 bit integer)	87
63	125	DIFE (Reactive)	40
64	126	VIF (unit kvarh with resolution 0.001)	83
65	127	VIFE (manufacturer specific)	FF
66	128	VIFE (Import)	AA
67	129	VIFE (manufacturer specific)	FF
68	130	VIFE (Partial)	2C
69	131-138	Partial Reactive Import Energy	xxxxxxxxxxxxxxxxxxx

70	139	DIF (32 bit integer)	87
71	140	DIFE (Reactive)	40
72	141	VIF (unit kvarh with resolution 0.001)	83
73	142	VIFE (manufacturer specific)	FF
74	143	VIFE (Export)	AB
75	144	VIFE (manufacturer specific)	FF
76	145	VIFE (Partial)	2C
77	146-153	Partial Reactive Export Energy	xxxxxxxxxxxxxxxx
78	154	DIF (32 bit integer)	07
79	155	VIF (unit kWh with resolution 0.001)	83
80	156	VIFE (manufacturer specific)	FF
81	157	VIFE(Total)	80
82	158	VIFE (manufacturer specific)	FF
83	159	VIFE (Partial)	2C
84	160-167	Partial Active Total Energy	xxxxxxxxxxxxxxxx
85	168	DIF (32 bit integer)	87
86	169	DIFE (Reactive)	40
87	170	VIF (unit kvarh with resolution 0.001)	83
88	171	VIFE (manufacturer specific)	FF
89	172	VIFE(Total)	80
90	173	VIFE (manufacturer specific)	FF
91	174	VIFE (Partial)	2C
92	175-182	Partial Reactive Total Energy	xxxxxxxxxxxxxxxx
93	183	DIF (32 bit integer)	87
94	184	DIFE(T1, Active)	10
95	185	VIF (unit kWh with resolution 0.001)	83
96	186	VIFE (manufacturer specific)	FF
97	187	VIFE(Import)	2A
98	188-195	T1 Active import energy	xxxxxxxxxxxxxxxx
99	196	DIF (32 bit integer)	87
100	197	DIFE(T1, Active)	10
101	198	VIF (unit kWh with resolution 0.001)	83
102	199	VIFE (manufacturer specific)	FF
103	200	VIFE(Export)	2B
104	201	T1 Active Export Energy	xxxxxxxxxxxxxxxx
105	202-209	DIF (32 bit integer)	84
106	210	DIFE(T1, Active)	10
107	211	VIF (unit kWh with resolution 0.001)	83
108	212	VIFE (manufacturer specific)	FF
109	213	VIFE(Total)	00
110	214-221	T1 Total Active Energy	xxxxxxxxxxxxxxxx

111	222	DIF (32 bit integer)	87
112	223	DIFE(T1, Reactive)	50
113	224	VIF (unit kvarh with resolution 0.001)	83
114	225	VIFE (manufacturer specific)	FF
115	226	VIFE(Total)	00
116	227-234	T1 Total Reactive Energy	xxxxxxxxxxxxxxxx
165	235	DIF (More data in next Telegram)	1F
166	236	Check sum	1
168	237	Stop	16

Telegram 2 :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	D6
3	3	L-Field	D6
4	4	Start	68
5	5	C-Field	08
6	6	A-Field	01
7	7	CI-Field	72
8	08-11	Identification number	xxxxxxx
9	12-13	Manufacturer's ID (RIL)	2C 49
10	14	Version	02
11	15	Medium	02
12	16	Access number	00
13	17	Status	00
14	18 - 19	Signature	00 00
15	20	DIF (32 bit integer)	87
16	21	DIFE(T1, Reactive)	50
17	22	VIF (unit kvarh with resolution 0.001)	83
18	23	VIFE (manufacturer specific)	FF
19	24	VIFE(Import)	2A
20	25-33	T1 Reactive import energy	xxxxxxxxxxxxxxxx
21	34	DIF (32 bit integer)	87
22	35	DIFE(T1, Reactive)	50
23	36	VIF (unit kvarh with resolution 0.001)	83
24	37	VIFE (manufacturer specific)	FF
25	38	VIFE(Export)	2B
26	39-46	T1 Reactive Export Energy	xxxxxxxxxxxxxxxx

27	47	DIF (32 bit integer)	87
28	48	DIFE(T2, Active)	20
29	49	VIF (unit kWh with resolution 0.001)	83
30	50	VIFE (manufacturer specific)	FF
310	51	VIFE(Total)	00
32	52-59	T2 Total Active Energy	xxxxxxxxxxxxxxxxxx
33	60	DIF (32 bit integer)	87
34	61	DIFE(T2, Active)	20
35	62	VIF (unit kWh with resolution 0.001)	83
36	63	VIFE (manufacturer specific)	FF
37	64	VIFE(Import)	2A
38	65-72	T2 Active Import Energy	xxxxxxxxxxxxxxxxxx
39	73	DIF (32 bit integer)	87
40	74	DIFE(T2, Active)	20
41	75	VIF (unit kWh with resolution 0.001)	83
42	76	VIFE (manufacturer specific)	FF
43	77	VIFE(Export)	2B
44	78-85	T2 Active Export Energy	xxxxxxxxxxxxxxxxxx
45	86	DIF (32 bit integer)	87
46	87	DIFE (T2, Reactive)	60
47	88	VIF (unit kvarh with resolution 0.001)	83
48	89	VIFE (manufacturer specific)	FF
49	90	VIFE(Total)	00
50	91-98	T2 Total Reactive Energy	xxxxxxxxxxxxxxxxxx
51	99	DIF (32 bit integer)	87
52	100	DIFE (T2, Reactive)	60
53	101	VIF (unit kvarh with resolution 0.001)	83
54	102	VIFE (manufacturer specific)	FF
55	103	VIFE (Import)	2A
56	104-111	T2 Reactive Import Energy	xxxxxxxxxxxxxxxxxx
57	112	DIF (32 bit integer)	87
58	113	DIFE (T2, Reactive)	60
59	114	VIF (unit kvarh with resolution 0.001)	83
60	115	VIFE (manufacturer specific)	FF
61	116	VIFE(Export)	2B
62	117-124	T2 Reactive Export Energy	xxxxxxxxxxxxxxxxxx
63	125	DIF (32 bit integer)	84

64	126	DIFE	80
65	127	DIFE	80
67	128	DIFE	40
68	129	VIF (unit kvarh with resolution 0.001)	A8
69	130	VIFE (manufacturer specific)	FF
70	131	VIFE(Import)	2A
71	132-135	Active Import Demand Power	xxxxxxxx
72	136	DIF (32 bit integer)	94
73	137	DIFE	80
74	138	DIFE	80
75	139	DIFE	40
76	140	VIF (unit kvarh with resolution 0.001)	A8
77	141	VIFE (manufacturer specific)	FF
78	142	VIFE(Import)	2A
79	143-146	Max Active Import Demand Power	xxxxxxxx
80	147	DIF (32 bit integer)	84
81	148	DIFE	80
82	149	DIFE	80
83	150	DIFE	40
84	151	VIF (unit kvarh with resolution 0.001)	A8
85	152	VIFE (manufacturer specific)	FF
86	153	VIFE(Export)	2B
87	154-157	Active Export Demand Power	xxxxxxxx
88	158	DIF (32 bit integer)	94
89	159	DIFE	80
90	160	DIFE	80
91	161	DIFE	40
92	162	VIF (unit kvarh with resolution 0.001)	A8
93	163	VIFE (manufacturer specific)	FF
94	164	VIFE(Export)	2B
95	165-168	Max Active Export Demand Power	xxxxxxxx
96	169	DIF (32 bit integer)	84
97	170	DIFE (Reactive)	C0
98	171	DIFE ()	80
99	172	DIFE (Demand)	40
100	173	VIF (unit kvarh with resolution 0.001)	A8
101	174	VIFE (manufacturer specific)	FF

