Eastron MBUS Protocol

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1 Standard

Data records

The data, together with information regarding coding, length and the type of data is transmitted in data records. The maximum total length of the data records is 240 bytes. The following table shows the structure of the data record (transmitted left to right):

Data Record Header				Data
Data Information Block (DIB)		Value Information Block (VIB)		
DIF	DIFE	VIF	VIFE	
1 byte	0-10 bytes	1 byte	0-10 bytes	0–n bytes

Each Data record consists of a data record header (DRH) and the actual data. The DRH in turn consists of the data information block (DIB) to describe the length, type and coding of the data, and the value information block (VIB) to give the value of the unit and the multiplier.

Data information block (DIB)

The DIB contains at least one byte (Data Information Field, DIF), and is in some cases expanded with, a maximum of 10, DIFE's (Data Information Field Extension). The following table shows the structure of the Data Information Field (DIF):

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Extenion bit	LSB(Least significant bit.) of storage NO	Function field		Data field			

The following list explains the content of the DIF: • The Extension Bit is set when the next byte is a DIFE. • The LSB of storage No. is normally set to 0 to indicate actual value. (1=stored value). • The Function Field is set to 00 for instantaneous values, 01 for maximum values and 10 for minimum values. • The Data Field shows the format of the data. The following table shows the coding of the data field:

Code	Meaning	Length
0000	No data	0
0001	8 bit integer	1
0010	16 bit integer	2
0100	32 Bit Integer	3
0111	64 Bit Integer	8
1001	2 digit BCD	1
1010	4 digit BCD	2
1011	6 digit BCD	3
1100	8 digit BCD	4
1101	Variable Length (ASCII)	Variable
1110	12 digit BCD	6

The function field gives the type of data as follows:

Code	Description
00b	Instantaneous value
01b	Maximum value

10b	Minimum value
11b	Value during error state

The following table shows the structure of the Data Information Field Extension (DIFE)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 2	Bit 1
Extension bit	Unit	Tariff		Storage no.			

The following list explains the content of the DIFE: • Unit is used for power and energy values show the type of power/energy. It is also used to define the number of inputs/outputs and to specify sign of offset when accessing event log data. • Tariff is used for energy values to give tariff information. • Storage number is set to 0 in values read to indicate momentary values. Storage number bigger than 0 is used to indicate previously stored values, i.e, values stored at a specific point of time in the past.

Custom

Unit	Meaning
0000 000n	1:Exported 0:import
0000 0110	NET
0000 0010	Total
0000 0011	Reactive
0000 0111	apparent

Value Information block (VIB)

VIB follows a DIF or DIFE without extension bit. It contains one value information field (VIF) and is in some cases expanded with up to 10 value information field extensions (VIFE). The following table shows the structure of the value informatiuon field (VIF):

Bit 7	6	5	4	3	2	1	0
Extension Bit	Value information						

Value information contains information about the value (unit, status, etc.,) The extension bit is set when the next byte is a VIFE. If VIF or VIFE = FFh then the next VIFE is manufacturer specific. The manufacturer specific VIFE has the same construction as a VIF. If the extension bit of the manufacturer specific VIFE is set, and the VIFE is less than 1111 1000, then the next byte is a standard VIFE, otherwise it is the first data byte. If the extension bit of the manufacturer specific VIFE is set and the VIFE is bigger than or equal to 1111 1000, then the next byte is an extension of manufacturer specific VIFE's.

Value Information Field codes

Standard VIF codes

VIF-code	Description	Range coding	Range
E000 0nnn	Energy	10(nnn-3) Wh	0.001Wh to 10000Wh
E010 1nnn	Power	10(nnn-3) W	0.001W to 10000W
E111 1000	Fabrication No		00000000 to 99999999
E111 1010	Bus address		0–250
1111 1011	Extension of VIFcodes		Not used by the meter
E111 1100	VIF in following string		allows user definable VIF´s

	(length in first byte)		(in plain ASCII-String)
1111 1101	Extension of VIFcodes		True VIF is given in the first VIFE and is coded using Table FD
1111 1111	Manufacturer specific		Next VIFE is manufac turer specific

Standard codes for VIFE used with extension indicator FDh

If the VIF contains the extension indicator FDh then the true VIF is contained in the first VIFE.

VIFE-code	**Description**
E000 1010	Manufacturer
E000 1100	Model/Version
E000 1101	Hardware version
E000 1110	Firmware Version
E000 1111	Other software version
E001 1010	Digital Output (binary)
E001 1011	Digital Input (binary)
E001 1100	Baud rate
E100 nnnn	10(nnnn-9) Volts
E101 nnnn	10(nnnn-12) A
E110 0001	Cumulating coun
E001 0110	Password

Alternate VIFE-Code Extension table (following VIF = 0FBh for primary VIF)

VIFE-code	Description	Range Coding	Range
E000 000n	Energy	10(n-1) MWh	0.1MWh to 1MWh
E000 001n	Reactive energy	10(n) kVARh	1 to 10 kVARh
E010 100n	Power	10(n-1) MW	0,1 MW to 1 MW

Standard codes for VIFE

The following value for VIFE's is defined for an enhancement of VIF's other than FDh and FBh:

VIFE-code	Description
1111 1111	Next VIFE is manufacturer specific

First manufacturer specific VIFE-codes

VIFE-code	Description
E000 0000	total
E000 0001	L1
E000 0010	L2
E000 0011	L3
E000 0100	N
E000 0101	L1-L2
E000 0110	L2-L3
E000 0111	L3-L1
E000 1000	Average line to neutral
E000 1001	Average line to line
E100 0nnn	Angle (10(nnn - 3) ˚)

E101 1nnn	Frequency (Hz *10 (nnn-3)
E110 0nnn	Power factor (*10 (nnn-3)
E111 0010	resettable energy
E111 0011	demand

C Field (Control Field, Function Field)

Besides labeling the functions and the actions caused by them, the function field specifies the direction of data flow, and is responsible for various additional tasks in both the calling and replying directions. Figure shows the coding of the individual bits of the C 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

The highest value (most significant) bit is reserved for future functions, and at present is allocated the value 0; bit number 6 is used to specify the direction of data flow. The frame count bit FCB indicates successful transmission procedures , in order to avoid transmission loss or multiplication. If the expected reply is missing or reception is faulty, the master sends again the same telegram with an identical FCB, and the slave replies with the same telegram as previously. The master indicates with a 1 in the FCV bit (frame count bit valid), that the FCB is used. When the FCV contains a "0", the slave should ignore the FCB.

In the replying direction, both these bits can undertake other tasks. The DFC (data flow control) serves to control the flow of data, in that the slave with a DFC=1 indicates that it can accept no further data. 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 bits 0 to 3 of the control field code the true function or action of the message. Table shows the function codes used in the calling and the replying directions.

Name	C Field Binary	C Field Hex.	Telegram	Description
SND_NKE	0100 0000	40	Short Frame	Initialization of Slave
SND_UD	01F1 0011	53/73	Long/Control Frame	Send User Data to Slave
REQ_UD2	01F1 1011	5B/7B	Short Frame	Request for Class 2 Data
REQ_UD1	01F1 1010	5A/7A	Short Frame	Request for Class1 Data(Alarm)
RSP_UD	00AD 1000	08/18/28/38	Long/Control Frame	Data Transfer from Slave to Master after Request

Data

The Data follows a VIF or a VIFE without the extension bit set

Manufacturer data header (MDH)

The manufacturer data header (MDH) is either made up by the character 1Fh that indicates that more data will follow in the next telegram, or by 0Fh indicating the last telegram.

Check sum

The Check Sum is used to recognize transmission and synchronization faults. It is calculated from the arithmetical sum, of the bytes from the control field to the last user data, without taking carry digits into account .

2 Initialization slave

Format:

Start	C Field	A Field	Check Sum	Stop
10	40	XX	CS	16

XX=1 to FF

The address field serves 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 can therefore take values from 0 to 255. The addresses 1 to 250 can be allocated to the individual slaves,up to a maximum of 250.Unconfigured slaves are given the address 0 at manufacture,and as a rule are allocated one of these addresses when connected to the M-Bus. The addresses254 (FE) and 255 (FF) are used to transmit information to all participants (Broadcast). With address 255 none of the slaves reply, and with address 254 all slaves reply with their own addresses.The latter case naturally results in collisions when two or more slaves are connected,and should only be used for test purposes.The address 253 (FD) indicates that the addressing has been performed in the Network Layer instead of Data Link Layer,The FD used when using The second level address. The remaining addresses 251 and 252 have been kept for future applications.

2.1 How to initialize a meter which you don't know the address

Master to slave :10 40 fe 3e 16
Slave to master：e5(success)

2.2 Remove the secondary address matching symbol of all the meters on BUS.

Master to slave : 10 40 fd 3d 16
Slave : e5(success)

2.3 How to initialize all meters on the bus line by using FF as broadcast address

Master to slave : 10 40 ff 3f 16
Slave : No answer

2.4 How to Initialize a Slave with specific address

Example:Address 01
Master to slave : 10 40 01 41 16
Slave to master: e5

3 How to Set Baut rate

3.1 Point to point baud-rate setting command format(Control Frame)

Start	L Field	L Field	Start	C Field	A Field	CI Field	Check Sum	Stop
68H	03	03	68H	53/73	Addr	b8~bd	CS	16

L Field------Byte length
C Field--------Control Field, Function Field
A Field --------Address Field
CI Field --------control information field
Check Sum------The Check Sum is calculated from the arithmetical sum of the data mentioned above, without taking carry digits into account.
B8-------300
B9-------600
BA-------1200
BB-------2400
BC-------4800
BD-------9600

Example: (Meter address is 01)
(1) How to change Baudrate to 2400bps
Master to slave: 68 03 03 68 53 01 BB 0F 16
Slave to master: E5
(2) How to change Baudrate to 9600
Master to slave: 68 03 03 68 53 01 BD 11 16
Slave to master: E5

3.2 how to use Broadcast command to set baudrate

Format:

Start	**L Field**	**L Field**	**Start**	**C Field**	**A Field**	**CI Field**	**Check Sum**	**Stop**
68H	03	03	68H	53/73	ff	b8~bd	CS	16

Slave to master: no answer
B8-------300
B9-------600
BA-------1200
BB-------2400
BC-------4800
BD-------9600

Example:
Change all the meters' baudrate to 2400bps

Master to slave:： 68 03 03 68 53 **ff** bb 0d 16
Slave to Master: No answer

4 How to Set primary address

4.1 How to set the address of all Slaves to 01

Format:

Start	L Field	L Field	Start	C Field	A Field	CI Field	DIF	VIF	Address Data	Check Sum	Stop
68H	06	06	68H	53/73	fe	51	01	7A	XX	CS	16

