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1. MANUFACTURER SPECIFIC COMMANDS

1.1 Reading of KTV

Reading of KTV Ratio is done with the following SND_UD telegram :

Field Name	Number of byte	Value	Meaning
Start	1	68h	Start
L-f	1	06h	**Header**
L-f	1	06h	
Start	1	68h	
C-f	1	53h/73h	**SND_UD**
A-f	1	**PADR**	Primary Address
CI-f	1	51h	Data send
DIF	1	08h	Selection for Readout
VIF	1	FFh	
VIFE	1	12h	KTV
Check Sum	1	CS	
Stop	1	16h	Stop

Reading example of KTV=100 (10.0) :

SND_UD	68 06 06 68 73 FE 51 08 FF 12 DB 16
E5h	E5
REQ_UD2	10 5B FE 59 16
RSP_UD	68 14 14 68 08 00 72 00 00 00 00 A8 15 00 02 5C 00 00 00 02 FF 12 64 00 0C 16

1.1 Reading of KTA

Reading of KTA Ratio is done with the following SND_UD telegram :

Field Name	Number of byte	Value	Meaning
Start	1	68h	Start
L-f	1	06h	**Header**
L-f	1	06h	
Start	1	68h	
C-f	1	53h/73h	**SND_UD**
A-f	1	**PADR**	Primary Address
CI-f	1	51h	Data send
DIF	1	08h	Selection for Readout
VIF	1	FFh	
VIFE	1	11h	KTA
Check Sum	1	CS	
Stop	1	16h	Stop

Reading example of KTA = 10 :

SND_UD	68 06 06 68 53 FE 51 08 FF 11 BA 16
E5h	E5
REQ_UD2	10 5B FE 59 16
RSP_UD	68 14 14 68 08 00 72 00 00 00 00 A8 15 00 02 5D 00 00 00 02 FF 11 0A 00 B2 16

NOTE : If KTV or KTA are changed, Energy registers and Max Power Demand are reset

1.3 Reading of Baud rate

To read Baud rate it is necessary to send a SND_UD telegram and then a REQ_UD2 :

Field Name	Number of byte	Value	Meaning
Start	1	68h	Start
L-f	1	06h	**Header**
L-f	1	06h	
Start	1	68h	
C-f	1	53h/73h	**SND_UD**
A-f	1	**PADR**	Primary Address
CI-f	1	51h	Data send
DIF	1	08h	Selection for Readout
VIF	1	FFh	
VIFE	1	42h	Baud rate
Check Sum	1	CS	
Stop	1	16h	Stop

Reading example of Baud rate of 600 bit/s

SND_UD	68 06 06 68 53 FE 51 08 FF 42 EB 16
E5h	E5
REQ_UD2	10 7B FE 79 16
RSP_UD	68 13 13 68 08 FD 72 01 00 00 00 A8 15 00 02 94 00 00 00 01 FF 42 01 0E 16

In the received telegram there is the baude rate after bytes 01 FF 42.

XX = 01 => baude 600 bit/s

00 300 bit/s
01 600 bit/s
02 1200 bit/s
03 2400 bit/s
04 4800 bit/s
05 9600 bit/s

1.4 Reading of Active Power

Reading of P, P1, P2, P3 is done with the following SND_UD telegram :

Field Name	Number of byte	Value	Meaning
Start	1	68h	Start
L-f	1	06h	**Header**
L-f	1	06h	
Start	1	68h	
C-f	1	53h/73h	**SND_UD**
A-f	1	**PADR**	Primary Address
CI-f	1	51h	Data send
DIF	1	88h	Selection for Readout
DIFE	1	0Xh	Parameter
VIF	1	28h	
Check Sum	1	CS	
Stop	1	16h	Stop

DIFE :

0X h : 00 h -> P
01 h -> P1
02 h -> P2
03 h -> P3

Parameter in RSP_UD :

XXXXXXXX : 32 Bit Integer, before LSB .