101	174	VIFE (manufacturer specific)	FF
102	175	VIFE(Import)	2A
103	176-179	Reactive Import Demand Power	xxxxxxx
104	180	DIF (32 bit integer)	94
105	181	DIFE (Reactive)	C0
106	182	DIFE ()	80
107	183	DIFE (Demand)	40
108	184	VIF (unit kvarh with resolution 0.001)	A8
109	185	VIFE (manufacturer specific)	FF
110	186	VIFE(Import)	2A
111	187-190	Max Reactive Import Demand Power	xxxxxxx
112	191	DIF (32 bit integer)	84
113	192	DIFE (Reactive)	C0
114	193	DIFE ()	80
115	194	DIFE (Demand)	40
116	195	VIF (unit kvarh with resolution 0.001)	A8
117	196	VIFE (manufacturer specific)	FF
118	197	VIFE(Export)	2B
119	198-101	Reactive Export Demand Power	xxxxxxx
120	102	DIF (32 bit integer)	94
121	103	DIFE (Reactive)	C0
122	104	DIFE ()	80
123	105	DIFE (Demand)	40
124	106	VIF (unit kvarh with resolution 0.001)	A8
125	107	VIFE (manufacturer specific)	FF
126	108	VIFE(Export)	2B
127	109-112	Max Reactive Export Demand Power	xxxxxxx
128	113	DIF (More data in next Telegram)	1F
129	114	Check sum	1
130	115	Stop	16

Telegram 3 :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	D5
3	3	L-Field	D5
4	4	Start	68
5	5	C-Field	08
6	6	A-Field	xx
7	7	CI-Field	72
8	08-11	Identification number	xxxxxxx
9	12-13	Manufacturer's ID (RIL)	2C 49
10	14	Version	01
11	15	Medium	02
12	16	Access number	01
13	17	Status	00
14	18-19	Signature	00 00
15	20	DIF (32 bit integer)	84
16	21	DIFE	80
17	22	DIFE	80
18	23	DIFE	40
19	24	VIF (unit kvarh with resolution 0.001)	FD
20	25	VIFE (manufacturer specific)	59
21	26-29	Current Demand	xxxxxxx
22	30	DIF (32 bit integer)	94
23	31	DIFE	80
24	32	DIFE	80
25	33	DIFE	40
26	34	VIF (VIF in next byte)	FD
27	35	VIFE (unit kvarh with resolution 0.001)	59
28	36-39	Max Current Demand	xxxxxxx

29	40	DIF	07
30	41	VIF (unit kWh with resolution 0.001)	83
31	42	VIFE (manufacturer specific)	FF
32	43	VIFE	80
33	44	VIFE (manufacturer specific)	FF
34	45	VIFE	01
35	46-53	L1 Total Active Energy	xxxxxxxxxxxxxxxx
36	54	DIF	07
37	55	VIF (unit kWh with resolution 0.001)	83
38	56	VIFE (manufacturer specific)	FF
39	57	VIFE	80
40	58	VIFE (manufacturer specific)	FF
41	59	VIFE	02
42	60-67	L2 Total Active Energy	xxxxxxxxxxxxxxxx
43	68	DIF	07
44	69	VIF (unit kWh with resolution 0.001)	83
45	70	VIFE (manufacturer specific)	FF
46	71	VIFE	80
47	72	VIFE (manufacturer specific)	FF
48	73	VIFE	03
49	74-81	L3 Total Active Energy	xxxxxxxxxxxxxxxx
50	82	DIF (32 bit integer)	87
51	83	DIFE (Reactive)	40
52	84	VIF (unit kvarh with resolution 0.001)	83
53	85	VIFE (manufacturer specific)	FF
54	86	VIFE	80
55	87	VIFE (manufacturer specific)	FF
56	88	VIFE	01
57	89-96	L1 Reactive Total Energy	xxxxxxxxxxxxxxxx
58	97	DIF (32 bit integer)	87
59	98	DIFE (Reactive)	40
60	99	VIF (unit kvarh with resolution 0.001)	83
61	100	VIFE (manufacturer specific)	FF
62	101	VIFE	80
63	102	VIFE (manufacturer specific)	FF
64	103	VIFE	02
65	104-111	L2 Reactive Total Energy	xxxxxxxxxxxxxxxx

67	112	DIF (32 bit integer)	87
68	113	DIFE (Reactive)	40
69	114	VIF (unit kvarh with resolution 0.001)	83
70	115	VIFE (manufacturer specific)	FF
71	116	VIFE	80
72	117	VIFE (manufacturer specific)	FF
73	118	VIFE	03
74	119-126	L3 Reactive Total Energy	xxxxxxxxxxxxxxxx
75	127	DIF	07
76	128	VIF (unit kWh with resolution 0.001)	83
78	129	VIFE (manufacturer specific)	FF
79	130	VIFE(Import)	AA
80	131	VIFE (manufacturer specific)	FF
81	132	VIFE	01
82	133	L1 Active Import Energy	xxxxxxxxxxxxxxxx
83	134	DIF	07
84	135	VIF (unit kWh with resolution 0.001)	83
85	136	VIFE (manufacturer specific)	FF
86	137	VIFE	AA
87	138	VIFE (manufacturer specific)	FF
88	139	VIFE	02
89	140-147	L2 Active Import Energy	xxxxxxxxxxxxxxxx
90	148	DIF	07
91	149	VIF (unit kWh with resolution 0.001)	83
92	150	VIFE (manufacturer specific)	FF
93	151	VIFE	AA
94	152	VIFE (manufacturer specific)	FF
95	153	VIFE	03
96	154	L3 Active Import Energy	xxxxxxxxxxxxxxxx
97	155	DIF	07
98	156	VIF (unit kWh with resolution 0.001)	83
99	157	VIFE (manufacturer specific)	FF
100	158	VIFE	AB
101	159	VIFE (manufacturer specific)	FF
102	160	VIFE	01
103	161-168	L1 Active Export Energy	xxxxxxxxxxxxxxxx
104	169	DIF	07
105	170	VIF (unit kWh with resolution 0.001)	83
106	171	VIFE (manufacturer specific)	FF

107	172	VIFE	AB
108	173	VIFE (manufacturer specific)	FF
109	174	VIFE	02
110	175-182	L2 Active Export Energy	xxxxxxxxxxxxxxxx
111	183	DIF	07
112	184	VIF (unit kWh with resolution 0.001)	83
113	185	VIFE (manufacturer specific)	FF
114	186	VIFE	AB
115	187	VIFE (manufacturer specific)	FF
116	188	VIFE	03
117	189-196	L3 Active Export Energy	xxxxxxxxxxxxxxxx
118	197	DIF (More data in next Telegram)	1F
119	198	Check sum	xx
120	199	Stop	16

Telegram 4 :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	99
3	3	L-Field	99
4	4	Start	68
5	5	C-Field	8
6	6	A-Field	xx
7	7	CI-Field	72
8	8-11	Identification number	xxxxxxx
9	12-13	Manufacturer's ID (RIL)	2C 49
10	14	Version	01
11	15	Medium	02
12	16	Access number	01
13	17	Status	00
14	18-19	Signature	00 00
15	20	DIF (32 bit integer)	87
16	21	DIFE (Reactive)	40
17	22	VIF (unit kvarh with resolution 0.001)	83
18	23	VIFE (manufacturer specific)	FF
19	24	VIFE	AA
20	25	VIFE (manufacturer specific)	FF
21	26	VIFE	01
22	27-34	L1 Reactive Import Energy	xxxxxxxxxxxxxxxxxx
23	35	DIF (32 bit integer)	87
24	36	DIFE (Reactive)	40
25	37	VIF (unit kvarh with resolution 0.001)	83
26	38	VIFE (manufacturer specific)	FF
27	39	VIFE	AA
28	40	VIFE (manufacturer specific)	FF
29	41	VIFE	02
30	42-49	L2 Reactive Import Energy	xxxxxxxxxxxxxxxxxx
31	50	DIF (32 bit integer)	87
32	51	DIFE (Reactive)	40
33	52	VIF (unit kvarh with resolution 0.001)	83
34	53	VIFE (manufacturer specific)	FF
35	54	VIFE	AA
36	55	VIFE (manufacturer specific)	FF
37	56	VIFE	03
38	57-64	L3 Reactive Import Energy	xxxxxxxxxxxxxxxxxx

39	65	DIF (32 bit integer)	87
40	66	DIFE (Reactive)	40
41	67	VIF (unit kvarh with resolution 0.001)	83
42	68	VIFE (manufacturer specific)	FF
43	69	VIFE	AB
44	70	VIFE (manufacturer specific)	FF
45	71	VIFE	01
46	72-79	L1 Reactive Export Energy	xxxxxxxxxxxxxxxxxx
47	80	DIF (32 bit integer)	87
48	81	DIFE (Reactive)	40
49	82	VIF (unit kvarh with resolution 0.001)	83
50	83	VIFE (manufacturer specific)	FF
51	84	VIFE	AB
52	85	VIFE (manufacturer specific)	FF
53	86	VIFE	02
54	87-93	L2 Reactive Export Energy	xxxxxxxxxxxxxxxxxx
55	94	DIF (32 bit integer)	87
56	95	DIFE (Reactive)	40
57	96	VIF (unit kvarh with resolution 0.001)	83
58	97	VIFE (manufacturer specific)	FF
59	98	VIFE	AB
60	99	VIFE (manufacturer specific)	FF
61	100	VIFE	03
62	101-108	L3 Reactive Export Energy	xxxxxxxxxxxxxxxxxx
63	109	DIF (8 bit integer)	04
64	110	VIF (VIF in next byte)	FD
65	111	VIFE	A5
66	112	VIFE (next byte is manufacturer specific)	FF
67	113	VIFE (DIT)	29
68	114-17	Demand Integration time	xxxxxxx