Example：
Master to slave : 68 06 06 68 53 fe 51 01 7a **01** 1e 16
Slave to master :e5

4.2 How to use Broadcast Command to set primary address to 01

Master to slave: 68 06 06 68 53 **ff** 51 01 7a **01** 1f 16

Start	L Field	L Field	Start	C Field	A Field	CI Field	DIF	VIF	Address Data	Check Sum	Stop
68H	06	06	68H	53/73	ff	51	01	7A	XX	CS	16

Slave :no answer

4.3 How to change Address from 01 to 02

Format

Start	L Field	L Field	Start	C Field	A Field	CI Field	DIF	VIF	Address Data	Check Sum	Stop
68H	06	06	68H	53/73	XX	51	01	7A	YY	CS	16

XX--current primary Address
YY--new primary address
Master to slave: 68 06 06 68 73 **01** 51 01 7A **02** 42 16
Slave to master :e5

4.4 How to Set primary address to 01 by using secondary address

For example: secondary address:12345678
Step1 Initialize the slave
Master to slave ： 10 40 ff 3f 16
Slave to master： no answer

Step2 Check the secondary address. After receiving the command, the Slave will check if the secondary address in the command is same with its secondary address or not.
Maseter to slave:68 0B 0B 68 73 **FD** 52 **78 56 34 12** FF FF FF FF D2 16

FD--- the primary Address used when you use secondary address to read data.
78 56 34 12 ---the meter's secondary address is 12 34 56 78
Master to slave :e5(success)

Step3 Change the primary address to 01
Master to slave :68 06 06 68 73 FD 51 01 7A **01** 3D
01---- new primary address
Slave to master:e5

5 Set the complete identification of the slave

(ID=12345678)

Start	L Field	L Field	Start	C Field	A Field	CI Field	DIF	VIF	Identification No	Check Sum	Stop
68H	09	09	68H	53/73	addr	51	04	79	4 byte	CS	16

For example: (Meter address is 01)
Master to slave: 68 09 09 68 53 01 51 04 79 78 56 34 12 36 16
Slave to master:e5

6 How to read out of class 2 information

6.1 Use primary address 01 to read Energy information

Format:
Master to slave: 10 7B/5B adr cs 16
Slave to master: Variable data structure
Example: 10 7B 01 7C 16

6.2 How to read out a meter's Energy information by using broadcast address 254 (FE)

Master to slave: 10 7b/5b fe cs 16
Slave to master: Variable data structure
Example: 10 5B FE 59 16

6.3 How to read out the meter's Energy information by using secondary Address

For example: Secondary address:12 34 56 78

Step1 initialize the slave
Master to slave:10 40 ff 3f 16
Slave to master: No answer

Step2 Check the secondary address. After receiving the command, the Slave will check if the secondary address in the command is same with its secondary address or not.

Master to slave:68 0b 0b 68 73 fd 52 78 56 34 12 FF FF FF FF d2 16
Slave to master:E5

Step3 Read the Energy information
Master to slave :10 7b fd 78 16

Slave to master:

Energy information

meter_2T

mode 1

bytes	Parameters	data structure	Notice
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 0A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	Energy Meter
1		55	ACCESS NO
1		00	STATUS
2		00 00	Signature
6	Current total active energy	0C	DIF: 8digit BCD ， Current Value
		04(1)	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current import active energy	0C	DIF: 8digit BCD， Current Value
		04(1)	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current export active energy	0C	DIF: 8digit BCD， Current Value
		04(1)	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current T1 active energy	0C	DIF: 8digit BCD， Current Value
		04(1)	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current T2 active energy	0C	DIF: 8digit BCD， Current Value
		04(1)	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current resettable total active energy	0C	DIF: 8digit BCD ， Current Value
		04(1)	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current resettable import active energy	0C	DIF: 8digit BCD， Current Value
		04(1)	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current resettable export active energy	0C	DIF: 8digit BCD， Current Value
		04(1)	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current resettable T1 active energy	0C	DIF: 8digit BCD ， Current Value
		04(1)	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current resettable T2 active energy	0C	DIF: 8digit BCD， Current Value
		04(1)	VIF: 10wh (0.01Kwh)

		78 56 34 12	123456.78kwh
7	Current total reactive energy	0C	DIF: 8digit BCD ， Current Value
		FD	VIF:fd
		3D(2)	VIFE: 10 VArh (0.01KVArh)
		78 56 34 12	123456.78kVarh
7	Current import reactive energy	0C	DIF: 8digit BCD， Current Value
		FD	VIF:fd
		3D(2)	VIFE: 10 VArh (0.01KVArh)
		78 56 34 12	123456.78kVarh
7	Current export reactive energy	8C	DIF: 8digit BCD， Current Value
		FD	VIF:fd
		3D(2)	VIFE: 10 VArh (0.01KVArh)
		78 56 34 12	123456.78kVarh
7	Current total resettable reactive energy	0C	DIF: 8digit BCD ， Current Value
		FD	VIF:fd
		3D(2)	VIFE: 10 VArh (0.01KVArh)
		78 56 34 12	123456.78kVarh
7	Current resettable import reactive energy	0C	DIF: 8digit BCD， Current Value
		FD	VIF:fd
		3D(2)	VIFE: 10 VArh (0.01KVArh)
		78 56 34 12	123456.78kVar
7	Current resettable export reactive energy	0C	DIF: 8digit BCD， Current Value
		FD	VIF:fd
		3D(2)	VIFE: 10 VArh (0.01KVArh)
		78 56 34 12	123456.78kVar
1	CHECK SUM	CS	
1	End	16	

Mode 2

bytes	Parameters	data structure	Notice
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 0A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	electricity
1		xx	ACCESS NO
1		00	STATUS
2		00 00	Signature
8	Current total active energy	8C	DIF: 8digit BCD
		80	DIFE:unit1
		40	DIFE:unit 2
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current import active energy	0C	DIF: 8digit BCD
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
7	Current export active energy	8C	DIF: 8digit BCD
		40	DIFE:unit 1
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
8	Current T1 active energy	8C	DIF: 8digit BCD
		90	DIFE:tariff 1
		40	DIFE:unit 2
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh

8	Current T2 active energy	8C	DIF: 8digit BCD
		A0	DIFE:tariff 2
		40	DIFE:unit 2
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
10	Current resettable total active energy	8C	DIF: 8digit BCD
		80	DIFE
		40	DIFE:unit 2
		84	VIF: 10wh (0.01Kwh)
		ff	VIFE next byte is manufacturer specific
		72	VIFE resettable energy
		78 56 34 12	123456.78kwh
8	Current resettable import active energy	0C	DIF: 8digit BCD
		84(1)	VIF: 10wh (0.01Kwh)
		ff	VIFE next byte is manufacturer specific
		72	VIFE resettable energy
		78 56 34 12	123456.78kwh
9	Current resettable export active energy	8C	DIF: 8digit BCD
		40	DIFE:unit 1
		84	VIF: 10wh (0.01Kwh)
		ff	VIFE next byte is manufacturer specific
		72	VIFE resettable energy
		78 56 34 12	123456.78kwh
10	Current resettable T1 active energy	8C	DIF: 8digit BCD
		90	DIFE:tariff 1
		40	DIFE:unit 2
		84	VIF: 10wh (0.01Kwh)
		ff	VIFE next byte is manufacturer specific
		72	VIFE resettable energy
		78 56 34 12	123456.78kwh
10	Current resettable T2 active energy	8C	DIF: 8digit BCD
		A0	DIFE:tariff 2
		40	DIFE:unit 2
		84	VIF: 10wh (0.01Kwh)
		ff	VIFE next byte is manufacturer specific
		72	VIFE resettable energy
		78 56 34 12	123456.78kwh
9	Current total reactive energy	8C	DIF: 8digit BCD
		80	DIFE
		40	DIFE:unit 2
		FB	VIF:fB
		02	VIFE: 1 KVArh
		78 56 34 12	12345678kVarh
7	Current import reactive energy	0C	DIF: 8digit BCD
		FB	VIF:fB
		02	VIFE: 1 KVArh
		78 56 34 12	12345678kVarh
8	Current export reactive energy	8C	DIF: 8digit BCD
		40	DIFE:unit 1
		FB	VIF:fB
		02	VIFE: 1 KVArh
		78 56 34 12	12345678kVarh
11	Current total resettable	8C	DIF: 8digit BCD

	reactive energy	80	DIFE
		40	DIFE:unit 2
		FB	VIF:fB
		82	VIFE: 1KVArh
		FF	VIFE next byte is manufacturer specific
		72	VIFE resettable energy
		78 56 34 12	12345678kVarh
9	Current resettable import reactive energy	0C	DIF: 8digit BCD
		FB	VIF:fB
		82	VIFE: 1KVArh
		FF	VIFE next byte is manufacturer specific
		72	VIFE resettable energy
		78 56 34 12	12345678kVar
10	Current resettable export reactive energy	8C	DIF: 8digit BCD
		40	DIFE:unit 1
		FB	VIF:fB
		82	VIFE: 1KVArh
		FF	VIFE next byte is manufacturer specific
		72	VIFE resettable energy
		78 56 34 12	12345678kVar
1	CHECK SUM	CS	
1	End	16	

Meter without 2T

mode 1

bytes	Parameters	data structure	Notice
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	Energy Meter
1		55	ACCESS NO
1		00	STATUS
2		00 00	Signature
6	Current total active energy	0C	DIF: 8digit BCD ， Current Value
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current import active energy	0C	DIF: 8digit BCD， Current Value
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current export active energy	0C	DIF: 8digit BCD， Current Value
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current resettable total active energy	0C	DIF: 8digit BCD ， Current Value
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current resettable import active energy	0C	DIF: 8digit BCD， Current Value
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current resettable export active energy	0C	DIF: 8digit BCD， Current Value
		04	VIF: 10wh (0.01Kwh)