For any KT value we have the following unit for Power :

KT = KTA * KTV	Unit	VIF
< 5000	1 W	2Bh
>= 5000	0,1 kW	2Dh

Reading example of Active Power :

SND_UD	68 06 06 68 73 FE 51 88 00 28 72 16
E5h	E5
REQ_UD2	10 5B FE 59 16
RSP_UD	68 16 16 68 08 01 72 00 00 00 00 A8 15 00 02 6B 00 00 00 84 00 2B 0E B0 03 00 7C 16

Received data 0E B0 03 00 h
Hexadecimal value = 00 03 B0 0E h
Decimal value = 241678 d

1.5 Reading of Phase Voltages

Reading of V1,V2, V3 is done with the following SND_UD telegram :

Field Name	Number of byte	Value	Meaning
Start	1	68h	Start
L-f	1	07h	**Header**
L-f	1	07h	
Start	1	68h	
C-f	1	53h/73h	**SND_UD**
A-f	1	**PADR**	Primary Address
CI-f	1	51h	Data send
DIF	1	88h	Selection for Readout
DIFE	1	0Xh	Parameter
VIF	1	FDh	
VIFE	1	40h	Voltages
Check Sum	1	CS	
Stop	1	16h	Stop

DIFE :

0X h : 01 h -> V1
02 h -> V2
03 h -> V3

Parameter in RSP_UD :

XXXXXXXX : 32 Bit Integer before LSB.

Resolution is 0.1 V

Reading example of V1 :

SND_UD	68 07 07 68 73 FE 51 88 01 FD 40 88 16
E5h	E5
REQ_UD2	10 7B FE 79 16
RSP_UD	68 17 17 68 08 01 72 11 11 11 11 A8 15 00 02 6F 00 00 00 84 01 FD 48 ED 59 00 00 FC 16

Received data ED 59 00 00 h
Hexadecimal value = 00 00 59 ED h
Decimal value = 23021 d

1.6 Reading of Phase Currents

Reading of I1,I2, I3 is done with the following SND_UD telegram :

Field Name	Number of byte	Value	Meaning
Start	1	68h	Start
L-f	1	07h	**Header**
L-f	1	07h	
Start	1	68h	
C-f	1	53h/73h	**SND_UD**
A-f	1	**PADR**	Primary Address
CI-f	1	51h	Data send
DIF	1	88h	Selection for Readout
DIFE	1	0Xh	Parameter
VIF	1	FDh	
VIFE	1	50h	Currents
Check Sum	1	CS	
Stop	1	16h	Stop

DIFE :

0X h : 01 h -> I1
02 h -> I2
03 h -> I3

Parameter in RSP_UD :

XXXXXXXX : 32 Bit Integer before LSB.

KTA	Risolution
1 <= KTA < 10	0.001 A
10 <= KTA < 100	0.01 A
100 <= KTA < 10000	0.1 A

Reading example of I1 :

SND_UD	68 07 07 68 53 01 51 88 01 FD 50 7B 16
E5h	E5
REQ_UD2	10 7B FE 79 16
RSP_UD	68 17 17 68 08 01 72 11 11 11 11 A8 15 00 02 72 00 00 00 84 01 FD 59 AC 88 00 00 FF 16

Received data AC 88 00 00 h
Hexadecimal value = 00 00 88 AC h
Decimal value = 34988 d

1.7 Reading of Phase to Phase Voltages

Reading of V12, V23, V31 is done with the following SND_UD telegram :

Field Name	Number of byte	Value	Meaning
Start	1	68h	Start
L-f	1	07h	**Header**
L-f	1	07h	
Start	1	68h	
C-f	1	53h/73h	**SND_UD**
A-f	1	**PADR**	Primary Address
CI-f	1	51h	Data send
DIF	1	88h	Selection for Readout
DIFE	1	0Xh	Parameter
VIF	1	FDh	
VIFE	1	60h	Chained Voltages
Check Sum	1	CS	
Stop	1	16h	Stop

DIFE :

0X h : 01 h -> V12
02 h -> V23
03 h -> V31

Parameter in RSP_UD :

XXXXXXXX : 32 Bit Integer before LSB.

Resolution is 0.1 V

Reading example of V12

SND_UD	68 07 07 68 73 FE 51 88 01 FD 60 A8 16
E5h	E5
REQ_UD2	10 7B FE 79 16
RSP_UD	68 17 17 68 08 01 72 11 11 11 11 A8 15 00 02 6F 00 00 00 84 01 FD **48** ED 59 00 00 FC 16

Received data ED 59 00 00 h
Hexadecimal value = 00 00 59 ED h
Decimal value = 23021 d

1.8 Reading of Partial Reactive Energy

Reading of Partial Reactive Energy is done with the following SND_UD telegram :

Field Name	Number of byte	Value	Meaning
Start	1	68h	Start
L-f	1	07h	**Header**
L-f	1	07h	
Start	1	68h	
C-f	1	53h/73h	**SND_UD**
A-f	1	**PADR**	Primary Address
CI-f	1	51h	Data send
DIF	1	88h	Selection for Readout
DIFE	1	00h	Parameter
VIF	1	FDh	
VIFE	1	70h	Reactive partial Energy
Check Sum	1	CS	
Stop	1	16h	Stop