69	118	DIF (32 bit integer)	04
70	119	VIF (manufacturer specific)	FF
71	120	VIF	32
72	121	VIF (manufacturer specific)	FF
73	122	VIFE	1
74	123-126	Pulse Width	xxxxxxx
75	127	DIF (32 bit integer)	04
76	128	VIF (manufacturer specific)	FF
78	129	VIFE	31
79	130	VIF (manufacturer specific)	FF
80	131	VIFE	1
81	132-135	Pulse Divisor	xxxxxxx
82	136	DIF (32 bit integer)	04
83	137	VIF (manufacturer specific)	FF
84	138	VIFE	B3
85	139	VIF (manufacturer specific)	FF
86	140	VIFE	01
87	141-144	Pulse para 1	xxxxxxx
88	145	DIF (32 bit integer)	04
89	146	VIF (manufacturer specific)	FF
90	147	VIFE	B3
91	148	VIF (manufacturer specific)	FF
92	149	VIFE	02
93	150-153	Pulse para 2	xxxxxxx
94	154	DIF (End of data record)	1F
95	155	Check sum	xx
96	156	Stop	16

Telegram 5 :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	BF
3	3	L-Field	BF
5	5	C-Field	08
6	6	A-Field	xx
7	7	CI-Field	72
8	8~11	Identification number	xxxxxxxx
9	12~13	Manufacturer's ID (RIL)	2C 49
10	14	Version	01
11	15	Medium	02
12	16	Access number	01
13	17	Status	00
14	18-19	Signature	00 00
15	20	DIF (32 bit integer)	04
16	21	VIF(unit A with resolution 0.001A)	FD
17	22	VIFE	C6
18	23	VIFE (manufacturer specific)	FF
19	24	VIFE (Phase 1)	01
20	25-28	L1 Voltage	xxxxxxxx
21	29	DIF (32 bit integer)	04
22	30	VIF(unit A with resolution 0.001A)	FD
23	31	VIFE	C6
24	32	VIFE (manufacturer specific)	FF
25	33	VIFE (Phase 2)	02
26	34-37	L2 Voltage	xxxxxxxx
27	38	DIF (32 bit integer)	04
28	39	VIF(unit A with resolution 0.001A)	FD
29	40	VIFE	C6
30	41	VIFE (manufacturer specific)	FF
31	42	VIFE (Phase 3)	03
32	43-46	L3 Voltage	xxxxxxxx
33	47	DIF (32 bit integer)	04
34	48	VIF(unit A with resolution 0.001A)	FD
35	49	VIFE	D9
36	50	VIFE (manufacturer specific)	FF
37	51	VIFE (Phase 1)	01
38	52-55	L1 Current	xxxxxxxx

39	56	DIF (32 bit integer)	04
40	57	VIF(unit A with resolution 0.001A)	FD
41	58	VIFE	D9
42	59	VIFE (manufacturer specific)	FF
43	60	VIFE (Phase 2)	02
44	61-64	L2 Current	xxxxxxx
45	65	DIF (32 bit integer)	04
46	66	VIF(unit A with resolution 0.001A)	FD
47	67	VIFE	D9
48	68	VIFE (manufacturer specific)	FF
49	69	VIFE (Phase 3)	03
50	70-73	L3 Current	xxxxxxx
51	74	DIF (32 bit integer)	84
52	75	DIFE	80
53	76	DIFE (Apparent)	40
54	77	VIF (unit kvarh with resolution 0.001)	A8
55	78	VIFE (manufacturer specific)	FF
56	79	VIFE	01
57	80-83	L1 Apparent Power	xxxxxxx
58	84	DIF (32 bit integer)	84
59	85	DIFE	80
60	86	DIFE (Apparent)	40
61	87	VIF (unit kvarh with resolution 0.001)	A8
62	88	VIFE (manufacturer specific)	FF
63	89	VIFE	02
64	90-93	L2 Apparent Power	xxxxxxx
65	94	DIF (32 bit integer)	84
66	95	DIFE	80
67	96	DIFE (Apparent)	40
68	97	VIF (unit kvarh with resolution 0.001)	A8
69	98	VIFE (manufacturer specific)	FF
70	99	VIFE	03
71	100-103	L3 Apparent Power	xxxxxxx
72	104	DIF (32 bit integer)	84
73	105	DIFE (Reactive)	40
74	106	VIF (unit kvarh with resolution 0.001)	A8
75	107	VIFE (manufacturer specific)	FF
76	108	VIFE	01
77	109-112	L1 Reactive Power	xxxxxxx

84	122	DIF (32 bit integer)	84
85	123	DIFE (Reactive)	40
86	124	VIF (unit kvarh with resolution 0.001)	A8
87	125	VIFE (manufacturer specific)	FF
88	126	VIFE	03
89	127-130	L3 Reactive Power	xxxxxxxx
90	131	DIF (32 bit integer)	04
91	132	VIF (unit kWh with resolution 0.001)	A8
92	133	VIFE (manufacturer specific)	FF
93	134	VIFE(Phase 1)	01
94	135-138	L1 Active Power	xxxxxxxx
95	139	DIF (32 bit integer)	04
96	140	VIF (unit kWh with resolution 0.001)	A8
97	141	VIFE (manufacturer specific)	FF
98	142	VIFE(Phase 2)	02
90	143-146	L2 Active Power	xxxxxxxx
91	147	DIF (32 bit integer)	04
92	148	VIF (unit kWh with resolution 0.001)	A8
93	149	VIFE (manufacturer specific)	FF
94	150	VIFE(Phase 3)	03
95	151-154	L3 Active Power	xxxxxxxx
96	155	DIF (32 bit integer)	04
97	156	VIF (unit kWh with resolution 0.001)	FF
98	157	VIFE	AE
99	158	VIFE (manufacturer specific)	FF
100	159	VIFE(Phase 1)	01
101	160-163	L1 Power Factor	xxxxxxxx
102	164	DIF (32 bit integer)	04
103	165	VIF (unit kWh with resolution 0.001)	FF
104	166	VIFE	AE
105	167	VIFE (manufacturer specific)	FF
106	168	VIFE(Phase 2)	02
107	169-172	L2 Power Factor	xxxxxxxx
108	173	DIF (32 bit integer)	04
109	174	VIF (unit kWh with resolution 0.001)	FF
110	175	VIFE	AE
111	176	VIFE (manufacturer specific)	FF
112	177	VIFE(Phase 3)	03
113	178-179	L3 Power Factor	xxxxxxxx

114	180	DIF (32 bit integer)	4
115	181	VIF	FF
116	182	VIFE	20
117	183-186	Frequency	xxxxxxxx
118	187	DIF (End of data record)	0F
119	188	Check sum	xx
120	189	Stop	16

Write Setup Parameters for MBUS Models of EX11XX, EX21XX, EC43XX ER43XX Demand Time :

The size of address field (yy) is one byte and it can take values from 0x01 to 0xFA.