		78 56 34 12	123456.78kwh
7	Current total reactive energy	0C	DIF: 8digit BCD ， Current Value
		FD	VIF:fd
		3D(2)	VIFE: 10 VArh (0.01KVArh)
		78 56 34 12	123456.78kVarh
7	Current import reactive energy	0C	DIF: 8digit BCD， Current Value
		FD	VIF:fd
		3D(2)	VIFE: 10 VArh (0.01KVArh)
		78 56 34 12	123456.78kVarh
7	Current export reactive energy	0C	DIF: 8digit BCD， Current Value
		FD	VIF:fd
		3D(2)	VIFE: 10 VArh (0.01KVArh)
		78 56 34 12	123456.78kVarh
7	Current total resettable reactive energy	0C	DIF: 8digit BCD ， Current Value
		FD	VIF:fd
		3D(2)	VIFE: 10 VArh (0.01KVArh)
		78 56 34 12	123456.78kVarh
7	Current resettable import reactive energy	0C	DIF: 8digit BCD， Current Value
		FD	VIF:fd
		3D(2)	VIFE: 10 VArh (0.01KVArh)
		78 56 34 12	123456.78kVar
7	Current resettable export reactive energy	0C	DIF: 8digit BCD， Current Value
		FD	VIF:fd
		3D(2)	VIFE: 10 VArh (0.01KVArh)
		78 56 34 12	123456.78kVar
1	CHECK SUM	CS	
1	End	16	

mode 2

bytes	Parameters	data structure	Notice
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 0A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	electricity
1		xx	ACCESS NO
1		00	STATUS
2		00 00	Signature
8	Current total active energy	8C	DIF: 8digit BCD
		80	DIFE:
		40	DIFE:unit 2
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current import active energy	0C	DIF: 8digit BCD
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
7	Current export active energy	8C	DIF: 8digit BCD
		40	DIFE:unit 1
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
10	Current resettable total active energy	8C	DIF: 8digit BCD
		80	DIFE
		40	DIFE:unit 2
		84	VIF: 10wh (0.01Kwh)

		ff	VIFE next byte is manufacturer specific
		72	VIFE resettable energy
		78 56 34 12	123456.78kwh
8	Current resettable import active energy	0C	DIF: 8digit BCD
		84(1)	VIF: 10wh (0.01Kwh)
		ff	VIFE next byte is manufacturer specific
		72	VIFE resettable energy
		78 56 34 12	123456.78kwh
9	Current resettable export active energy	8C	DIF: 8digit BCD
		40	DIFE:unit 1
		84	VIF: 10wh (0.01Kwh)
		ff	VIFE next byte is manufacturer specific
		72	VIFE resettable energy
		78 56 34 12	123456.78kwh
9	Current total reactive energy	8C	DIF: 8digit BCD
		80	DIFE
		40	DIFE:unit 2
		FB	VIF:fB
		02	VIFE: 1 KVArh
		78 56 34 12	12345678kVarh
7	Current import reactive energy	0C	DIF: 8digit BCD
		FB	VIF:fB
		02	VIFE: 1 KVArh
		78 56 34 12	12345678kVarh
8	Current export reactive energy	8C	DIF: 8digit BCD
		40	DIFE:unit 1
		FB	VIF:fB
		02	VIFE: 1 KVArh
		78 56 34 12	12345678kVarh
11	Current total resettable reactive energy	8C	DIF: 8digit BCD
		80	DIFE
		40	DIFE:unit 2
		FB	VIF:fB
		82	VIFE: 1KVArh
		FF	VIFE next byte is manufacturer specific
		72	VIFE resettable energy
		78 56 34 12	12345678kVarh
9	Current resettable import reactive energy	0C	DIF: 8digit BCD
		FB	VIF:fB
		82	VIFE: 1KVArh
		FF	VIFE next byte is manufacturer specific
		72	VIFE resettable energy
		78 56 34 12	12345678kVar
10	Current resettable export reactive energy	8C	DIF: 8digit BCD
		40	DIFE:unit 1
		FB	VIF:fB
		82	VIFE: 1KVArh
		FF	VIFE next byte is manufacturer specific
		72	VIFE resettable energy
		78 56 34 12	12345678kVar
1	CHECK SUM	CS	
1	End	16	

(1) VIF=FB,VIFE=01,unit = MWH

Electrical information

Three-phase meter

Mode 1

bytes		data structure	Notice
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	Energy Meter
1		55	ACCESS NO
1		00	STATUS
2		00 00	Signature
6	L1 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47	VIFE: 0.01V
		56 34 12	1234.56V
6	L2 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47	VIFE: 0.01V
		56 34 12	1234.56V
6	L3 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47	VIFE: 0.01V
		56 34 12	1234.56V
6	L1-L2 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47	VIFE: 0.01V
		56 34 12	1234.56V
6	L2-L3 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47	VIFE: 0.01V
		56 34 12	1234.56V
6	L3-L1 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47	VIFE: 0.01V
		56 34 12	1234.56V
6	L1 current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59	VIFE: 1mA(xxx.xxxA)
		56 34 12	123456mA(123.456A)
6	L2 current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59	VIFE: 1mA(xxx.xxxA)
		56 34 12	123456mA(123.456A)
6	L3 current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59	VIFE: 1mA(xxx.xxxA)
		56 34 12	123456mA(123.456A)

6	N current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59	VIFE: 1mA(xxx.xxxA)
		56 34 12	123456mA(123.456A)
5	total active power	0b	DIF: 6digit BCD
		2a (1)	VIF:0.1W(xx.xxxxkw)
		56 34 12	12345.6w(12.3456kw)
5	L1 active power	0b	DIF: 6digit BCD
		2a (1)	VIF:0.1W(xx.xxxxkw)
		56 34 12	12345.6w(12.3456kw)
5	L2 active power	0b	DIF: 6digit BCD
		2a (1)	VIF:0.1W(xx.xxxxkw)
		56 34 12	12345.6w(12.3456kw)
5	L3 active power	0b	DIF: 6digit BCD
		2a (1)	VIF:0.1W(xx.xxxxkw)
		56 34 12	12345.6w(12.3456kw)
6	total reactive power	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3b (2)	VIFE:0.1var(xx.xxxxkvar)
		56 34 12	12345.6var (12.3456kvar)
6	L1 reactive power	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3b (2)	VIFE:0.1var(xx.xxxxkvar)
		56 34 12	12345.6var (12.3456kvar)
6	L2 reactive power	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3b (2)	VIFE:0.1var(xx.xxxxkvar)
		56 34 12	12345.6var (12.3456kvar)
6	L3 reactive power	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3b (2)	VIFE:0.1var(xx.xxxxkvar)
		56 34 12	12345.6var (12.3456kvar)
5	Total power factor	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 05	0.500
5	A power factor	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 05	0.500
5	B power factor	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 05	0.500
5	C power factor	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 05	0.500
5	Frequency	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 50	50.00 z
1	End	CS	
1		16	

Mode 2

bytes		data structure	Notice
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	electricity
1		xx	ACCESS NO
1		00	STATUS
2		00 00	Signature
8	L1 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		01	VIFE L1
		56 34 12	1234.56V
8	L2 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		02	VIFE L2
		56 34 12	1234.56V
8	L3 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		03	VIFE L3
		56 34 12	1234.56V
8	L1-L2 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		05	VIFE L1-L2
		56 34 12	1234.56V
8	L2-L3 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		06	VIFE L2-L3
		56 34 12	1234.56V
8	L3-L1 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		07	VIFE L3-L1
		56 34 12	1234.56V
8	L1 current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9	VIFE: 1mA(xxx.xxxA)
		FF	VIFE next byte is manufacturer specific
		01	VIFE L1
		56 34 12	123456mA(123.456A)

8	L2 current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9	VIFE: 1mA(xxx.xxxA)
		FF	VIFE next byte is manufacturer specific
		02	VIFE L2
		56 34 12	123456mA(123.456A)
8	L3 current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9	VIFE: 1mA(xxx.xxxA)
		FF	VIFE next byte is manufacturer specific
		03	VIFE L3
		56 34 12	123456mA(123.456A)
8	N current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9	VIFE: 1mA(xxx.xxxA)
		FF	VIFE next byte is manufacturer specific
		04	VIFE N
		56 34 12	123456mA(123.456A)
5	total active power	0b	DIF: 6digit BCD
		2A	VIF:0.1W(xx.xxxxkw)
		56 34 12	12345.6w(12.3456kw)
7	L1 active power	0b	DIF: 6digit BCD
		Aa	VIF:0.1W(xx.xxxxkw)
		FF	VIFE next byte is manufacturer specific
		01	VIFE L1
		56 34 12	12345.6w(12.3456kw)
7	L2 active power	0b	DIF: 6digit BCD
		Aa	VIF:0.1W(xx.xxxxkw)
		FF	VIFE next byte is manufacturer specific
		02	VIFE L2
		56 34 12	12345.6w(12.3456kw)
7	L3 active power	0b	DIF: 6digit BCD
		Aa	VIF:0.1W(xx.xxxxkw)
		FF	VIFE next byte is manufacturer specific
		03	VIFE L3
		56 34 12	12345.6w(12.3456kw)
11	total reactive power	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		40	DIFE : unit 2
		7C	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		56 34 12	123456var (123.456kvar)
13	L1 reactive power	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		40	DIFE : unit 2
		FC	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		FF	VIFE next byte is manufacturer specific
		01	VIFE L1
		56 34 12	123456var (123.456kvar)
13	L2 reactive power	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		40	DIFE : unit 2

		FC	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		FF	VIFE next byte is manufacturer specific
		02	VIFE L2
		56 34 12	123456var (123.456kvar)
13	L3 reactive power	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		40	DIFE : unit 2
		FC	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		FF	VIFE next byte is manufacturer specific
		03	VIFE L3
		56 34 12	123456var (123.456kvar)
6	Total power factor	0b	DIF: 6digit BCD
		FF	VIF next byte is manufacturer specific
		60	VIFE power factor with resolution 0.001
		00 05 f0	-00.500
8	A power factor	0b	DIF: 6digit BCD
		FF	VIF next byte is manufacturer specific
		E0	VIFE power factor with resolution 0.001
		FF	VIFE next byte is manufacturer specific
		01	VIFE L1
		00 05 f0	-00.500
8	B power factor	0b	DIF: 6digit BCD
		FF	VIF next byte is manufacturer specific
		E0	VIFE power factor with resolution 0.001
		FF	VIFE next byte is manufacturer specific
		02	VIFE L2
		00 05 00	00.500
8	C power factor	0b	DIF: 6digit BCD
		FF	VIF next byte is manufacturer specific
		E0	VIFE power factor with resolution 0.001
		FF	VIFE next byte is manufacturer specific
		03	VIFE L3
		00 05 00	00.500
5	Frequency	0a	DIF: 4digit BCD
		FF	VIF next byte is manufacturer specific
		59	VIFE Frequency with resolution 0.01Hz
		XX.XX	Frequency
1	End	CS	
1		16	

Single phase meter

MODE 1

bytes		data structure	Notice
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E