When reading the value 0xYYYYYYYY after a REQ_UD2 message, it unit is defined as following :

KTA*KTV < 10 10 Varh
KTA*KTV < 100 100 Varh
KTA*KTV < 1000 1 kVarh
KTA*KTV < 10000 10 kVarh
KTA*KTV >= 10000 100 kVarh

1.9 Reading of Primary Address

Reading of Primary Address is done with the following SND_UD telegram :

Field Name	Number of byte	Value	Meaning
Start	1	68h	Start
L-f	1	05h	**Header**
L-f	1	05h	
Start	1	68h	
C-f	1	53h/73h	**SND_UD**
A-f	1	**FE**	Broadcast Address
CI-f	1	51h	Data send
DIF	1	08h	Selection for Readout
VIF	1	7Ah	
Check Sum	1	CS	
Stop	1	16h	Stop

Reading example of primary address 1 :

SND_UD	68 05 05 68 53 FE 51 08 7A 24 16
E5h	E5
REQ_UD2	10 7B FE 79 16
RSP_UD	68 12 12 68 08 01 72 00 00 00 00 A8 15 00 02 9E 00 00 00 01 7A 01 54 16

Answer : 01 7A 01 (in blue) : last 01 is the device primary address

1.10 Reading of Secondary Address

Reading of Secondary Address is done with the following SND_UD telegram :

Field Name	Number of byte	Value	Meaning
Start	1	68h	Start
L-f	1	05h	Header
L-f	1	05h	
Start	1	68h	
C-f	1	53h/73h	SND_UD
A-f	1	PADR	Primary Address
CI-f	1	51h	Data send
DIF	1	08h	
VIF	1	79h	
Check Sum	1	CS	
Stop	1	16h	Stop

Parameter : in SND_UD and in RSP_UD
X1X0 X3X2 X5X4 X7X6 => X7X6 X5X4 X3X2 X1X0: 8 BCD digits.
E.g.
Secondary address : **78 56 34 12** (8 BCD digits) but LSB before and MSB at the end so :
Real value : **12 34 56 78**

Reading example of secondary address 12345678 :

SND_UD	68 05 05 68 73 FE 51 08 79 43 16
E5h	E5
REQ_UD2	10 5B FE 59 16
RSP_UD	68 15 15 68 08 01 72 78 56 34 12 A8 15 00 02 0E 00 00 00 0C 79 78 56 34 12 F5 16

Received value = 78 56 34 12 h
Real value 12345678

1.11 Application reset

After this message NEMO96HD resets the answer counter, the pending selection frame, the error flags and responds with the ACK character (E5h) :

Field Name	Number of byte	Value	Meaning
Start	1	68h	
L-f	1	03h	Header
L-f	1	03h	
Start	1	68h	
C-f	1	53h/73h	SND_UD
A-f	1	PADR	Primary Address
CI-f	1	50h	Application reset
Check Sum	1	CS	
Stop	1	16h	

1.12 Selection through secondary address

A M-Bus network can manage up to 250 primary addresses, from 1 to 250, instead 0 is used for a not configured device. If there are more than 250 devices, it is necessary to make an extension with secondary address.

Master sends the following SND_UD telegram to select the device with the requested secondary address :

Field Name	Number of byte	Value	Meaning
Start	1	68h	
L-f	1	0Bh	Header
L-f	1	0Bh	
Start	1	68h	
C-f	1	53h/73h	SND_UD
A-f	1	FDh	Primary Address
CI-f	1	52h	
Value	4	X1X0 X3X2 X5X4 X7X6	Secondary Address
Manufacturer code	2	A5 25	"IME" = 25A5
Device version	1	GEN	Version
Medium	1	02	Electricity
Check Sum	1	CS	
Stop	1	16h	

If there is a Slave that has the Secondary Address X7X6X5X4X3X2X1X0, with the right Manufacturer code, Device version and Medium, it responds with an ACK (0xE5) char, otherwise no answer will be sent.

If the Slave is correctly selected it changes its state in "selected" . This means that it will answer to all commands REQ_UD2, issued to the Slave with Primary Address 0xFD, with a RSP_UD.
In other words Master uses Primary Address 253 (0xFD) to poll the Slave.

The Slave remains in a "selected" state until it receives either a selection command to a different Secondary Address or a SND_NKE command to Address 0xFD.

During the selection it is allowed to use 0xF wild card instead of any digit of Manufacturer code, Device version and Medium. For example 0xFFFF instead of 0xA525, 0xFF instead of 0x02 for the Medium.