Sr. No.	Field Names	Values
1	Start	68
2	L Field	09
3	L Field	09
4	Start	68
5	C Field	53
6	A Field	yy
7	CI Field	51
8	DIF (8 bit integer)	01
9	VIF (VIF in next byte)	FD
10	VIFE	A5
11	VIFE (next byte is manufacturer specific)	FF
12	VIFE (DIT)	29
13	Demand Integration time	xx
14	Check Sum	CS
15	Stop	16

Response - E5 (for EX11XX & EX21XX models)

Valid values of xx - 05 - 5 min

0A - 10 min

0F - 15 min

1E - 30 min

Response - E5 (for EC43XX & ER43XX MBUS models)

Valid values of xx - 0x05 - 5 mins to 0x3C - 60 mins

Pulse Divisor :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	08
3	L Field	08
4	Start	68
5	C Field	53
6	A Field	yy
7	CI Field	51
8	DIF (16 bit integer)	02
9	VIF (manufacturer specific)	FF
10	VIFE (Pulse Divisor)	31
12	Pulse Divisor	xx
		xx
13	Check Sum	CS
14	Stop	16

Response - E5

Valid values of xx - 01 00 - 1

0A - 00 - 10

64 - 00 - 100

03 - E8 - 1000

Pulse Width :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	07
3	L Field	07
4	Start	68
5	C Field	53
6	A Field	yy
7	CI Field	51
8	DIF (8 bit integer)	01
9	VIF (manufacturer specific)	FF
10	VIFE (Pulse Width)	32
12	Pulse Width	xx
13	Check Sum	CS
14	Stop	16

Response - E5

Valid values of xx - 3C -60

64 - 100

C8 - 200 ms

Reset Parameters :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	07
3	L Field	07
4	Start	68
5	C Field	53
6	A Field	yy
7	CI Field	51
8	DIF (8 bit integer)	01
9	VIF (manufacturer specific)	FF
10	VIFE (Reset Parameter)	53
11	Reset Parameters	xx
12	Check Sum	CS
13	Stop	16

Response - E5

Valid values of xx - 1 - Energy Reset

2 - Demand Reset

3 - PD Count

4 - All

Autoscroll :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	07
3	L Field	07
4	Start	68
5	C Field	53
6	A Field	yy
7	CI Field	51

8	DIF (8 bit integer)	01
9	VIF (manufacturer specific)	FF
10	VIFE (Auto Scroll)	36
11	Autoscroll	xx
12	Check Sum	CS
13	Stop	16

Response - E5 (for EX11XX & EX21XX MBUS Models)

Valid values of xx - 0 - OFF

0A - 10 seconds

14 - 20 seconds

1E - 30 seconds

Response - E5 (EC43XX & ER43XX MBUS Models)

Valid values of xx - 0 - Deactivate 1 - Activate

Pulse parameter 1 :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	07
3	L Field	07
4	Start	68
5	C Field	53
6	A Field	yy
7	CI Field	51
8	DIF (8 bit integer)	01
9	VIF (manufacturer specific)	FF
10	VIFE	B3
11	VIF (manufacturer specific)	FF
12	VIFE	01
13	Pulse Parameter 1	xx
14	Check Sum	CS
15	Stop	16

Response - E5

Valid values of xx - 1 - Import Active Energy

2 - Export Active Energy

3 - Import Reactive Energy

4 - Export Reactive Energy

5 - Inductive Reactive Energy

6 - Capacitive Reactive Energy

7 Total Active Energy

8 Total Reactive Energy

Pulse parameter 2 :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	07
3	L Field	07
4	Start	68
5	C Field	53
6	A Field	yy
7	CI Field	51
8	DIF (8 bit integer)	01
9	VIF (manufacturer specific)	FF
10	VIFE	B3
11	VIF (manufacturer specific)	FF
12	VIFE	02
13	Pulse Parameter 2	xx
14	Check Sum	CS
15	Stop	16

Response - E5

- Valid values of xx -
- 1 - Import Active Energy
 - 2 - Export Active Energy
 - 3 - Import Reactive Energy
 - 4 - Export Reactive Energy
 - 5 - Inductive Reactive Energy
 - 6 - Capacitive Reactive Energy
 - 7 Total Active Energy
 - 8 Total Reactive Energy

Tariff Configuration :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	07
3	L Field	07
4	Start	68
5	C Field	53
6	A Field	yy
7	CI Field	51
8	DIF (8 bit integer)	01
9	VIF (manufacturer specific)	FF
10	VIFE (Tariff Configuration)	37
11	Tariff Configuration	xx
12	Check Sum	CS
13	Stop	16

Response - E5

Valid values of xx - 1 - IP

2 - T1

3 - T2

Baud rate :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	3
3	L Field	3
4	Start	68
5	C Field	73
6	A Field	yy
7	CI Field	51
8	VIF (manufacturer specific)	FF
9	VIFE	2E
10	Check Sum	CS
11	Stop	16

Response - E5

Valid values of xx - B8 - 300

B9 - 600

BA - 1200

BB - 2400

BC - 4800

BD - 9600

Password :

The user must authenticate themselves before executing any write query. The 'Password' query is used to do so. It requires the existing password (yy yy) of the meter. If the meter gives 'E5' as a response then the user can proceed with the write operation. If the user desires to change the password, the user should first authenticate themselves by using the following query with the existing password and once the acknowledgment response (E5) is received user can use the password query again with the new password. In this way the old password will be updated to a new password.

Sr. No.	Field Names	Values
1	Start	68
2	L Field	08
3	L Field	08
4	Start	68
5	C Field	53
6	A Field	yy
7	CI Field	51
8	DIF (8 bit integer)	02
9	VIF (next byte extension)	FD
10	VIFE (Password)	30
11	Valid Value	xx
12	Password	xx
13	Check Sum	CS
14	Stop	16

Response - E5

Valid values of xx - 0000 to 9999(New Password)

3. Telegrams for ED43XX MBUS models

Telegram 1 :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	D4
3	3	L-Field	D4
4	4	Start	68
5	5	C-Field	08
6	6	A-Field	xx
7	7	CI-Field	72
8	08~11	Identification number	xxxxxxxx
9	12~13	Manufacturer's ID (RIL)	2C 49
10	14	Version	02
11	15	Medium	02
12	16	Access number	02
13	17	Status	00
14	18 - 19	Signature	00 00
15	20	DIF (32 bit integer)	04
16	21	VIF (unit kWh with resolution 0.001)	83
17	22	VIFE (manufacturer specific)	FF
18	23	VIFE(Import)	2A
19	24 - 27	Active import energy	xxxxxxxx
20	28	DIF(32 bit integer)	04
21	29	VIF (unit kWh with resolution 0.001)	83
22	30	VIFE (manufacturer specific)	FF
23	31	VIFE(Export)	2B
24	32 - 35	Active export energy	xxxxxxxx
25	36	DIF (32 bit integer)	04
26	37	VIF (unit kWh with resolution 0.001)	83
27	38	VIFE (manufacturer specific)	FF
28	39	VIFE(Total)	00
29	40 - 43	Total Active energy	xxxxxxxx
30	44	DIF (32 bit integer)	84
31	45	DIFE (Reactive)	40
32	46	VIF (unit kvarh with resolution 0.001)	83
33	47	VIFE (manufacturer specific)	FF
34	48	VIFE(Import)	2A
35	49 - 52	Reactive import energy	xxxxxxxx

36	53	DIF (32 bit integer)	84
37	54	DIFE (Reactive)	40
38	55	VIF (unit kvarh with resolution 0.001)	83
39	56	VIFE (manufacturer specific)	FF
40	57	VIFE(Export)	2B
41	58 - 61	Reactive export energy	xxxxxxxx
42	62	DIF (32 bit integer)	84
43	63	DIFE (Reactive)	40
44	64	VIF (unit kvarh with resolution 0.001)	83
45	65	VIFE (manufacturer specific)	FF
46	66	VIFE(Total)	00
47	67-70	Total Reactive energy	xxxxxxxx
48	71	DIF (32 bit integer)	04
49	72	VIF (unit kWh with resolution 0.001)	83
50	73	VIFE (manufacturer specific)	FF
51	74	VIFE(Import)	AA
52	75	VIFE (manufacturer specific)	FF
53	76	VIFE (Partial)	2C
54	77-80	Partial Active Import Energy	xxxxxxxx
55	81	DIF (32 bit integer)	04
56	82	VIF (unit kWh with resolution 0.001)	83
57	83	VIFE (manufacturer specific)	FF
58	84	VIFE(Import)	AB
59	85	VIFE (manufacturer specific)	FF
60	86	VIFE (Partial)	2C
61	87-90	Partial Active Export Energy	xxxxxxxx
62	91	DIF (32 bit integer)	04
63	92	VIF (unit kWh with resolution 0.001)	83
64	93	VIFE (manufacturer specific)	FF
65	94	VIFE(Total)	80
66	95	VIFE (manufacturer specific)	FF
67	96	VIFE (Partial)	2C
68	97-100	Partial Active Total Energy	xxxxxxxx
69	101	DIF (32 bit integer)	84
70	102	DIFE (Reactive)	40
71	103	VIF (unit kvarh with resolution 0.001)	83
72	104	VIFE (manufacturer specific)	FF
73	105	VIFE (Import)	AA