1		01	Generation 1
1		02	electricity
1		55	ACCESS NO
1		00	STATUS
2		00 00	Signature
6	Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47	VIFE: 0.01V
		56 34 12	1234.56V
6	Reserve	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47	VIFE: 0.01V
		00 00 00	0
6	Reserve	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47	VIFE: 0.01V
		00 00 00	0
6	Reserve	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47	VIFE: 0.01V
		00 00 00	0000.00
6	Reserve	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47	VIFE: 0.01V
		00 00 00	0000.00
6	Reserve	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47	VIFE: 0.01V
		00 00 00	0
6	current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59	VIFE: 1mA(xxx.xxxA)
		56 34 12	123456mA(123.456A)
6	Reserve	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59	VIFE: 1mA(xxx.xxxA)
		00 00 00	0
6	Reserve	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59	VIFE: 1mA(xxx.xxxA)
		00 00 00	0
6	Reserve	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59	VIFE: 1mA(xxx.xxxA)
		00 00 00	0
5	active power	0b	DIF: 6digit BCD
		2a	VIF:0.1W(xx.xxxxkw)
		56 34 12	12345.6w(12.3456kw)
5	Reserve	0b	DIF: 6digit BCD
		2a	VIF:0.1W(xx.xxxxkw)
		00 00 00	0
5	Reserve	0b	DIF: 6digit BCD
		2a	VIF:0.1W(xx.xxxxkw)
		00 00 00	0
5	Reserve	0b	DIF: 6digit BCD
		2a	VIF:0.1W(xx.xxxxkw)
		00 00 00	0
6	reactive power	0b	DIF: 6digit BCD
		Fd	VIF:fd

		3b [(2)]	VIFE:0.1var(xx.xxxxkvar)
		56 34 12	12345.6w(12.3456kw)
6	Reserve	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 00 00	0
6	Reserve	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 00 00	0
6	Reserve	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 00 00	0
5	power factor	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 05	0.500
5	Reserve	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 00	0
5	Reserve	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 00	0
5	Reserve	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 00	0
5	Frequency	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 50	50.00 Hz
1	End	CS	
1		16	

Mode 2

bytes		**data structure**	**Notice**
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	electricity
1		xx	ACCESS NO
1		00	STATUS
2		00 00	Signature
6	Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47	VIFE: 0.01V
		56 34 12	1234.56V
6	current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59	VIFE: 1mA(xxx.xxxA)
		56 34 12	123456mA(123.456A)
5	active power	0b	DIF: 6digit BCD

		2A	VIF:0.1W(xx.xxxxkw)
		56 34 12	12345.6w(12.3456kw)
11	reactive power	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		40	DIFE : unit 2
		7C	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		56 34 12	123456var (123.456kvar)
6	power factor	0b	DIF: 6digit BCD
		FF	VIF next byte is manufacturer specific
		60	VIFE power factor with resolution 0.001
		00 05 00	00.500
5	Frequency	0a	DIF: 4digit BCD
		FF	VIF next byte is manufacturer specific
		59	VIFE Frequency with resolution 0.01Hz
		XX.XX	Frequency
1	End	CS	
1		16	

Note(1): VIF=2a, unit=0.1W; VIF=2b, unit=1W; VIF=2C, unit=10W; VIF=2D, unit=100W; VIF=2E, unit=1000W; VIF=2F, unit=10000W

VIF=FB,VIFE=29,unit = MW

Note(2): VIFE=3b, unit=0.1VAr; VIFE=3c, unit=1VAr; VIFE=3d, unit=10VAr/VA; VIFE=3e, unit=100VAr/VA; VIFE=3f, unit=1000VAr/VA;VIFE=40, unit=10000VAr/VA;

electrical information（THD）

Mode 1:
Three-phase

bytes		data structure	Notice
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	Energy Meter
1		55	ACCESS NO
1		00	STATUS
2		00 00	Signature
5	3P4W: Phase 1 L/N volts THD 3P3W: Line 1 to line 2 volts THD.	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 20	20.00%
5	3P4W: Phase 2 L/N volts THD 3P3W: Line 2 to line 3 volts THD.	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 20	20.00%

5	3P4W：Phase 3 L/N volts THD 3P3W：Line 3 to line 1 volts THD.	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 20	20.00%
5	Phase 1 Current THD	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 20	20.00%
5	Phase 2 Current THD	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 20	20.00%
5	Phase 3 Current THD	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 20	20.00%
5	3P4W：Average line to neutral volts THD. 3P3W：Average line to line volts THD	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 20	20.00%
5	Average line current THD	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 20	20.00%
1	End	CS	
1		16	

Single-phase

bytes		**data structure**	**Notice**
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	Energy Meter
1		55	ACCESS NO
1		00	STATUS
2		00 00	Signature
5	Phase 1 L/N volts THD	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 20	20.00%
5	Reserve	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 00	0
5	Reserve	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 00	0
5	Phase 1 Current THD	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 20	20.00%
5	Reserve	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF

		00 00	0
5	Reserve	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 00	0
5	3P4W：Average line to neutral volts THD. 3P3W：Average line to line volts THD	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 20	20.00%
5	Average line current THD	0a	DIF: 4digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		00 20	20.00%
1	End	CS	
1		16	

Mode 2：
Three-phase

bytes		**data structure**	**Notice**
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	Electricity
1		xx	ACCESS NO
1		00	STATUS
2		00 00	Signature
12	Phase 1 L/N volts THD	0b	DIF: 6digit BCD
		FC	VIF:ACSII
		05	Lenth of ASCII
		75	“u”
		44	“D”
		48	“H”
		54	“T”
		25	“%”
		FF	VIFE: next byte is manufacturer specific
		01	VIFE:L1
		00 20 00	20.00%
12	Phase 2 L/N volts THD	0b	DIF: 6digit BCD
		FC	VIF:ACSII
		05	Lenth of ASCII
		75	“u”
		44	“D”
		48	“H”
		54	“T”
		25	“%”
		FF	VIFE: next byte is manufacturer specific
		02	VIFE:L2
		00 20 00	20.00%
12	Phase 3 L/N volts THD	0b	DIF: 6digit BCD
		FC	VIF:ACSII
		05	Lenth of ASCII
		75	“u”
		44	“D”
		48	“H”

		54	“T”
		25	“%”
		FF	VIFE: next byte is manufacturer specific
		03	VIFE:L3
		00 20 00	20.00%
12	Line 1 to line 2 volts THD.	0b	DIF: 6digit BCD
		FC	VIF:ACSII
		05	Lenth of ASCII
		75	“u”
		44	“D”
		48	“H”
		54	“T”
		25	“%”
		FF	VIFE: next byte is manufacturer specific
		05	VIFE:L1-L2
		00 20 00	20.00%
12	Line 2 to line 3 volts THD.	0b	DIF: 6digit BCD
		FC	VIF:ACSII
		05	Lenth of ASCII
		75	“u”
		44	“D”
		48	“H”
		54	“T”
		25	“%”
		FF	VIFE: next byte is manufacturer specific
		06	VIFE:L2-L3
		00 20 00	20.00%
12	Line 3 to line 1 volts THD.	0b	DIF: 6digit BCD
		FC	VIF:ACSII
		05	Lenth of ASCII
		75	“u”
		44	“D”
		48	“H”
		54	“T”
		25	“%”
		FF	VIFE: next byte is manufacturer specific
		07	VIFE:L3-L1
		00 20 00	20.00%
12	Phase 1 Current THD	0b	DIF: 6digit BCD
		FC	VIF:ACSII
		05	Lenth of ASCII
		69	“i”

		44	“D”
		48	“H”
		54	“T”
		25	“%”
		FF	VIFE: next byte is manufacturer specific
		01	VIFE:L1
		00 20 00	20.00%
12	Phase 2 Current THD	0b	DIF: 6digit BCD
		FC	VIF:ACSII
		05	Lenth of ASCII
		69	“i”
		44	“D”
		48	“H”
		54	“T”
		25	“%”
		FF	VIFE: next byte is manufacturer specific
		02	VIFE:L2
		00 20 00	20.00%
12	Phase 3 Current THD	0b	DIF: 6digit BCD
		FC	VIF:ACSII
		05	Lenth of ASCII
		69	“i”
		44	“D”
		48	“H”
		54	“T”
		25	“%”
		FF	VIFE: next byte is manufacturer specific
		03	VIFE:L3
		00 20 00	20.00%
12	3P4W：Average line to neutral volts THD. 3P3W：Average line to line volts THD	0b	DIF: 6digit BCD
		FC	VIF:ACSII
		05	Lenth of ASCII
		75	“u”
		44	“D”
		48	“H”
		54	“T”
		25	“%”
		FF	VIFE: next byte is manufacturer specific
		08/09	VIFE:AVG L-N/L-L
		00 20 00	20.00%
12	Average line current THD	0b	DIF: 6digit BCD
		FC	VIF:ACSII
		05	Lenth of ASCII
		69	“i”
		44	“D”
		48	“H”
		54	“T”
		25	“%”
		FF	VIFE: next byte is manufacturer specific
		08	VIFE:AVG L-N
		00 20 00	20.00%
1	End	CS	
1		16	

Single-phase

bytes		data structure	Notice
4	header telegram	68 len len 68	header of RSP_UD telegram

3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	Electricity
1		xx	ACCESS NO
1		00	STATUS
2		00 00	Signature
12	L/N volts THD	0b	DIF: 6digit BCD
		7C	VIF:ACSII
		05	Lenth of ASCII
		75	“u”
		44	“D”
		48	“H”
		54	“T”
		25	“%”
		00 20 00	20.00%
12	Current THD	0b	DIF: 6digit BCD
		7C	VIF:ACSII
		05	Lenth of ASCII
		69	“i”
		44	“D”
		48	“H”
		54	“T”
		25	“%”
		00 20 00	20.00%
1	End	CS	
1		16	

electrical information（ANGLE）

Mode 1:

bytes		**data structure**	**Notice**
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	Energy Meter
1		55	ACCESS NO
1		00	STATUS
2		00 00	Signature
6	Total system volt amps	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3c(1)	VIFE: 1VA(1)
		56 34 12	123456VA(123.456KVA)
6	Phase 1 volt amps	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3c(1)	VIFE: 1VA(1)
		56 34 12	123456VA(123.456KVA)
6	Phase 2 volt amps	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3c(1)	VIFE: 1VA(1)
		56 34 12	12345.6VA(12.3456KVA)
6	Phase 3 volt amps	0b	DIF: 6digit BCD

		Fd	VIF:fd
		3c(1)	VIFE: 1VA(1)
		56 34 12	123456VA(123.456KVA)
6	Average line to neutral volts	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47 (2)	VIFE: 0.01V(2)
		56 34 12	1234.56V
6	Average line to line volts	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47 (2)	VIFE: 0.01V(2)
		56 34 12	1234.56V
6	Average line current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59 (3)	VIFE: 1mA(xxx.xxxA) (3)
		56 34 12	123456mA(123.456A)
6	Sum of line currents	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59 (3)	VIFE: 1mA(xxx.xxxA) (3)
		56 34 12	123456mA(123.456A)
6	Total system phase angle	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		06 12 01	112.06 degrees
6	Phase 1 phase angle.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		06 12 01	112.06 degrees
6	Phase 2phase angle.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		06 12 01	112.06 degrees
6	Phase 3 phase angle.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3a	VIFE: dimensionless / no VIF
		06 12 01	112.06 degrees
7	VAh	0c	DIF: 8digit BCDFIE, Current Value
		FD	VIF:fd
		3d(4)	VIF: 10VAh (0.01KVAh)(4)
		78 56 34 12	123456.78kVAh
7	Ah	0c	DIF: 8digit BCDFIE, Current Value
		FD	VIF:fd
		3a	VIF: 0.1Ah
		78 56 34 12	1234567.8Ah
1	End	CS	
1		16	