Secondary address :

```
M => S   [68][0b][0b][68][53][fd][52]  [02][00][00][00]  [a5][25][14][02][8d][16]
S => M   [E5]
```

2. MODE 1 PROTOCOL

This is the single telegram protocol.

2.1 STANDARD M-Bus TELEGRAMS

2.1.1 Standard Data (Answer for REQ_UD2)

Initialization of Slave (SND_NKE)

To start or initialize the communication Master sends this telegram to Slave :

SND_NKE	
CODE	**Description**
10h	Start
40h	C field : initialization
PADR	A field : device address 0..250 /254/255
CS	CheckSum = (10h+40h+PADR) mod 100h
16h	Stop

If Slave receives SND_NKE it resets TC counter of sending telegrams and answers with E5.

Request for Data (REQ_UD2)

REQ_UD2	
CODE	**Description**
10h	Start
5B/7Bh	C field : Request for Data
PADR	A field : device address 0..250 /254
CS	CheckSum = (10h+5B/7Bh+PADR) mod 100h
16h	Stop

When Master sends this telegram to a Slave, it answers a Standard Frame with variable data structure giving following informations :

Total Active Energy
Partial Active Energy
Total Reactive Energy
Peak Active Power
Error flags

Standard Frame

DATA	**DESCRIPTION**	**LENGHT**	**DATA TYPE**
1	Total Active Energy	4	Type A , 8 BCD digits
2	Partial Active Energy	4	Type A , 8 BCD digits
3	Total Reactive Energy	4	Type A , 8 BCD digits
4	Peak Active Power	4	Type B , 32-bit Integer
5	Error flags	1	Type C, 8-bit UINT (*)

(*) UINT : unsigned integer
Error flags gives the error status

Abbreviations

NAME	**Meaning**
LEN	length in byte
PADR	Primary Address
IDENT	Secondary Address
MAN	Manufacturer
GEN	Generation Version
MED	Medium (water, electricity..)
TC	Telegram Counter
STAT	Status
L-f	Length field
C-f	Control field
CI-f	Control Information field
A-f	Address field
DIF	Data information field
VIF	Value information field

RSP_UD			
Field Name	**Byte Number**	**Value**	**Meaning**
Start	1	68	Start byte
L-f	1	LEN	Frame number byte
L-f	1	LEN	Frame number byte
Start	1	68	Start byte
C-f	1	08	RSP_UD
A-f	1	**PADR**	0..250
CI-f	1	72	Variable structure,LSB is trasmitted first
Secondary address	4	IDENT	XXXXXXXX (8 BCD digits)
Manufacturer code	2	A5 25	"IME" = 25A5
Device version	1	**GEN**	Version
Medium	1	02	Electricity
Access number	1	TC	**Incremented by 1 for any aswered telegram**
Status	1	STAT	Status for EN 1434-3 (*****)
Signature	2	00 00	**Not used**
DIF	1	8C	Istantaneous Value, 8 BCD digits
DIFE	1	10	(1=0001 b Tariff bit1bit0=01)
VIF	1	01..06/81..86	Format XXXXX.XXX kWh/MWh
VIFE	0/1	--/7D	
Value	4	xxxxxxxx	Total Active Energy
DIF	1	8C	Istantaneous Value, 8 BCD digits
DIFE	1	20	(2=0010 b Tariff bit1bit0=10)
VIF	1	01..06/81..86	Format XXXXX.XXX kWh/MWh
VIFE	0/1	--/7D	
Value	4	xxxxxxxx	Partial Active Energy
DIF	1	8C	Istantaneous Value, 8 BCD digits
DIFE	1	50	(5= 0101 b Tariff bit1 bit0 = 01)
VIF	1	01..06/81..86	(01 b Unit bit0 = 01) =>Unit 1
VIFE	0/1	--/7D	Format XXXXX.XXX kVArh/MVArh
Value	4	xxxxxxxx	Total Reactive Energy
DIF	1	C4	Istantaneous Value, 32-bit integer
DIFE	1	00	(C = 1100 b Storage bit0 = 1) => Storage = 1
VIF	1	zz	Power W/kW/MW
Value	4	xxxxxxxx	Peak Active Power (******)
DIF	1	01	Istantaneous Value, 8-bit integer
VIF	1	FD	Error flags (*******)
VIFE	1	17	
Value	1	yy	Error on 8 bit B7..B0
Checksum	1	CS	
Stop	1	16	

(*) Status
With this field various information about the status of counter, and faults which one occurred, are communicated :

Bit set	**EN 1434-3**
Bit 7 = 1	Specific to manufacturer
Bit 6 = 1	Specific to manufacturer
Bit 5 = 1	Specific to manufacturer
Bit 4 = 1	Temporary Error
Bit 3 = 1	Permanent Error
Bit 2 = 1	Power low
Bit 1 = 1	Application layer error 1
Bit 0 = 1	Application layer error 0

(**) Peak Active power

Parameter : XXXXXXXX is 32 bit Integer, LSB before.