74	106	VIFE (manufacturer specific)	FF
75	107	VIFE (Partial)	2C
76	108-111	Partial Reactive Import Energy	xxxxxxxx
77	112	DIF (32 bit integer)	84
78	113	DIFE (Reactive)	40
79	114	VIF (unit kvarh with resolution 0.001)	83
80	115	VIFE (manufacturer specific)	FF
81	116	VIFE (Export)	AB
82	117	VIFE (manufacturer specific)	FF
83	118	VIFE (Partial)	2C
84	119-122	Partial Reactive Export Energy	xxxxxxxx
85	123	DIF (32 bit integer)	84
86	124	DIFE (Reactive)	40
87	125	VIF (unit kvarh with resolution 0.001)	83
88	126	VIFE (manufacturer specific)	FF
89	127	VIFE(Total)	80
90	128	VIFE (manufacturer specific)	FF
91	129	VIFE (Partial)	2C
92	130-133	Partial Reactive Total Energy	xxxxxxxx
93	134	DIF (32 bit integer)	84
94	135	DIFE(T1, Active)	10
95	136	VIF (unit kWh with resolution 0.001)	83
96	137	VIFE (manufacturer specific)	FF
97	138	VIFE(Import)	2A
98	139-142	T1 Active import energy	xxxxxxxx
99	143	DIF (32 bit integer)	84
100	144	DIFE(T1, Active)	10
101	145	VIF (unit kWh with resolution 0.001)	83
102	146	VIFE (manufacturer specific)	FF
103	147	VIFE(Export)	2B
104	148-151	T1 Active Export Energy	xxxxxxxx
105	152	DIF (32 bit integer)	84
106	153	DIFE(T1, Active)	10
107	154	VIF (unit kWh with resolution 0.001)	83
108	155	VIFE (manufacturer specific)	FF
109	156	VIFE(Total)	00
110	157-160	T1 Total Active Energy	xxxxxxxx

111	161	DIF (32 bit integer)	84
112	162	DIFE(T1, Reactive)	50
113	163	VIF (unit kvarh with resolution 0.001)	83
114	164	VIFE (manufacturer specific)	FF
115	165	VIFE(Import)	2A
116	166-169	T1 Reactive import energy	xxxxxxxx
117	170	DIF (32 bit integer)	84
118	171	DIFE(T1, Reactive)	50
119	172	VIF (unit kvarh with resolution 0.001)	83
120	173	VIFE (manufacturer specific)	FF
121	174	VIFE(Export)	2B
122	175-178	T1 Reactive Export Energy	xxxxxxxx
123	179	DIF (32 bit integer)	84
124	180	DIFE(T1, Reactive)	50
125	181	VIF (unit kvarh with resolution 0.001)	83
126	182	VIFE (manufacturer specific)	FF
127	183	VIFE(Total)	00
128	184-187	T1 Total Reactive Energy	xxxxxxxx
129	188	DIF (32 bit integer)	84
130	189	DIFE(T2, Active)	20
131	190	VIF (unit kWh with resolution 0.001)	83
132	191	VIFE (manufacturer specific)	FF
133	192	VIFE(Import)	2A
134	193-196	T2 Active Import Energy	xxxxxxxx
135	197	DIF (32 bit integer)	84
136	198	DIFE(T2, Active)	20
137	199	VIF (unit kWh with resolution 0.001)	83
138	200	VIFE (manufacturer specific)	FF
139	201	VIFE(Export)	2B
140	202-205	T2 Active Export Energy	xxxxxxxx
141	206	DIF (32 bit integer)	84
142	207	DIFE(T2, Active)	20
143	208	VIF (unit kWh with resolution 0.001)	83
144	209	VIFE (manufacturer specific)	FF
145	210	VIFE(Total)	00
146	211-214	T2 Total Active Energy	xxxxxxxx
147	215	DIF (More data in next Telegram)	1F
148	216	Check sum	01
149	217	Stop	16

Telegram 2 :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	DD
3	3	L-Field	DD
4	4	Start	68
5	5	C-Field	08
6	6	A-Field	xx
7	7	CI-Field	72
8	08-11	Identification number	xxxxxxxx
9	12-13	Manufacturer's ID (RIL)	2C 49
10	14	Version	02
11	15	Medium	02
12	16	Access number	02
13	17	Status	00
14	18 - 19	Signature	00 00
15	20	DIF (32 bit integer)	84
16	21	DIFE (T2, Reactive)	60
17	22	VIF (unit kvarh with resolution 0.001)	83
18	23	VIFE (manufacturer specific)	FF
19	24	VIFE (Import)	2A
20	25-28	T2 Reactive Import Energy	xxxxxxxx
21	29	DIF (32 bit integer)	84
22	30	DIFE (T2, Reactive)	60
23	31	VIF (unit kvarh with resolution 0.001)	83
24	32	VIFE (manufacturer specific)	FF
25	33	VIFE(Export)	2B
26	34-37	T2 Reactive Export Energy	xxxxxxxx
27	38	DIF (32 bit integer)	84
28	39	DIFE (T2, Reactive)	60
29	40	VIF (unit kvarh with resolution 0.001)	83
30	41	VIFE (manufacturer specific)	FF
31	42	VIFE(Total)	00
32	43-46	T2 Total Reactive Energy	xxxxxxxx
33	47	DIF (32 bit integer)	84
34	48	DIFE(T3, Active)	30
35	49	VIF (unit kWh with resolution 0.001)	83
36	50	VIFE (manufacturer specific)	FF

36	50	VIFE (manufacturer specific)	FF
37	51	VIFE(Import)	2A
38	52-55	T3 Active Import Energy	xxxxxxxx
39	56	DIF (32 bit integer)	84
40	57	DIFE(T3, Active)	30
41	58	VIF (unit kWh with resolution 0.001)	83
42	59	VIFE (manufacturer specific)	FF
43	60	VIFE(Export)	2B
44	61-64	T3 Active Export Energy	xxxxxxxx
45	65	DIF (32 bit integer)	84
46	66	DIFE(T3, Active)	30
47	67	VIF (unit kWh with resolution 0.001)	83
48	68	VIFE (manufacturer specific)	FF
49	69	VIFE(Total)	00
50	70-73	T3 Total Active Energy	xxxxxxxx
51	74	DIF (32 bit integer)	84
52	75	DIFE (T3, Reactive)	70
53	76	VIF (unit kvarh with resolution 0.001)	83
54	77	VIFE (manufacturer specific)	FF
55	78	VIFE (Import)	2A
56	79-82	T3 Reactive Import Energy	xxxxxxxx
57	83	DIF (32 bit integer)	84
58	84	DIFE (T3, Reactive)	70
59	85	VIF (unit kvarh with resolution 0.001)	83
60	86	VIFE (manufacturer specific)	FF
61	87	VIFE(Export)	2B
62	88-91	T3 Reactive Export Energy	xxxxxxxx
63	92	DIF (32 bit integer)	84
64	93	DIFE (T3, Reactive)	70
65	94	VIF (unit kvarh with resolution 0.001)	83
66	95	VIFE (manufacturer specific)	FF
67	96	VIFE(Total)	00
68	97-100	T3 Total Reactive Energy	xxxxxxxx
69	101	DIF (32 bit integer)	84
70	102	DIFE(T4, Active)	80
71	103	DIFE	10
72	104	VIF (unit kWh with resolution 0.001)	83
73	105	VIFE (manufacturer specific)	FF

74	106	VIFE(Import)	2A
75	107-110	T4 Active Import Energy	xxxxxxxx
76	111	DIF (32 bit integer)	84
77	112	DIFE(T4, Active)	80
78	113	DIFE	10
79	114	VIF (unit kWh with resolution 0.001)	83
80	115	VIFE (manufacturer specific)	FF
81	116	VIFE(Export)	2B
82	117-120	T4 Active Export Energy	xxxxxxxx
83	121	DIF (32 bit integer)	84
84	122	DIFE(T4, Active)	80
85	123	DIFE	10
86	124	VIF (unit kWh with resolution 0.001)	83
87	125	VIFE (manufacturer specific)	FF
88	126	VIFE(Total)	00
89	127-130	T4 Total Active Energy	xxxxxxxx
90	131	DIF (32 bit integer)	84
91	132	DIFE(T4, Active)	80
92	133	DIFE	50
93	134	VIF (unit kvarh with resolution 0.001)	83
94	135	VIFE (manufacturer specific)	FF
95	136	VIFE (Import)	2A
96	137-140	T4 Reactive Import Energy	xxxxxxxx
97	141	DIF (32 bit integer)	84
98	142	DIFE(T4, Active)	80
99	143	DIFE	50
100	144	VIF (unit kvarh with resolution 0.001)	83
101	145	VIFE (manufacturer specific)	FF
102	146	VIFE(Export)	2B
103	147-150	T4 Reactive Export Energy	xxxxxxxx
104	151	DIF (32 bit integer)	84
105	152	DIFE(T4, Active)	80
106	153	DIFE	50
107	154	VIF (unit kvarh with resolution 0.001)	83
108	155	VIFE (manufacturer specific)	FF
109	156	VIFE(Total)	00
110	157-160	T4 Total Reactive Energy	xxxxxxxx