Mode 2:
Three-phase

bytes		**data structure**	**Notice**
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	electricity
1		xx	ACCESS NO
1		00	STATUS

2		00 00	Signature
8	Total system volt amps	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		7C	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		56 34 12	123456VA(123.456KVA)
13	Phase 1 volt amps	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		FC	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		FF	VIFE: next byte is manufacturer specific
		01	VIFE:L1
		56 34 12	123456VA(123.456KVA)
13	Phase 2 volt amps	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		FC	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		FF	VIFE: next byte is manufacturer specific
		02	VIFE:L2
		56 34 12	12345.6VA(12.3456KVA)
13	Phase 3 volt amps	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		FC	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		FF	VIFE: next byte is manufacturer specific
		03	VIFE:L3
		56 34 12	123456VA(123.456KVA)
8	Average line to neutral volts	0b	DIF: 6digit BCD
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		08	VIFE AVG L-N
		56 34 12	1234.56V
8	Average line to line volts	0b	DIF: 6digit BCD
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		09	VIFE AVG L-L
		56 34 12	1234.56V
8	Average line current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9 (3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIFE next byte is manufacturer specific

		08	VIFE AVG L-N
		56 34 12	123456mA(123.456A)
6	Sum of line currents	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59 (3)	VIFE: 1mA(xxx.xxxA) (3)
		56 34 12	123456mA(123.456A)
6	Total system phase angle	0b	DIF: 6digit BCD
		FF	VIF:next byte is manufacturer specific
		41	ANGLE: 0.01°
		06 12 01	112.06 degrees
8	Phase 1 phase angle.	0b	DIF: 6digit BCD
		FF	VIF:next byte is manufacturer specific
		C1	ANGLE: 0.01°
		FF	VIF:next byte is manufacturer specific
		01	VIFE: L1
		06 12 01	112.06 degrees
8	Phase 2phase angle.	0b	DIF: 6digit BCD
		FF	VIF:next byte is manufacturer specific
		C1	ANGLE: 0.01°
		FF	VIF:next byte is manufacturer specific
		02	VIFE: L2
		06 12 01	112.06 degrees
8	Phase 3 phase angle.	0b	DIF: 6digit BCD
		FF	VIF:next byte is manufacturer specific
		C1	ANGLE: 0.01°
		FF	VIF:next byte is manufacturer specific
		03	VIFE: L3
		06 12 01	112.06 degrees
13	VAh	8c	DIF: 8digit BCD
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		7C	VIF:ASCII
		03	Lenth of ASCII
		68	“h”
		41	“A”
		56	“V”
		78 56 34 12	12345.678kVAh
9	Ah	0c	DIF: 8digit BCDFIE, Current Value
		7C	VIF:ASCII
		02	Lenth of ASCII
		68	“h”
		41	“A”
		78 56 34 12	12345678Ah
1	End	CS	
1		16	

Single-phase

bytes		**data structure**	**Notice**
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	electricity
1		xx	ACCESS NO
1		00	STATUS
2		00 00	Signature

8	Total system volt amps	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		7C	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		56 34 12	123456VA(123.456KVA)
8	line to neutral volts	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47	VIFE: 0.01V
		56 34 12	1234.56V
6	line current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59 (3)	VIFE: 1mA(xxx.xxxA) (3)
		56 34 12	123456mA(123.456A)
6	Total system phase angle	0b	DIF: 6digit BCD
		FF	VIF:next byte is manufacturer specific
		41	ANGLE: 0.01°
		06 12 01	112.06 degrees
13	VAh	8c	DIF: 8digit BCD
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		7C	VIF:ASCII
		03	Lenth of ASCII
		68	“h”
		41	“A”
		56	“V”
		78 56 34 12	12345.678kVAh
9	Ah	0c	DIF: 8digit BCDFIE，Current Value
		7C	VIF:ASCII
		02	Lenth of ASCII
		68	“h”
		41	“A”
		78 56 34 12	12345678Ah
1	End	CS	
1		16	

Note(1)：VIFE=3c，unit=1VA；VIFE=3d，unit=10VA；VIFE=3e，unit=100VA; VIFE=3f，unit=1000VA; VIFE=40，unit=10000VA;

Note(2)：VIFE=47，unit=0.01V；VIFE=48，unit=0.1V；VIFE=49，unit=1V;

Note(3)：VIFE=59，unit=1mA；VIFE=5A，unit=10mA；VIFE=5B，unit=100mA;

Note(4)：VIFE=3D，unit=10VAh；VIF=3E，unit=100VAh

Maximum damand information

mode 1:

bytes		data structure	Notice
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	Energy Meter
1		55	ACCESS NO
1		00	STATUS
2		00 00	Signature
5	Maximum total system active power demand	0b	DIF: 6digit BCD
		2b (1)	VIF:01W(xx.xxxxkw) (1)
		56 34 12	123456w(123.456kw)
6	Maximum total system reactive power demand	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3c(2)	VIFE: 1VAr(2)
		56 34 12	123456VAr(123.456KVAr)
6	Maximum total system apparent power demand.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3c(2)	VIFE: 1VA(2)
		56 34 12	12345.6VA(12.3456KVA)
6	Maximum phase 1 current demand.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59(3)	VIFE: 1mA(xxx.xxxA) (3)
		56 34 12	123456mA(123.456A)
6	Maximum phase 2 current demand.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59 (3)	VIFE: 1mA(xxx.xxxA) (3)
		56 34 12	123456mA(123.456A)
6	Maximum phase 3 current demand.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59(3)	VIFE: 1mA(xxx.xxxA) (3)
		56 34 12	123456mA(123.456A)
6	Maximum N current demand.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59(3)	VIFE: 1mA(xxx.xxxA) (3)
		56 34 12	123456mA(123.456A)
5	total system active power demand	0b	DIF: 6digit BCD
		2b(1)	VIF:1W(xx.xxxxkw) (1)
		56 34 12	123456w(123.456kw)
6	total system reactive power demand	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3c(2)	VIFE: 1VAr(2)
		56 34 12	123456VAr(123.456KVAr)
6	total system apparent power demand.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3c(2)	VIFE: 1VA(2)
		56 34 12	123456VA(123.456KVA)
6	Phase 1 current demand.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59(3)	VIFE: 1mA(xxx.xxxA) (3)
		56 34 12	123456mA(123.456A)
6	Phase 2 current demand.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59(3)	VIFE: 1mA(xxx.xxxA) (3)
		56 34 12	123456mA(123.456A)
6	Phase 3 current demand.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59(3)	VIFE: 1mA(xxx.xxxA) (3)

		56 34 12	123456mA(123.456A)
6	Phase N current demand.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59(3)	VIFE: 1mA(xxx.xxxA) (3)
		56 34 12	123456mA(123.456A)
1	End	CS	
1		16	

Mode 2:
Three-phase-2T

bytes		data structure	Notice
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	electricity
1		xx	ACCESS NO
1		00	STATUS
2		00 00	Signature
7	T1 Maximum total system active power demand	9b	DIF: 6digit BCD Maximum value
		10	DIFE: T1
		Ab (1)	VIF:01W(xx.xxxxkw) (1)
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456w(123.456kw)
7	T2 Maximum total system active power demand	9b	DIF: 6digit BCD Maximum value
		20	DIFE: T2
		Ab (1)	VIF:01W(xx.xxxxkw) (1)
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456w(123.456kw)
13	T1 Maximum total system reactive power demand	9b	DIF: 6digit BCD Maximum value
		D0	DIFE : unit 1 T1
		40	DIFE : unit 2
		FC	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456VAr(123.456KVAr)
13	T2 Maximum total system reactive power demand	9b	DIF: 6digit BCD Maximum value
		E0	DIFE : unit 1 T2
		40	DIFE : unit 2
		FC	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456VAr(123.456KVAr)
13	T1 Maximum total system apparent power demand.	9b	DIF: 6digit BCD Maximum value
		D0	DIFE : unit 1 T1
		C0	DIFE : unit 2
		40	DIFE : unit 3

		FC	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	12345.6VA(12.3456KVA)
13	T2 Maximum total system apparent power demand.	9b	DIF: 6digit BCD Maximum value
		E0	DIFE : unit 1 T2
		C0	DIFE : unit 2
		40	DIFE : unit 3
		FC	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	12345.6VA(12.3456KVA)
10	T1 Maximum phase 1 current demand.	9b	DIF: 6digit BCD Maximum value
		10	DIFE:T1
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		01	VIFE:L1
		56 34 12	123456mA(123.456A)
10	T2 Maximum phase 1 current demand.	9b	DIF: 6digit BCD Maximum value
		20	DIFE:T2
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		01	VIFE:L1
		56 34 12	123456mA(123.456A)
10	T1 Maximum phase 2 current demand.	9b	DIF: 6digit BCD Maximum value
		10	DIFE:T1
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		02	VIFE:L2
		56 34 12	123456mA(123.456A)
10	T2 Maximum phase 2 current demand.	9b	DIF: 6digit BCD Maximum value
		20	DIFE:T2
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		02	VIFE:L2
		56 34 12	123456mA(123.456A)
10	T1 Maximum phase 3 current demand.	9b	DIF: 6digit BCD Maximum value
		10	DIFE:T1
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific

		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		03	VIFE:L3
		56 34 12	123456mA(123.456A)
10	T2 Maximum phase 3 current demand.	9b	DIF: 6digit BCD Maximum value
		20	DIFE:T2
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		03	VIFE:L3
		56 34 12	123456mA(123.456A)
10	T1 Maximum N current demand.	9b	DIF: 6digit BCD Maximum value
		10	DIFE:T1
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		04	VIFE:N
		56 34 12	123456mA(123.456A)
10	T2 Maximum N current demand.	9b	DIF: 6digit BCD Maximum value
		20	DIFE:T2
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		04	VIFE:N
		56 34 12	123456mA(123.456A)
7	total system active power demand Current tariff	0b	DIF: 6digit BCD
		Ab (1)	VIF:01W(xx.xxxxkw) (1)
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456w(123.456kw)
13	total system reactive power demand Current tariff	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		40	DIFE : unit 2
		FC	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456VAr(123.456KVAr)
13	total system apparent power demand. Current tariff	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		FC	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456VA(123.456KVA)
10	Phase 1 current demand.	0b	DIF: 6digit BCD