KT = KTA * KTV	**Unit**	**VIF**
< 6000	1 W	2Bh
>= 6000	0,1 kW	2Dh

(***) Error flags

Parameter : YY = b7b6b5b4b3b2b1b0 is a bit mapped 8 bit Integer.

BIT number	**Description**
b7 = 1	Not used
b6 = 1	Not used
b5 = 1	Not used
b4 = 1	Not used
b3 = 1	Not used
b2 = 1	Not used
b1 = 1	Not used
b0 = 1	Not used

3. MODE 2 PROTOCOL

3.1 SUMMARY OF M-Bus COMMANDS

See in the following table the summary of the 3 basic telegrams.

	RSP_UD - 1st message									
Symbol	**Sequence**	**UNIT**	**DIF**	**DIFE(1)**	**DIFE(2)**	**DIFE(3)**		**VIF**	**VIFE**	**FORMAT**
Et+	Active positive energy	0	0x04					0x84	0X3B	INT 32
P+	Active positive power	0	0x04					0xAB	0x3B	INT 32
P-	Active negative power	0	0x04					0xAB	0x3C	INT 32
Er+	Reactive positive energy	1	0x84	0x40				0x84	0X3B	INT 32
Q+	Reactive positive power	1	0x84	0x40				0xAB	0x3B	INT 32
Q-	Reactive negative power	1	0x84	0x40				0xAB	0x3C	INT 32
Part Et+	Active partial positive energy	2	0x84	0x80	0x40			0x84	0X3B	INT 32
Part Er+	Reactive partial positive energy	3	0x84	0xC0	0x40			0x84	0x3B	INT 32
Pd	Average Power Demand	4	0x84	0x80	0x80	0x40		0xAB	0X3C	INT 32
RFU	Reserved	5	0x84	0xC0	0x80	0x40		0x84	0x3C	INT 32
	RSP_UD - 2nd message									
	Sequence	**UNIT**	**DIF**	**DIFE(1)**	**DIFE(2)**	**DIFE(3)**		**VIF**	**VIFE**	**FORMAT**
L1-N	V1	2	0x84	0x80	0x40			0xFD	0x48	INT 32
I1	I1	2	0x84	0x80	0x40			0xFD	0x59	INT 32
P1+	P1	2	0x84	0x80	0x40			0xAB	0x3B	INT 32
P1-	P1-negative	2	0x84	0x80	0x40			0xAB	0x3C	INT 32
L2-N	V2	3	0x84	0xC0	0x40			0xFD	0x48	INT 32
I2	I2	3	0x84	0xC0	0x40			0xFD	0x59	INT 32
P2+	P2	3	0x84	0xC0	0x40			0xAB	0x3B	INT 32
P2-	P2-negative	3	0x84	0xC0	0x40			0xAB	0x3C	INT 32
L3-N	V3	4	0x84	0x80	0x80	0x40		0xFD	0x48	INT 32
I3	I3	4	0x84	0x80	0x80	0x40		0xFD	0x59	INT 32
P3+	P3	4	0x84	0x80	0x80	0x40		0xAB	0x3B	INT 32
P3-	P3-negative	4	0x84	0x80	0x80	0x40		0xAB	0x3C	INT 32
L1-L2	V12	5	0x84	0xC0	0x80	0x40		0xFD	0x48	INT 32
Q1+	Q1	5	0x84	0xC0	0x80	0x40		0xAB	0x3B	INT 32
Q1-	Q1-negative	5	0x84	0xC0	0x80	0x40		0xAB	0x3C	INT 32
L2-L3	V23	6	0x84	0x80	0xC0	0x40		0xFD	0x48	INT 32
Q2+	Q2	6	0x84	0x80	0xC0	0x40		0xAB	0x3B	INT 32
Q2-	Q2-negative	6	0x84	0x80	0xC0	0x40		0xAB	0x3C	INT 32
L1-L3	V13	7	0x84	0xC0	0xC0	0x40		0xFD	0x48	INT 32
Q3+	Q3	7	0x84	0xC0	0xC0	0x40		0xAB	0x3B	INT 32