111	161	DIF	04
112	162	VIF (unit kWh with resolution 0.001)	83
113	163	VIFE (manufacturer specific)	FF
114	164	VIFE(Import)	AA
115	165	VIFE (manufacturer specific)	FF
116	166	VIFE	01
117	167-170	L1 Active Import Energy	xxxxxxx
118	171	DIF	04
119	172	VIF (unit kWh with resolution 0.001)	83
120	173	VIFE (manufacturer specific)	FF
121	174	VIFE	AB
122	175	VIFE (manufacturer specific)	FF
123	176	VIFE	01
124	177-180	L1 Active Export Energy	xxxxxxx
125	181	DIF	04
126	182	VIF (unit kWh with resolution 0.001)	83
127	183	VIFE (manufacturer specific)	FF
128	184	VIFE	80
129	185	VIFE (manufacturer specific)	FF
130	186	VIFE	01
131	187-190	L1 Total Active Energy	xxxxxxx
132	191	DIF (32 bit integer)	84
133	192	DIFE (Reactive)	40
134	193	VIF (unit kvarh with resolution 0.001)	83
135	194	VIFE (manufacturer specific)	FF
136	195	VIFE	AA
137	196	VIFE (manufacturer specific)	FF
138	197	VIFE	01
139	198-201	L1 Reactive Import Energy	xxxxxxx
140	202	DIF (32 bit integer)	84
141	203	DIFE (Reactive)	40
142	204	VIF (unit kvarh with resolution 0.001)	83
143	205	VIFE (manufacturer specific)	FF
144	206	VIFE	AB
145	207	VIFE (manufacturer specific)	FF
146	208	VIFE	01
147	209-212	L21Reactive Export Energy	xxxxxxx
148	213	DIF (32 bit integer)	84

149	214	DIFE (Reactive)	40
150	215	VIF (unit kvarh with resolution 0.001)	83
151	216	VIFE (manufacturer specific)	FF
152	217	VIFE	80
153	218	VIFE (manufacturer specific)	FF
154	219	VIFE	01
155	220-223	L1 Reactive Total Energy	xxxxxxx
156	224	DIF (More data in next Telegram)	1F
157	225	Check sum	01
158	226	Stop	16

Telegram 3 :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	E7
3	3	L-Field	E7
4	4	Start	68
5	5	C-Field	08
6	6	A-Field	xx
7	7	CI-Field	72
8	8~11	Identification number	xxxxxxx
9	12~13	Manufacturer's ID (RIL)	2C 49
10	14	Version	01
11	15	Medium	02
12	16	Access number	01
13	17	Status	00
14	18-19	Signature	00 00
15	20	DIF	04
16	21	VIF (unit kWh with resolution 0.001)	83
17	22	VIFE (manufacturer specific)	FF
18	23	VIFE	AA
19	24	VIFE (manufacturer specific)	FF
20	25	VIFE	02
21	26-29	L2 Active Import Energy	xxxxxxx
22	30	DIF	04
23	31	VIF (unit kWh with resolution 0.001)	83
24	32	VIFE (manufacturer specific)	FF
25	33	VIFE	AB

26	34	VIFE (manufacturer specific)	FF
27	35	VIFE	02
28	36-39	L2 Active Export Energy	xxxxxxxx
29	40	DIF	04
30	41	VIF (unit kWh with resolution 0.001)	83
31	42	VIFE (manufacturer specific)	FF
32	43	VIFE	80
33	44	VIFE (manufacturer specific)	FF
34	45	VIFE	02
35	46-49	L2 Total Active Energy	xxxxxxxx
36	50	DIF (32 bit integer)	84
37	51	DIFE (Reactive)	40
38	52	VIF (unit kvarh with resolution 0.001)	83
39	53	VIFE (manufacturer specific)	FF
40	54	VIFE	AA
41	55	VIFE (manufacturer specific)	FF
42	56	VIFE	02
43	57-60	L2 Reactive Import Energy	xxxxxxxx
44	61	DIF (32 bit integer)	84
45	62	DIFE (Reactive)	40
46	63	VIF (unit kvarh with resolution 0.001)	83
47	64	VIFE (manufacturer specific)	FF
48	65	VIFE	AB
49	66	VIFE (manufacturer specific)	FF
50	67	VIFE	02
51	68-71	L2 Reactive Export Energy	xxxxxxxx
52	72	DIF (32 bit integer)	84
53	73	DIFE (Reactive)	40
54	74	VIF (unit kvarh with resolution 0.001)	83
55	75	VIFE (manufacturer specific)	FF
56	76	VIFE	80
57	77	VIFE (manufacturer specific)	FF
58	78	VIFE	02
59	79-82	L2 Reactive Total Energy	xxxxxxxx
60	83	DIF	04
61	84	VIF (unit kWh with resolution 0.001)	83
62	85	VIFE (manufacturer specific)	FF
63	86	VIFE	AA
64	87	VIFE (manufacturer specific)	FF

65	88	VIFE	03
66	89-92	L3 Active Import Energy	xxxxxxxx
67	93	DIF	04
68	94	VIF (unit kWh with resolution 0.001)	83
69	95	VIFE (manufacturer specific)	FF
70	96	VIFE	AB
71	97	VIFE (manufacturer specific)	FF
72	98	VIFE	03
73	99-102	L3 Active Export Energy	xxxxxxxx
74	103	DIF	04
75	104	VIF (unit kWh with resolution 0.001)	83
76	105	VIFE (manufacturer specific)	FF
77	106	VIFE	80
78	107	VIFE (manufacturer specific)	FF
79	108	VIFE	03
80	109-112	L3 Total Active Energy	xxxxxxxx
81	113	DIF (32 bit integer)	84
82	114	DIFE (Reactive)	40
83	115	VIF (unit kvarh with resolution 0.001)	83
84	116	VIFE (manufacturer specific)	FF
85	117	VIFE	AA
86	118	VIFE (manufacturer specific)	FF
87	119	VIFE	03
88	120-123	L3 Reactive Import Energy	xxxxxxxx
89	124	DIF (32 bit integer)	84
90	125	DIFE (Reactive)	40
91	126	VIF (unit kvarh with resolution 0.001)	83
92	127	VIFE (manufacturer specific)	FF
93	128	VIFE	AB
94	129	VIFE (manufacturer specific)	FF
95	130	VIFE	03
96	131-134	L3 Reactive Export Energy	xxxxxxxx
97	135	DIF (32 bit integer)	84
98	136	DIFE (Reactive)	40
99	137	VIF (unit kvarh with resolution 0.001)	83
100	138	VIFE (manufacturer specific)	FF
101	139	VIFE	80
102	140	VIFE (manufacturer specific)	FF

103	141	VIFE	03
104	142-145	L3 Reactive Total Energy	xxxxxxxx
105	146	DIF (32 bit integer)	84
106	147	DIFE	80
107	148	DIFE	80
108	149	DIFE	40
109	150	VIF (unit kvarh with resolution 0.001)	A8
110	151	VIFE (manufacturer specific)	FF
111	152	VIFE(Import)	2A
112	153-156	Active Import Demand Power	xxxxxxxx
113	157	DIF (32 bit integer)	94
114	158	DIFE	80
115	159	DIFE	80
116	160	DIFE	40
117	161	VIF (unit kvarh with resolution 0.001)	A8
118	162	VIFE (manufacturer specific)	FF
119	163	VIFE(Import)	2A
120	164-167	Max Active Import Demand Power	xxxxxxxx
121	168	DIF (32 bit integer)	84
122	169	DIFE	80
123	170	DIFE	80
124	171	DIFE	40
125	172	VIF (unit kvarh with resolution 0.001)	A8
126	173	VIFE (manufacturer specific)	FF
127	174	VIFE(Export)	2B
128	175-178	Active Export Demand Power	xxxxxxxx
129	179	DIF (32 bit integer)	94
130	180	DIFE	80
131	181	DIFE	80
132	182	DIFE	40
133	183	VIF (unit kvarh with resolution 0.001)	A8
134	184	VIFE (manufacturer specific)	FF
135	185	VIFE(Export)	2B
136	186-189	Max Active Export Demand Power	xxxxxxxx
137	190	DIF (32 bit integer)	84
138	191	DIFE (Reactive)	C0
139	192	DIFE ()	80
140	193	DIFE (Demand)	40