	Current tariff	Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		01	VIFE:L1
		56 34 12	123456mA(123.456A)
10	Phase 2 current demand. Current tariff	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		02	VIFE:L2
		56 34 12	123456mA(123.456A)
10	Phase 3 current demand. Current tariff	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		03	VIFE:L3
		56 34 12	123456mA(123.456A)
10	Phase N current demand. Current tariff	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		04	VIFE:n
		56 34 12	123456mA(123.456A)
1	End	CS	
1		16	

Three-phase

bytes		**data structure**	**Notice**
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	electricity
1		xx	ACCESS NO
1		00	STATUS
2		00 00	Signature
7	Maximum total system active power demand	1b	DIF: 6digit BCD Maximum value
		Ab (1)	VIF:01W(xx.xxxxkw) (1)
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456w(123.456kw)
13	Maximum total system reactive power demand	9b	DIF: 6digit BCD Maximum value
		C0	DIFE : unit 1
		40	DIFE : unit 2
		FC	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”

		76	“v”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456VAr(123.456KVAr)
13	Maximum total system apparent power demand.	9b	DIF: 6digit BCD Maximum value
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		FC	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	12345.6VA(12.3456KVA)
10	Maximum phase 1 current demand.	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		01	VIFE:L1
		56 34 12	123456mA(123.456A)
10	Maximum phase 2 current demand.	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		02	VIFE:L2
		56 34 12	123456mA(123.456A)
10	Maximum phase 3 current demand.	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		03	VIFE:L3
		56 34 12	123456mA(123.456A)
10	Maximum N current demand.	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		04	VIFE:N
		56 34 12	123456mA(123.456A)
7	total system active power demand	0b	DIF: 6digit BCD
		Ab (1)	VIF:01W(xx.xxxxkw) (1)
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456w(123.456kw)
13	total system reactive power demand	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		40	DIFE : unit 2
		FC	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”

		76	“v”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456VAr(123.456KVAr)
13	total system apparent power demand.	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		FC	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456VA(123.456KVA)
10	Phase 1 current demand.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		01	VIFE:L1
		56 34 12	123456mA(123.456A)
10	Phase 2 current demand.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		02	VIFE:L2
		56 34 12	123456mA(123.456A)
10	Phase 3 current demand.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		03	VIFE:L3
		56 34 12	123456mA(123.456A)
10	Phase N current demand.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		F3	VIFE:DEMAND
		FF	VIF:next byte is manufacturer specific
		04	VIFE:n
		56 34 12	123456mA(123.456A)
1	End	CS	
1		16	

Single-phase-2T

bytes		data structure	Notice
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	electricity
1		xx	ACCESS NO

1		00	STATUS
2		00 00	Signature
7	T1 Maximum total system active power demand	9b	DIF: 6digit BCD Maximum value
		10	DIFE: T1
		Ab (1)	VIF:01W(xx.xxxxkw) (1)
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456w(123.456kw)
7	T2 Maximum total system active power demand	9b	DIF: 6digit BCD Maximum value
		20	DIFE: T2
		Ab (1)	VIF:01W(xx.xxxxkw) (1)
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456w(123.456kw)
13	T1 Maximum total system reactive power demand	9b	DIF: 6digit BCD Maximum value
		D0	DIFE : unit 1 T1
		40	DIFE : unit 2
		FC	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456VAr(123.456KVAr)
13	T2 Maximum total system reactive power demand	9b	DIF: 6digit BCD Maximum value
		E0	DIFE : unit 1 T2
		40	DIFE : unit 2
		FC	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456VAr(123.456KVAr)
13	T1 Maximum total system apparent power demand.	9b	DIF: 6digit BCD Maximum value
		D0	DIFE : unit 1 T1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		FC	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	12345.6VA(12.3456KVA)
13	T2 Maximum total system apparent power demand.	9b	DIF: 6digit BCD Maximum value
		E0	DIFE : unit 1 T2
		C0	DIFE : unit 2
		40	DIFE : unit 3
		FC	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	12345.6VA(12.3456KVA)
10	T1 Maximum current	9b	DIF: 6digit BCD Maximum value

	demand.	10	DIFE:T1
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456mA(123.456A)
10	T2 Maximum current demand.	9b	DIF: 6digit BCD Maximum value
		20	DIFE:T2
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456mA(123.456A)
7	total system active power demand Current tariff	0b	DIF: 6digit BCD
		Ab (1)	VIF:01W(xx.xxxxkw) (1)
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456w(123.456kw)
13	total system reactive power demand Current tariff	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		40	DIFE : unit 2
		FC	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456VAr(123.456KVAr)
13	total system apparent power demand. Current tariff	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		FC	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456VA(123.456KVA)
10	current demand. Current tariff	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456mA(123.456A)
1	End	CS	
1		16	

Three-phase

bytes		**data structure**	**Notice**
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	electricity

1		xx	ACCESS NO
1		00	STATUS
2		00 00	Signature
7	Maximum total system active power demand	1b	DIF: 6digit BCD Maximum value
		Ab (1)	VIF:01W(xx.xxxxkw) (1)
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456w(123.456kw)
13	Maximum total system reactive power demand	9b	DIF: 6digit BCD Maximum value
		C0	DIFE : unit 1
		40	DIFE : unit 2
		FC	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456VAr(123.456KVAr)
13	Maximum total system apparent power demand.	9b	DIF: 6digit BCD Maximum value
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		FC	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	12345.6VA(12.3456KVA)
10	Maximum current demand.	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456mA(123.456A)
7	total system active power demand	0b	DIF: 6digit BCD
		Ab (1)	VIF:01W(xx.xxxxkw) (1)
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456w(123.456kw)
13	total system reactive power demand	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		40	DIFE : unit 2
		FC	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456VAr(123.456KVAr)
13	total system apparent power demand.	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		FC	VIF:ACSII
		02	Lenth of ASCII
		41	“A”

		56	“V”
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456VA(123.456KVA)
10	current demand.	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9(3)	VIFE: 1mA(xxx.xxxA) (3)
		FF	VIF:next byte is manufacturer specific
		73	VIFE:DEMAND
		56 34 12	123456mA(123.456A)
1	End	CS	
1		16	

Note(1): VIF=2a, unit=0.1W; VIF=2b, unit=1W; VIF=2c, unit=10W; VIF=2d, unit=100W; VIF=2e, unit=1000W; VIF=2f, unit=10000W;
Note(2): VIFE=3b, unit=0.1VAr; VIFE=3c, unit=1VAr/VA; VIFE=3d, unit=10VAr/VA; VIFE=3e, unit=100VAr/VA; VIFE=3f, unit=1000VAr/VA;VIFE=40, unit=10000VAr/VA;
Note(3): VIFE=59, unit=1mA; VIFE=5A, unit=10mA; VIFE=5B, unit=100mA;

Maximum or Minimum information

Mode 1:

bytes		data structure	Notice
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	Energy Meter
1		55	ACCESS NO
1		00	STATUS
2		00 00	Signature
6	Maximum value of L1 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47 (1)	VIFE: 0.01V(1)
		56 34 12	1234.56V
6	Maximum value of L2 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47 (1)	VIFE: 0.01V(1)
		56 34 12	1234.56V
6	Maximum value of L3 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47 (1)	VIFE: 0.01V(1)
		56 34 12	1234.56V
6	Maximum value of L1-2 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47 (1)	VIFE: 0.01V(1)
		56 34 12	1234.56V
6	Maximum value of L2-3 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47 (1)	VIFE: 0.01V(1)
		56 34 12	1234.56V

6	Maximum value of L3-1 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47 (1)	VIFE: 0.01V(1)
		56 34 12	1234.56V
6	Maximum value of L1 current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59(2)	VIFE: 1mA(xxx.xxxA) (2)
		56 34 12	123456mA(123.456A)
6	Maximum value of L2 current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59 (2)	VIFE: 1mA(xxx.xxxA) (2)
		56 34 12	123456mA(123.456A)
6	Maximum value of L3 current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59 (2)	VIFE: 1mA(xxx.xxxA) (2)
		56 34 12	123456mA(123.456A)
6	Maximum value of N current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59 (2)	VIFE: 1mA(xxx.xxxA) (2)
		56 34 12	123456mA(123.456A)
5	Maximum value of total active power	0b	DIF: 6digit BCD
		2b(3)	VIF:1W(xxx.xxxkw) (3)
		56 34 12	123456w(123.456kw)
6	Maximum value of total reactive power	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3c(4)	VIFE：1var(4)
		56 34 12	123456VAr (123.456kVAr)
6	Maximum value of Total apparent power	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3c(4)	VIFE: 1VA(4)
		56 34 12	123456VA(123.456KVA)
6	Minimum value of L1 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47 (1)	VIFE: 0.01V(1)
		56 34 12	1234.56V
6	Minimum value of L2 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47 (1)	VIFE: 0.01V(1)
		56 34 12	1234.56V
6	Minimum value of L3 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47 (1)	VIFE: 0.01V(1)
		56 34 12	1234.56V
6	Minimum value of L1-2 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47 (1)	VIFE: 0.01V(1)
		56 34 12	1234.56V
6	Minimum value of L2-3 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47 (1)	VIFE: 0.01V(1)
		56 34 12	1234.56V
6	Minimum value of L3-1 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		47 (1)	VIFE: 0.01V(1)
		56 34 12	1234.56V
6	Minimum value of L1 current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59(2)	VIFE: 1mA(xxx.xxxA) (2)
		56 34 12	123456mA(123.456A)

6	Minimum value of L2 current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59 (2)	VIFE: 1mA(xxx.xxxA) (2)
		56 34 12	123456mA(123.456A)
6	Minimum value of L3 current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59 (2)	VIFE: 1mA(xxx.xxxA) (2)
		56 34 12	123456mA(123.456A)
6	Minimum value of N current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		59 (2)	VIFE: 1mA(xxx.xxxA) (2)
		56 34 12	123456mA(123.456A)
5	Minimum value of total active power	0b	DIF: 6digit BCD
		2b(3)	VIF:1W(xxx.xxxkw) (3)
		56 34 12	123456w(123.456kw)
6	Minimum value of total reactive power	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3c(4)	VIFE：1var(4)
		56 34 12	123456VAr (123.456kVAr)
6	Minimum value of Total apparent power	0b	DIF: 6digit BCD
		Fd	VIF:fd
		3c(4)	VIFE: 1VA(4)
		56 34 12	123456VA(123.456KVA)
1	End	CS	
1		16	

Mode 2:
Three-phase

bytes		data structure	Notice
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	electricity
1		xx	ACCESS NO
1		00	STATUS
2		00 00	Signature
8	Maximum value of L1 Voltage	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		01	VIFE L1
		56 34 12	1234.56V
8	Maximum value of L2 Voltage	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		02	VIFE L2
		56 34 12	1234.56V
8	Maximum value of L3 Voltage	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		03	VIFE L3
		56 34 12	1234.56V