Q3-	Q3-negative	7	0x84	0xC0	0xC0	0x40		0xAB	0x3C	INT 32
	RSP_UD - 3rd message									
	Sequence	**UNIT**	**DIF**	**DIFE(1)**	**DIFE(2)**	**DIFE(3)**	**DIFE(4)**	**VIF**	**VIFE**	
PF	Power factor	8	0x82	0x80	0x80	0x80	0x40	0xEE	0x3B	INT 16
PF-	Power factor -	8	0x82	0x80	0x80	0x80	0x40	0xEE	0x3C	INT 16
Fr	Frequency	9	0x82	0xC0	0x80	0x80	0x40	0x6E		INT 16
CT	Current ratio (KTA)	10	0x84	0x80	0xC0	0x80	0x40	0x6E		INT 32
VT	Voltage ratio (KTV)	11	0x84	0xC0	0xC0	0x80	0x40	0x6E		INT 32
PF1	Power factor L1	12	0x82	0x80	0x80	0xC0	0x40	0xEE	0x3B	INT 16
PF1-	Power factor L1-	12	0x82	0x80	0x80	0xC0	0x40	0xEE	0x3C	INT 16
PF2	Power factor L2	13	0x82	0xC0	0x80	0xC0	0x40	0xEE	0x3B	INT 16
PF2-	Power factor L2-	13	0x82	0xC0	0x80	0xC0	0x40	0xEE	0x3C	INT 16
PF3	Power factor L3	14	0x82	0x80	0xC0	0xC0	0x40	0xEE	0x3B	INT 16
PF3-	Power factor L3-	14	0x82	0x80	0xC0	0xC0	0x40	0xEE	0x3C	INT 16

3.3 STANDARD DATA TELEGRAMS

Details of the telegrams (all values are hexadecimal).

3.3.1 Details of telegrams 1

	RSP_UD			
	Field Name	**Byte n.**	Value	**Meaning**
	Start	1	68	Start byte
	L-f	1	LEN	Frame number byte
	L-f	1	LEN	Frame number byte
	Start	1	68	Start byte
	C-f	1	08	RSP_UD
	A-f	1	**PADR**	0..250
	CI-f	1	72	Variable structure ,LSB is trasmitted first
	Secondary address	4	IDENT	XXXXXXXX (8 BCD digits)
	Manufacturer code	2	A5 25	"IME" = 25A5
	Device version	1	**GEN**	Version
	Medium	1	02	Electricity
	Access number	1	TC	**Incremented by 1 for any aswered telegram**
	Status	1	STAT	Status for EN 1434-3 (*)
	Signature	2	00 00	**Not used**
Et +	DIF	1	04	Instantaneous Value, 32 bit Integer
	VIF	1	84	Units kWh with resolution 10 Wh
	VIFE (1)	1	3B	
	Value	4	xxxxxxxx	3-phase Active Positive Energy
P +	DIF	1	04	Instantaneous Value, 32-bit Integer
	VIF	1	AB	W
	VIFE (1)	1	3B	Accumulation only if positive contribution
	Value	4	xxxxxxxx	3-phase Active Positive Power
P –	DIF	1	04	Instantaneous Value, 32-bit Integer
	VIF	1	AB	W
	VIFE (1)	1	3C	Accumulation of abs value only if negative contribution
	Value	4	xxxxxxxx	3-phase Active Negative Power
Er +	DIF	1	84	Instantaneous Value, 32 bit Integer
	DIFE (1)	1	40	Unit 1
	VIF	1	84	kvarh with resolution 10 varh
	VIFE (1)	1	3B	Accumulation only if positive
	Value	4	xxxxxxxx	3-phase Reactive Positive Energy
Q +	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	40	Unit 1
	VIF	1	AB	var
	VIFE (1)	1	3B	Accumulation only if positive
	Value	4	xxxxxxxx	3-phase Reactive Positive Power
Q -	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	40	Unit 1
	VIF	1	AB	var
	VIFE (1)	1	3C	Accumulation of abs value only if negative contribution
	Value	4	xxxxxxxx	3-phase Reactive Negative Power
Part Et +	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	40	
	VIF	1	84	kWh with resolution 10Wh
	VIFE (1)	1	3B	Accumulation only if positive contribution
	Value	4	xxxxxxxx	3-phase Partial Active Positive Energy
PartEr +	DIF	1	84	Instantaneous Value, 32 bit Integer
	DIFE (1)	1	C0	
	VIF	1	40	kVArh with resolution 0,01k/0,1k VArh
	VIFE	1	84	
	VIFE (1)	1	3B	Accumulation only if positive contribution