141	194	VIF (unit kvarh with resolution 0.001)	A8
142	195	VIFE (manufacturer specific)	FF
143	196	VIFE(Import)	2A
144	197-200	Reactive Import Demand Power	xxxxxxxx
145	201	DIF (32 bit integer)	94
146	202	DIFE (Reactive)	C0
147	203	DIFE ()	80
148	204	DIFE (Demand)	40
149	205	VIF (unit kvarh with resolution 0.001)	A8
150	206	VIFE (manufacturer specific)	FF
151	207	VIFE(Import)	2A
152	208-211	Max Reactive Import Demand Power	xxxxxxxx
153	212	DIF (32 bit integer)	84
154	213	DIFE (Reactive)	C0
155	214	DIFE ()	80
156	215	DIFE (Demand)	40
157	216	VIF (unit kvarh with resolution 0.001)	A8
158	217	VIFE (manufacturer specific)	FF
159	218	VIFE(Export)	2B
160	219-222	Reactive Export Demand Power	xxxxxxxx
161	223	DIF (32 bit integer)	94
162	224	DIFE (Reactive)	C0
163	225	DIFE ()	80
164	226	DIFE (Demand)	40
165	227	VIF (unit kvarh with resolution 0.001)	A8
166	228	VIFE (manufacturer specific)	FF
167	229	VIFE(Export)	2B
168	230-233	Max Reactive Export Demand Power	xxxxxxxx
169	234	DIF (More data in next Telegram)	1F
170	235	Check sum	01
171	236	Stop	16

Telegram 4 :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	C6
3	3	L-Field	C6
4	4	Start	68
5	5	C-Field	08
6	6	A-Field	xx
7	7	CI-Field	72
8	08-11	Identification number	xxxxxxxx
9	12-13	Manufacturer's ID (RIL)	2C 49
10	14	Version	01
11	15	Medium	02
12	16	Access number	01
13	17	Status	00
14	18-19	Signature	00 00
15	20	DIF (32 bit integer)	84
16	21	DIFE	80
17	22	DIFE	80
18	23	DIFE	40
19	24	VIF (unit kvarh with resolution 0.001)	FD
20	25	VIFE (manufacturer specific)	59
21	26-29	Current Demand	xxxxxxxx
22	30	DIF (32 bit integer)	94
23	31	DIFE	80
24	32	DIFE	80
25	33	DIFE	40
26	34	VIF (VIF in next byte)	FD
27	35	VIFE (unit kvarh with resolution 0.001)	59
28	36-39	Max Current Demand	xxxxxxxx
29	40	DIF (32 bit integer)	04
30	41	VIF(unit A with resolution 0.001A)	FD
31	42	VIFE	C6
32	43	VIFE (manufacturer specific)	FF
33	44	VIFE (Phase 1)	001
34	45-48	L1 Voltage	xxxxxxxx
35	49	DIF (32 bit integer)	04

36	50	VIF(unit A with resolution 0.001A)	FD
37	51	VIFE	C6
38	52	VIFE (manufacturer specific)	FF
39	53	VIFE (Phase 2)	02
40	54-57	L2 Voltage	xxxxxxxx
41	58	DIF (32 bit integer)	04
42	59	VIF(unit A with resolution 0.001A)	FD
43	60	VIFE	C6
44	61	VIFE (manufacturer specific)	FF
45	62	VIFE (Phase 3)	03
46	63-66	L3 Voltage	xxxxxxxx
47	67	DIF (32 bit integer)	04
48	68	VIF(unit A with resolution 0.001A)	FD
49	69	VIFE	D9
50	70	VIFE (manufacturer specific)	FF
51	71	VIFE (Phase 1)	01
52	72-75	L1 Current	xxxxxxxx
53	76	DIF (32 bit integer)	04
54	77	VIF(unit A with resolution 0.001A)	FD
55	78	VIFE	D9
56	79	VIFE (manufacturer specific)	FF
57	80	VIFE (Phase 2)	02
58	81-84	L2 Current	xxxxxxxx
59	85	DIF (32 bit integer)	04
60	86	VIF(unit A with resolution 0.001A)	FD
61	87	VIFE	D9
62	88	VIFE (manufacturer specific)	FF
63	89	VIFE (Phase 3)	03
64	90-93	L3 Current	xxxxxxxx
65	94	DIF (32 bit integer)	04
66	95	VIF (unit kWh with resolution 0.001)	A8
67	96	VIFE (manufacturer specific)	FF
68	97	VIFE(Phase 1)	01
69	98-101	L1 Active Power	xxxxxxxx
70	102	DIF (32 bit integer)	04

71	103	VIF (unit kWh with resolution 0.001)	A8
72	104	VIFE (manufacturer specific)	FF
73	105	VIFE(Phase 2)	02
74	106-109	L2 Active Power	xxxxxxxx
75	110	DIF (32 bit integer)	04
76	111	VIF (unit kWh with resolution 0.001)	A8
77	112	VIFE (manufacturer specific)	FF
78	113	VIFE(Phase 3)	03
79	114-115	L3 Active Power	xxxxxxxx
80	116	DIF (32 bit integer)	84
81	117	DIFE(L1, Aparent)	80
82	118	DIFE	40
83	119	VIF (unit kWh with resolution 0.001)	A8
84	120	VIFE (manufacturer specific)	FF
85	121	VIFE(Phase 1)	01
86	122-125	L1 Apparent Power	xxxxxxxx
87	126	DIF (32 bit integer)	84
88	127	DIFE(L2, Aparent)	80
89	128	DIFE	40
90	129	VIF (unit kWh with resolution 0.001)	A8
91	130	VIFE (manufacturer specific)	FF
92	131	VIFE(Phase 2)	02
93	132-135	L2 Apparent Power	xxxxxxxx
94	136	DIF (32 bit integer)	84
95	137	DIFE(L3, Aparent)	80
96	138	DIFE	40
97	139	VIF (unit kWh with resolution 0.001)	A8
98	140	VIFE (manufacturer specific)	FF
99	141	VIFE(Phase 3)	03
100	142-145	L3 Apparent Power	xxxxxxxx
101	146	DIF (32 bit integer)	84
102	147	DIFE	40
103	148	VIF (unit kWh with resolution 0.001)	A8
104	149	VIFE (manufacturer specific)	FF
105	150	VIFE(Phase 1)	01
106	151-154	L1 Reactive Power	xxxxxxxx

107	155	DIF (32 bit integer)	84
108	156	DIFE	40
109	157	VIF (unit kWh with resolution 0.001)	A8
110	158	VIFE (manufacturer specific)	FF
111	159	VIFE(Phase 2)	02
112	160-163	L2 Reactive Power	xxxxxxxx
113	164	DIF (32 bit integer)	84
114	165	DIFE	40
115	167	VIF (unit kWh with resolution 0.001)	A8
116	168	VIFE (manufacturer specific)	FF
117	169	VIFE(Phase 3)	03
118	170-173	L3 Reactive Power	xxxxxxxx
119	174	DIF (32 bit integer)	04
120	175	VIF (unit kWh with resolution 0.001)	FF
121	176	VIFE	AE
122	177	VIFE (manufacturer specific)	FF
123	178	VIFE(Phase 1)	01
124	179-182	L1 Power Factor	xxxxxxxx
125	183	DIF (32 bit integer)	04
126	184	VIF (unit kWh with resolution 0.001)	FF
127	185	VIFE	AE
128	186	VIFE (manufacturer specific)	FF
129	187	VIFE(Phase 2)	02
130	188-191	L2 Power Factor	xxxxxxxx
131	192	DIF (32 bit integer)	04
132	193	VIF (unit kWh with resolution 0.001)	FF
133	194	VIFE	AE
134	195	VIFE (manufacturer specific)	FF
135	196	VIFE(Phase 3)	03
136	197-200	L3 Power Factor	xxxxxxxx
137	201	DIF (End of data record)	1F
138	202	Check sum	xx
139	203	Stop	16

Telegram 5 :