8	Maximum value of L1-2 Voltage	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		05	VIFE L1-L2
		56 34 12	1234.56V
8	Maximum value of L2-3 Voltage	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		06	VIFE L2-L3
		56 34 12	1234.56V
8	Maximum value of L3-1 Voltage	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		07	VIFE L3-L1
		56 34 12	1234.56V
8	Maximum value of L1 current	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		D9(2)	VIFE: 1mA(xxx.xxxA) (2)
		FF	VIFE next byte is manufacturer specific
		01	VIFE L1
		56 34 12	123456mA(123.456A)
8	Maximum value of L2 current	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		D9(2)	VIFE: 1mA(xxx.xxxA) (2)
		FF	VIFE next byte is manufacturer specific
		02	VIFE L2
		56 34 12	123456mA(123.456A)
8	Maximum value of L3 current	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		D9(2)	VIFE: 1mA(xxx.xxxA) (2)
		FF	VIFE next byte is manufacturer specific
		03	VIFE L3
		56 34 12	123456mA(123.456A)
8	Maximum value of N current	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		D9(2)	VIFE: 1mA(xxx.xxxA) (2)
		FF	VIFE next byte is manufacturer specific
		04	VIFE N
		56 34 12	123456mA(123.456A)
5	Maximum value of total active power	1b	DIF: 6digit BCD Maximum value
		2b(3)	VIF:1W(xxx.xxxkw) (3)
		56 34 12	123456w(123.456kw)
11	Maximum value of total reactive power	9b	DIF: 6digit BCD Maximum value
		C0	DIFE : unit 1
		40	DIFE : unit 2
		7C	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		56 34 12	123456VAr (123.456kVAr)
11	Maximum value of Total apparent power	9b	DIF: 6digit BCD Maximum value
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		7C	VIF:ACSII

		02	Lenth of ASCII
		41	“A”
		56	“V”
		56 34 12	123456VA(123.456KVA)
8	Minimum value of L1 Voltage	2b	DIF: 6digit BCD Minimum value
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		01	VIFE L1
		56 34 12	1234.56V
8	Minimum value of L2 Voltage	2b	DIF: 6digit BCD Minimum value
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		02	VIFE L2
		56 34 12	1234.56V
8	Minimum value of L3 Voltage	2b	DIF: 6digit BCD Minimum value
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		03	VIFE L3
		56 34 12	1234.56V
8	Minimum value of L1-2 Voltage	2b	DIF: 6digit BCD Minimum value
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		05	VIFE L1-L2
		56 34 12	1234.56V
8	Minimum value of L2-3 Voltage	2b	DIF: 6digit BCD Minimum value
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		06	VIFE L2-L3
		56 34 12	1234.56V
8	Minimum value of L3-1 Voltage	2b	DIF: 6digit BCD Minimum value
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		07	VIFE L3-L1
		56 34 12	1234.56V
8	Minimum value of L1 current	2b	DIF: 6digit BCD Minimum value
		Fd	VIF:fd
		D9(2)	VIFE: 1mA(xxx.xxxA) (2)
		FF	VIFE next byte is manufacturer specific
		01	VIFE L1
		56 34 12	123456mA(123.456A)
8	Minimum value of L2 current	2b	DIF: 6digit BCD Minimum value
		Fd	VIF:fd
		D9(2)	VIFE: 1mA(xxx.xxxA) (2)
		FF	VIFE next byte is manufacturer specific
		02	VIFE L2
		56 34 12	123456mA(123.456A)
8	Minimum value of L3 current	2b	DIF: 6digit BCD Minimum value
		Fd	VIF:fd
		D9(2)	VIFE: 1mA(xxx.xxxA) (2)
		FF	VIFE next byte is manufacturer specific
		03	VIFE L3
		56 34 12	123456mA(123.456A)
8	Minimum value of N	2b	DIF: 6digit BCD Minimum value

	current	Fd	VIF:fd
		D9[2]	VIFE: 1mA(xxx.xxxA) [2]
		FF	VIFE next byte is manufacturer specific
		04	VIFE N
		56 34 12	123456mA(123.456A)
5	Minimum value of total active power	2b	DIF: 6digit BCD Minimum value
		2b[3]	VIF:1W(xxx.xxxkw) [3]
		56 34 12	123456w(123.456kw)
11	Minimum value of total reactive power	Ab	DIF: 6digit BCD Minimum value
		C0	DIFE : unit 1
		40	DIFE : unit 2
		7C	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		56 34 12	123456VAr (123.456kVAr)
11	Minimum value of Total apparent power	Ab	DIF: 6digit BCD Minimum value
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		7C	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		56 34 12	123456VA(123.456KVA)
1	End	CS	
1		16	

Single-phase

bytes		**data structure**	**Notice**
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	electricity
1		xx	ACCESS NO
1		00	STATUS
2		00 00	Signature
8	Maximum value of Voltage	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		47	VIFE: 0.01V
		56 34 12	1234.56V
8	Maximum value of current	1b	DIF: 6digit BCD Maximum value
		Fd	VIF:fd
		59[2]	VIFE: 1mA(xxx.xxxA) [2]
		56 34 12	123456mA(123.456A)
5	Maximum value of total active power	1b	DIF: 6digit BCD Maximum value
		2b[3]	VIF:1W(xxx.xxxkw) [3]
		56 34 12	123456w(123.456kw)
11	Maximum value of total reactive power	9b	DIF: 6digit BCD Maximum value
		C0	DIFE : unit 1
		40	DIFE : unit 2
		7C	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”

		56 34 12	123456VAr (123.456kVAr)
11	Maximum value of Total apparent power	9b	DIF: 6digit BCD Maximum value
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		7C	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		56 34 12	123456VA(123.456KVA)
8	Minimum value of Voltage	2b	DIF: 6digit BCD Minimum value
		Fd	VIF:fd
		47	VIFE: 0.01V
		56 34 12	1234.56V
8	Minimum value of current	2b	DIF: 6digit BCD Minimum value
		Fd	VIF:fd
		59(2)	VIFE: 1mA(xxx.xxxA) (2)
		56 34 12	123456mA(123.456A)
5	Minimum value of total active power	2b	DIF: 6digit BCD Minimum value
		2b(3)	VIF:1W(xxx.xxxkw) (3)
		56 34 12	123456w(123.456kw)
11	Minimum value of total reactive power	Ab	DIF: 6digit BCD Minimum value
		C0	DIFE : unit 1
		40	DIFE : unit 2
		7C	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		56 34 12	123456VAr (123.456kVAr)
11	Minimum value of Total apparent power	Ab	DIF: 6digit BCD Minimum value
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		7C	VIF:ACSII
		02	Lenth of ASCII
		41	“A”
		56	“V”
		56 34 12	123456VA(123.456KVA)
1	End	CS	
1		16	

Note(1)：VIFE=47，unit=0.01V；VIFE=48，unit=0.1V；VIFE=49，unit=1V;
Note(2)：VIFE=59，unit=1mA；VIFE=5A，unit=10mA；VIFE=5B，unit=100mA;
Note(3)：VIF=2b，unit=1W；VIF=2c，unit=10W；VIF=2d，unit=100W; VIF=2e，unit=1000W; VIF=2f，unit=10000W;
Note(4)：VIFE=3c，unit=1VAr/VA；VIFE=3d，unit=10VAr/VA；VIFE=3e，unit=100VAr/VA; VIFE=3f，unit=1000VAr/VA;
VIFE=40，unit=10000VAr/VA;

Setup information

bytes		**data structure**	**Notice**
4	header telegram	68 len len 68	header of RSP_UD telegram

3		08 A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	electricity
1		xx	ACCESS NO
1		00	STATUS
2		00 00	Signature
5	password	0a	DIF: 4digit BCD
		Fd	VIF:fd
		16	VIFE: password
		34 12	1234
4	Demand interval	09	DIF: 2digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info
		12	1234 min
4	slide time	09	DIF: 2digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info
		12	1234 min
4	Display time	0a	DIF: 4digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info
		34 12	1234 min
4	LCD time	0a	DIF: 4digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info
		34 12	1234 min
4	measurement mode	09	DIF: 2digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info
		01	means import energy
4	output mode of Pulse 1	09	DIF: 2digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info
		01	Import active energy
4	the constant of Pulse 1	09	DIF: 2digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info
		01	0.01kwh(kvarh)/imp
4	the Pulse Width of pulse 1	09	DIF: 2digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info
		00	60ms
4	Communication parity bit and stop bit	09	DIF: 2digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info
		01	even, 1 stop bit
5	CT1	0a	DIF: 4digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info
		34 12	1234A
4	CT2	09	DIF: 2digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info
		01	1A
6	PT1	0b	DIF: 6digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info

		56 34 12	123456V
5	PT2	0a	DIF: 4digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info
		00 04	0400V
4	Current Direction Correction	09	DIF: 2digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info
		04	L1 Frd, L2 Frd, L3 Rev
4	System Type	09	DIF: 2digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info
		03	3P4W
9	the serial number of meter	0E	DIF: 12digit BCD
		Fd	VIF:fd
		67	VIFE: Special Supplier Info
		12 90 78 56 34 12	123456789012
5	meter code	0a	DIF: 4digit BCD
		Fd	VIF:fd
		0c	VIFE: model/version
		34 12	1234
5	Hardware version	0a	DIF: 4digit BCD
		Fd	VIF:fd
		0d	VIFE: hardware version
		34 12	1234
5	Firmware version	0a	DIF: 4digit BCD
		Fd	VIF:fd
		0e	VIFE: firmware version
		34 12	1234
1	End	CS	
1		16	

Custom special

bytes	Parameters	data structure	Notice
4	header telegram	68 len len 68	header of RSP_UD telegram
3		08 0A 72	C field =08 address A CI field 72
4		78 56 34 12	Identification number =12345678
2		6E 16	Manufacturer ID 166E
1		01	Generation 1
1		02	electricity
1		xx	ACCESS NO
1		00	STATUS
2		00 00	Signature
8	Current total active energy	8C	DIF: 8digit BCD
		80	DIFE:unit1

		40	DIFE:unit 2
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
6	Current import active energy	0C	DIF: 8digit BCD
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
7	Current export active energy	8C	DIF: 8digit BCD
		40	DIFE:unit 1
		04	VIF: 10wh (0.01Kwh)
		78 56 34 12	123456.78kwh
10	Current resettable total active energy	8C	DIF: 8digit BCD
		80	DIFE
		40	DIFE:unit 2
		84	VIF: 10wh (0.01Kwh)
		ff	VIFE next byte is manufacturer specific
		72	VIFE resettable energy
		78 56 34 12	123456.78kwh
9	Current total reactive energy	8C	DIF: 8digit BCD
		80	DIFE
		40	DIFE:unit 2
		FB	VIF:fB
		02	VIFE: 1 KVArh
		78 56 34 12	12345678kVarh
7	Current import reactive energy	0C	DIF: 8digit BCD
		FB	VIF:fB
		02	VIFE: 1 KVArh
		78 56 34 12	12345678kVarh
8	Current export reactive energy	8C	DIF: 8digit BCD
		40	DIFE:unit 1
		FB	VIF:fB
		02	VIFE: 1 KVArh
		78 56 34 12	12345678kVarh
8	L1 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		01	VIFE L1
		56 34 12	1234.56V
8	L2 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		02	VIFE L2
		56 34 12	1234.56V
8	L3 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		03	VIFE L3
		56 34 12	1234.56V
8	L1-L2 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific

		05	VIFE L1-L2
		56 34 12	1234.56V
8	L2-L3 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		06	VIFE L2-L3
		56 34 12	1234.56V
8	L3-L1 Voltage	0b	DIF: 6digit BCD
		Fd	VIF:fd
		C7	VIFE: 0.01V
		FF	VIFE next byte is manufacturer specific
		07	VIFE L3-L1
		56 34 12	1234.56V
8	L1 current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9	VIFE: 1mA(xxx.xxxA)
		FF	VIFE next byte is manufacturer specific
		01	VIFE L1
		56 34 12	123456mA(123.456A)
8	L2 current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9	VIFE: 1mA(xxx.xxxA)
		FF	VIFE next byte is manufacturer specific
		02	VIFE L2
		56 34 12	123456mA(123.456A)
8	L3 current	0b	DIF: 6digit BCD
		Fd	VIF:fd
		D9	VIFE: 1mA(xxx.xxxA)
		FF	VIFE next byte is manufacturer specific
		03	VIFE L3
		56 34 12	123456mA(123.456A)
5	total active power	0b	DIF: 6digit BCD
		2A	VIF:0.1W(xx.xxxxkw)
		56 34 12	12345.6w(12.3456kw)
11	total reactive power	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		40	DIFE : unit 2
		7C	VIF:ASCII
		03	Lenth of ASCII
		72	“r”
		61	“a”
		76	“v”
		56 34 12	123456var (123.456kvar)
5	Frequency	0a	DIF: 4digit BCD
		FF	VIF next byte is manufacturer specific
		59	VIFE Frequency with resolution 0.01Hz
		XX.XX	Frequency
8	Total system volt amps	8b	DIF: 6digit BCD
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		7C	VIF:ACSII
		02	Lenth of ASCII

		41	“A”
		56	“V”
		56 34 12	123456VA(123.456KVA)
13	VAh	8c	DIF: 8digit BCD
		C0	DIFE : unit 1
		C0	DIFE : unit 2
		40	DIFE : unit 3
		7C	VIF:ASCII
		03	Lenth of ASCII
		68	“h”
		41	“A”
		56	“V”
		78 56 34 12	12345.678kVAh
1	CHECK SUM	CS	
1	End	16	

7 Change to a new Password

Start	L Field	L Field	Start	C Field	A Field	CI Field	Data(BCD) 1~9999		C eck Sum	Stop
68	5	5	68	53/73	addr	A0	Password L	Password H	CS	16

For example: addr 01 / password 1000
Master to Slave：68 05 05 68 53 01 A0 00 10 04 16
Slave to Master：E5

8 How to reset all resettable energy data

Start	L Field	L Field	Start	C Field	A Field	CI Field	Data(BCD)	C eck Sum	Stop
68	4	4	68	53/73	addr	A1	00:resettable energy 01:demand 02:MAX&MIN	CS	16

For example: addr : 01
Master to Slave：68 04 04 68 53 01 A1 00 F5 16
Slave to Master：e5

9 Set Demand interval、slide time、Display time、LED time

Send：68 09 09 68 53 FE 51 30 01 60 01 05 06 3F 16

Start	L Field	L Field	Start	C Field	A Field	CI Field	data	Check Sum	Stop
68H	07	07	68H	53/73	addr	A2	Demand interval、slide time、Display time、LED time Display time=0 ： the display does not scroll automatically. LED time=0 ： Backlight always on min-min-s-min 6 bytes	cs	16

Example:(Meter address is 01)

Master to Slave：68 09 09 68 53 01 A2 60 01 05 00 05 00 61 16

Slave to Master：E5

10 Set up the measurement mode

Start	L Field	L Field	Start	C Field	A Field	CI Field	data	Check Sum	Stop
68	04	04	68	53/73	addr	**A3**	xx	CS	16

Example:(Meter address is 01)

Master to Slave:68 04 04 68 53 01 A3 01 F8 16

Slave to Master:e5

The red-lighted **01** represents the measurement mode

01 means import energy

02 means import energy + export energy

03 means import energy - export energy

04 means export energy

11 Set up the output mode of Pulse 1

Start	L Field	L Field	Start	C Field	A Field	CI Field	data	Check Sum	Stop
68	08	08	68	53/73	addr	A4	01/02/04/05/06/08	CS	16

Example:(Meter address is 01)

Master to Slave: 68 04 04 68 53 01 A4 01 F9 16

Slave to Master:e5

The red-lighted **01** represents the output mode of Pulse1

01: Import active energy,

02: Import + export active energy,

04: Export active energy, (default).

05: Import reactive energy,

06: Import + export reactive energy,

08: Export reactive energy,

12 Set up the constant of Pulse 1

Start	L Field	L Field	Start	C Field	A Field	CI Field	data	Check Sum	Stop
68	04	04	68	53/73	addr	A5	00/01/02/03/04/05	CS	16

Example:(Meter address is 01)

Master to Slave: 68 04 04 68 53 01 A5 00 F9 16

Slave to Master: e5

The red-lighted **00** represents the constant of Pulse1

00: 0.001kwh(kvarh)/imp(default) / 0.0025kwh(kvarh)/imp(default)

01: 0.01kwh(kvarh)/imp

02: 0.1kwh(kvarh)/imp

03: 1kwh(kvarh)/imp

04: 10kwh(kvarh)/imp

05: 100kwh(kvarh)/imp

06: 1000kwh(kvarh)/imp

13 Set communication parity bit and stop bit

Start	L Field	L Field	Start	C Field	A Field	CI Field	data	Check Sum	Stop
68	04	04	68	53/73	addr	A6	xx	CS	16

Example:(Meter address is 01)

Master to Slave: 68 04 04 68 53 01 A6 00 FA 16

Slave to Master: e5

The red-lighted **00** represents the parity bit of MBUS

00： none， 1 stop bit

01： even， 1 stop bit

02： odd， 1 stop bit

03： none， 2 stop bit

14 Set CT1

Start	L Field	L Field	Start	C Field	A Field	CI Field	data		Check Sum	Stop
68	05	05	68	53/73	addr	A7	CT1_L	CT1_H	CS	16

Example:(Meter address is 01)

Master to Slave: 68 05 05 68 53 01 A7 34 12 41 16

Slave to Master: e5

The red-lighted **34 12** represents the CT1 = 1234

15 Set CT2

Start	L Field	L Field	Start	C Field	A Field	CI Field	data	Check Sum	Stop
68	04	04	68	53/73	addr	A8	CT2	CS	16

Example:(Meter address is 01)

Master to Slave: 68 04 04 68 53 01 A8 01 FD 16

Slave to Master: e5

The red-lighted **01** represents the CT2 = 1

Note:CT2 = 1 or 5.

16 Set PT1

Start	L Field	L Field	Start	C Field	A Field	CI Field	data			Check Sum	Stop
68	06	06	68	53/73	addr	A9	PT1_L	PT1_M	PT1_H	CS	16

Example:(Meter address is 01)

Master to Slave: 68 06 06 68 53 01 A9 56 34 12 99 16

Slave to Master: e5

The red-lighted **56 34 12** represents the PT1 = 123456

Note:PT1 range is 100 ~ 500000.

17 Set PT2

Start	L Field	L Field	Start	C Field	A Field	CI Field	data		Check Sum	Stop
68	05	05	68	53/73	addr	AA	PT2_L	PT2_H	CS	16

Example:(Meter address is 01)

Master to Slave: 68 05 05 68 53 01 AA 30 02 30 16

Slave to Master: e5

The red-lighted **30 02** represents the PT2 = 230

Note:PT2 range is 100 ~ 480.

18 Set Current Direction Correction（when the external CT is connected reversely）

Start	L Field	L Field	Start	C Field	A Field	CI Field	data	Check Sum	Stop

68	04	04	68	53/73	addr	AB	**CDC**	CS	16

Example:(Meter address is 01)

Master to Slave: 68 04 04 68 53 01 AB 02 01 16

Slave to Master: e5

The red-lighted **02** represents：L1 Frd，L2 Rev，L3 Frd

Note: CDC： 0 = L1 Frd，L2 Frd，L3 Frd

1 = L1 Rev，L2 Frd，L3 Frd

2 = L1 Frd，L2 Rev，L3 Frd

3 = L1 Rev，L2 Rev，L3 Frd

4 = L1 Frd，L2 Frd，L3 Rev

5 = L1 Rev，L2 Frd，L3 Rev

6 = L1 Frd，L2 Rev，L3 Rev

7 = L1 Rev，L2 Rev，L3 Rev

Default 0

19 Set the Pulse Width of pluse1

Start	**L Field**	**L Field**	**Start**	**C Field**	**A Field**	**CI Field**	**data**	**Check Sum**	**Stop**
68	04	04	68	53/73	addr	AC	xx	CS	16

Example:(Meter address is 01)

Master to Slave: 68 04 04 68 53 01 AC 00 00 16

Slave to Master: e5

The red-lighted **00** represents the Pulse Width of pluse1

00： 60ms

01： 100ms

02： 200ms

20 Set the System Type

Start	**L Field**	**L Field**	**Start**	**C Field**	**A Field**	**CI Field**	**data**	**Check Sum**	**Stop**
68	04	04	68	53/73	addr	AD	xx	CS	16

Example:(Meter address is 01)

Master to Slave: 68 04 04 68 53 01 AD 03 04 16

Slave to Master: e5

The red-lighted **03** represents the system type

01: 1p2w,

02: 3p3w 2ct

03: 3p4w

04: 1p3w

05: 3P3W Balance load

06: 3P4W Balance load

07: 3p3w_3ct

08: 3P4W_PV

21 select the readout class 2 information

Start	L Field	L Field	Start	C Field	A Field	CI Field	data	Check Sum	Stop
68	04	04	68	53/73	addr	AE	xx	CS	16

Example:(Meter address is 01)

Master to Slave: 68 04 04 68 53 01 AE 03 05 16

Slave to Master: e5

The red-lighted **03** represents readout class 2 information

00:Energy information(default)

01: electrical information

02: electrical information（THD）

03: electrical information（ANGLE）

04: Maximum damand information

05: Maximum or Minimum information

06: Setup information

07: Custom special