	Value	4	xxxxxxxx	3-phase Partial Reactive Positive Energy
Power Demand	DIF	1	84	Instantaneous Value, 32 bit Integer
	DIFE (1)	1	80	
	DIFE	1	80	
	DIFE (3)	1	40	Unit 4
	VIF	1	84	
	VIFE (1)	1	3C	
	Value	4	xxxxxxxx	Active Power Demand
Reserved	DIF	1	84	Instantaneous Value, size 32 bit Integer
	DIFE (1)	1	C0	
	DIFE (2)	1	80	
	DIFE (3)	1	40	Unit 5
	VIF	1	84	
	VIFE (1)	1	3C	
	Value	4	xxxxxxxx	
	DIF	1	1F	more records will follow in next telegram
	Value	5	0000000000	PAD bytes
	Checksum	1	CS	
	Stop	1	16	

3.3.2 Details of telegrams 2

RSP_UD			
Field Name	**Byte Number**	Value	**Meaning**
Start	1	68	Start byte
L-f	1	LEN	Frame number byte
L-f	1	LEN	Frame number byte
Start	1	68	Start byte
C-f	1	08	RSP_UD
A-f	1	**PADR**	0..250
CI-f	1	72	Variable structure,LSB is trasmitted first
Secondary address	4	IDENT	XXXXXXXX (8 BCD digits)
Manufacturer code	2	A5 25	"IME" = 25A5
Device version	1	**GEN**	Version
Medium	1	02	Electricity
Access number	1	TC	**Incremented by 1 for any aswered telegram**
Status	1	STAT	Status for EN 1434-3 (*)
Signature	2	00 00	**Not used**
L1 – N	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE	1	80	
	DIFE	1	40	Units 2
	VIF	1	FD	Extension of VIF code
	VIFE (1)	1	48	0.1 V
	Value	4	xxxxxxxx	Voltage L1-N
I 1	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE	1	80	
	DIFE	1	40	Unit 2
	VIF	1	FD	Extension of VIF code
	VIFE (1)	1	59	mA
	Value	4	xxxxxxxx	Current L1
P 1 +	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE	1	80	
	DIFE	1	40	Unit 2
	VIF	1	AB	W
	VIFE (1)	1	3B	Accumulation only if positive contribution
	Value	4	xxxxxxxx	Positive Active Power Line 1
P1 -	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	40	Unit 2
	VIF	1	AB	W
	VIFE (1)	1	3C	Accumulation of abs value only if negative contribution
	Value	4	xxxxxxxx	Negative Active Power Line 1
L2 - N	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE	1	C0	
	DIFE	1	40	Unit 3
	VIF	1	FD	Extension of VIF code
	VIFE	1	48	0.1 V
	Value	4	xxxxxxxx	Voltage L2-N
I 2	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	C0	
	DIFE (2)	1	40	Unit 3
	VIF	1	FD	Extension of VIF code
	VIFE (1)	1	59	mA
	Value	4	xxxxxxxx	Current L2
P 2 +	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	C0	
	DIFE (2)	1	40	Unit 3
	VIF	1	AB	W

	VIFE (1)	1	3B	Accumulation only if positive contribution
	Value	4	xxxxxxxx	Positive Active Power Line 2
P2 -	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	C0	
	DIFE (1)	1	40	Unit 3
	VIF	1	AB	W
	VIFE (1)	1	3C	Accumulation of abs value only if negative contribution
	Value	4	xxxxxxxx	Negative Active Power Line 2
L3 - N	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	80	
	DIFE (3)	1	40	Unit 4
	VIF	1	FD	Extension of VIF code
	VIFE (1)	1	48	0.1 V
	Value	4	xxxxxxxx	Voltage L3-N
I 3	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	80	
	DIFE (3)	1	40	Unit 4
	VIF	1	FD	Extension of VIF code
	VIFE (1)	1	59	mA
	Value	4	xxxxxxxx	Current L3
P 3 +	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	80	
	DIFE (3)	1	40	Unit 4
	VIF	1	AB	W
	VIFE	1	3B	Accumulation only if positive contribution
	Value	4	xxxxxxxx	Positive Active Power Line 3
P3 -	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	80	
	DIFE (3)	1	40	Unit 4
	VIF	1	AB	W
	VIFE (1)	1	3C	Accumulation of abs value only if negative contribution
	Value	4	xxxxxxxx	Negative Active Power Line 3
L1 – L2	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	C0	
	DIFE (2)	1	80	
	DIFE (3)	1	40	Unit 5
	VIF	1	FD	Extension of VIF code
	VIFE (1)	1	48	0.1 V
	Value	4	xxxxxxxx	Voltage L1-L2
Q 1 +	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	C0	
	DIFE (2)	1	80	
	DIFE (3)	1	40	Unit 5
	VIF	1	AB	Var
	VIFE (1)	1	3B	Accumulation only if positive contribution
	Value	4	xxxxxxxx	Positive Reactive Power Line 1