Sr.no	Bytes	Field Name	Values
1	1	Start	68
2	2	L-Field	64
3	3	L-Field	64
4	4	Start	68
5	5	C-Field	08
6	6	A-Field	xx
7	7	CI-Field	72
8	08~11	Identification number	xxxxxxxx
9	12~13	Manufacturer's ID (RIL)	2C 49
10	14	Version	01
11	15	Medium	02
12	16	Access number	01
13	17	Status	00
14	18-19	Signature	00 00
15	20	DIF (32 bit integer)	04
16	21	VIF (VIF in next byte)	FD
17	22	VIFE	A5
18	23	VIF (manufacturer specific)	FF
19	24	VIFE	29
20	25-28	DIT	xxxxxxxx
21	29	DIF (32 bit integer)	04
22	30	VIF (VIF in next byte)	FF
23	31	VIFE	53
24	32-35	Reset Parameters	xxxxxxxx
25	36	DIF (32 bit integer)	04
26	37	VIF (VIF in next byte)	FF
27	38	VIFE	71
28	39-42	Primary Addresses	xxxxxxxx
29	43	DIF (32 bit integer)	04
30	44	VIF (manufacturer specific)	FF
31	45	VIFE	31
32	46-49	Pulse Width 1	xxxxxxxx
33	50	DIF (32 bit integer)	04
34	51	VIF (manufacturer specific)	FF
35	52	VIFE	32
36	53-56	Pulse Divisor 1	xxxxxxxx

37	57	DIF (32 bit integer)	04
38	58	VIF (manufacturer specific)	FF
39	59	VIFE	33
40	60	Pulse para 1	xxxxxxxx
41	61	DIF (32 bit integer)	04
42	62	VIF (manufacturer specific)	FF
43	63	VIFE	34
44	64-67	Pulse Width 2	xxxxxxxx
45	68	DIF (32 bit integer)	04
46	69	VIF (manufacturer specific)	FF
47	70	VIFE	35
48	71-74	Pulse Divisor 2	xxxxxxxx
49	75	DIF (32 bit integer)	04
50	76	VIF (manufacturer specific)	FF
51	77	VIFE	36
52	78-81	Pulse para 2	xxxxxxxx
53	82	DIF (32 bit integer)	04
54	83	VIF (manufacturer specific)	FF
55	84	VIFE	37
56	85-88	Autoscroll	xxxxxxxx
57	89	DIF (32 bit integer)	04
58	90	VIF (manufacturer specific)	FF
59	91	VIFE	38
60	92-95	Baud Rate	xxxxxxxx
61	96	DIF (32 bit integer)	04
62	97	VIF (manufacturer specific)	FF
63	98	VIFE	39
64	99-102	Password	xxxxxxxx
65	103	DIF (More data in next Telegram)	0F
66	104	Check sum	01
67	105	Stop	16

Write Parameters for ED43XX MBUS models

DIT (Demand Integration Time) :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	09
3	L Field	09
4	Start	68
5	C Field	53
6	A Field	yy
7	CI Field	51
8	DIF (8 bit integer)	01
9	VIF (VIF in next byte)	FD
10	VIFE	A5
11	VIFE (next byte is manufacturer specific)	FF
12	VIFE (DIT)	29
13	Demand Integration time	xx
14	Check Sum	CS
15	Stop	16

Response - E5 (for EX11XX & EX21XX MBUS models)

Valid values of xx - 05 - 5 min

0A - 10 min

0F - 15 min

1E - 30 min

01 - 1 min

3C - 60 min

Reset Parameters :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	07
3	L Field	07
4	Start	68
5	C Field	53
6	A Field	01

7	CI Field	51
8	DIF (8 bit integer)	01
9	VIF (manufacturer specific)	FF
10	VIFE (Reset Parameter)	53
11	Reset Parameters	xx
12	Check Sum	CS
13	Stop	16

Response - E5

Valid values of xx - 1 - Energy Reset

2 - Demand Reset

3 - PD Count

4 - All

Primary Address :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	07
3	L Field	07
4	Start	68
5	C Field	53
6	A Field	yy
7	CI Field	51
8	DIF (8 bit integer)	01
9	VIF (manufacturer specific)	FF
10	VIFE	2E
11	primary Address	xx
12	Check Sum	CS
13	Stop	16

1. Pulse Duration 1 :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	07
3	L Field	07
4	Start	68
5	C Field	53
6	A Field	01
7	CI Field	51
8	DIF (8 bit integer)	01
9	VIF (manufacturer specific)	FF
10	VIFE (Pulse Width)	31
12	Pulse Width	xx
13	Check Sum	CS
14	Stop	16

Response - E5

Valid values of xx - 3C -60

64 - 100

C8 - 200 ms

Pulse Rate 1 :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	08
3	L Field	08
4	Start	68
5	C Field	53
6	A Field	01
7	CI Field	51
8	DIF (16 bit integer)	01
9	VIF (manufacturer specific)	FF
10	VIFE (Pulse Rate)	32
11	Pulse Rate	xx
		xx
12	Check Sum	CS
13	Stop	16

Response - E5

Valid values of xx - 01 00 - 1

0A - 00 - 10

64 - 00 - 100

03 - E8 - 1000

F4 - 01 - 500

02 - 00 - 0.1

03 - 00 - 0.01

Pulse Parameter 1 :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	07
3	L Field	07
4	Start	68
5	C Field	53
6	A Field	01
7	Cl Field	51
8	DIF (8 bit integer)	01
9	VIF (manufacturer specific)	FF
10	VIFE	33
11	Pulse Parameter 1	xx
12	Check Sum	CS
13	Stop	16

Response - E5

Valid values of xx - 0 Total Active Energy

1 - Import Active Energy

2 - Export Active Energy

3 - Total Reactive Energy

4 - Import Reactive Energy

5 - Export Reactive Energy

Pulse Duration 2 :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	07
3	L Field	07
4	Start	68

5	C Field	53
6	A Field	01
7	CI Field	51
8	DIF (8 bit integer)	01
9	VIF (manufacturer specific)	FF
10	VIFE (Pulse Duration)	34
12	Pulse Duration	xx
13	Check Sum	CS
14	Stop	16

Response - E5

Valid values of xx - 3C -60

64 - 100

Pulse Rate 2 : C8 - 200 ms

Sr. No.	Field Names	Values
1	Start	68
2	L Field	08
3	L Field	08
4	Start	68
5	C Field	53
6	A Field	01
7	CI Field	51
8	DIF (16 bit integer)	01
9	VIF (manufacturer specific)	FF
10	VIFE (Pulse Rate)	35
11	Pulse rate	xx
		xx
12	Check Sum	CS
13	Stop	16

Response - E5

Valid values of xx - 01 00 - 1

0A - 00 - 10

64 - 00 - 100

03 - E8 - 1000

F4 - 01 - 500

02 - 00 - 0.1

03 - 00 - 0.01

Pulse Parameter 2 :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	07
3	L Field	07
4	Start	68
5	C Field	53
6	A Field	01
7	CI Field	51
8	DIF (8 bit integer)	01
9	VIF (manufacturer specific)	FF
10	VIFE	36
11	Pulse Parameter 2	xx
12	Check Sum	CS
13	Stop	16

Response - E5

Valid values of xx - 0 Total Active Energy

- 1 - Import Active Energy
- 2 - Export Active Energy
- 3 - Total Reactive Energy
- 4 - Import Reactive Energy
- 5 - Export Reactive Energy

Autoscroll :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	07
3	L Field	07
4	Start	68
5	C Field	53
6	A Field	01
7	CI Field	51
8	DIF (8 bit integer)	01
9	VIF (manufacturer specific)	FF
10	VIFE (Auto Scroll)	37
11	Autoscroll	xx
12	Check Sum	CS
13	Stop	16

Response - E5

Valid values of xx - 0 - OFF

1 - ON

Baud Rate :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	03
3	L Field	03
4	Start	68
5	C Field	73
6	A Field	01
7	Baud Rate	xx
8	Check Sum	CS
9	Stop	16

Response - E5

Valid values of xx - B8 - 300

B9 - 600

BA - 1200

BB - 2400

BC - 4800

BD - 9600

Password :

Sr. No.	Field Names	Values
1	Start	68
2	L Field	08
3	L Field	08
4	Start	68
5	C Field	53
6	A Field	01
7	CI Field	51
8	DIF (8 bit integer)	02
9	VIF (next byte extension)	FD
10	VIFE (Password)	30

11	Valid Value	xx
		xx
12	Check Sum	CS
13	Stop	16

Response - E5

Valid values of xx - 0000 to 9999(New Password)

List of abbreviations :

s.a.- Secondary address.

p.a.- Primary address.

S - Start

ST - Stop.

L-F Length Field/ L Field C-FControl Field/ C Field A-FAddress Field/ A Field.

CI-F Control Information Field/ CI Field CSCheck sum.

DIF Data Information Field.

DIFE Data Information Field Extension VIFValue Information Field.

VIFE Value Information Field Extension M.Id.Manufacturer Identification Number Ver.

Version Med.Medium