Q 1 -	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	C0	
	DIFE (2)	1	80	
	DIFE (3)	1	40	Unit 5
	VIF	1	AB	Var
	VIFE (1)	1	3C	Accumulation of abs value only if negative contribution
	Value	4	xxxxxxxx	Negative Reactive Power Line 1
L2 – L3	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	C0	
	DIFE (3)	1	40	Unit 6
	VIF	1	FD	Extension of VIF code
	VIFE (1)	1	48	0.1 V
	Value	4	xxxxxxxx	Voltage L2-L3
Q 2 +	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	C0	
	DIFE (3)	1	40	Unit 6
	VIF	1	AB	Var
	VIFE (1)	1	3B	Accumulation only if positive contribution
	Value	4	xxxxxxxx	Positive Reactive Power Line 2
Q 2 -	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	C0	
	DIFE (3)	1	40	Unit 6
	VIF	1	AB	Var
	VIFE (1)	1	3C	Accumulation of abs value only if negative contribution
	Value	4	xxxxxxxx	Negative Reactive Power Line 1
L1 – L3	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	C0	
	DIFE (2)	1	C0	
	DIFE (3)	1	40	Unit 7
	VIF	1	FD	Extension of VIF code
	VIFE (1)	1	48	0.1 V
	Value	4	xxxxxxxx	Voltage L1-L3
Q 3 +	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	C0	
	DIFE (2)	1	C0	
	DIFE (3)	1	40	Unit 7
	VIF	1	AB	Var
	VIFE (1)	1	3B	Accumulation only if positive contribution
	Value	4	xxxxxxxx	Positive Reactive Power Line 3
Q 3 -	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	C0	
	DIFE (2)	1	C0	
	DIFE (3)	1	40	Unit 7
	VIF	1	AB	Var
	VIFE (1)	1	3C	Accumulation of abs value only if negative contribution
	Value	4	xxxxxxxx	Negative Reactive Power Line 3
	DIF	1	1F	More records will follow in next telegram
	Value	5	0000000000	PAD bytes
	Checksum	1	CS	
	Stop	1	16	

3.3.3 Details of telegrams 3

	RSP_UD			
	Field Name	**Byte Number**	Value	**Meaning**
	Start	1	68	Start byte
	L-f	1	LEN	Frame number byte
	L-f	1	LEN	Frame number byte
	Start	1	68	Start byte
	C-f	1	08	RSP_UD
	A-f	1	**PADR**	0..250
	CI-f	1	72	Variable structure, LSB is trasmitted first
	Secondary address	4	IDENT	XXXXXXXX (8 BCD digits)
	Manufacturer code	2	A5 25	"IME" = 25A5
	Device version	1	**GEN**	Version
	Medium	1	02	Electricity
	Access number	1	TC	**Incremented by 1 for any answered telegram**
	Status	1	STAT	Status for EN 1434-3 (*)
	Signature	2	00 00	**Not used**
PF	DIF	1	82	Instantaneous Value, 16-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	80	
	DIFE (3)	1	80	
	DIFE (4)	1	40	Unit 8
	VIF	1	EE	Dimensionless (1.00 => 100)
	VIFE (1)	1	3B	
	Value	2	xxxx	Three phase power factor
PF-	DIF	1	82	Instantaneous Value, 16-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	80	
	DIFE (3)	1	80	
	DIFE (4)	1	40	Unit 8
	VIF	1	EE	Dimensionless (1.00 => 100)
	VIFE (1)	1	3C	
	Value	2	xxxx	Three phase power factor
Frequency	DIF	1	82	Instantaneous Value, 16-bit Integer
	DIFE (1)	1	C0	
	DIFE (2)	1	80	
	DIFE (3)	1	80	
	DIFE (4)	1	40	Unit 9
	VIF	1	6E	Dimensionless (50.0 => 500)
	Value	2	xxxx	Frequency
CT Ratio	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	C0	
	DIFE (3)	1	80	
	DIFE (4)	1	40	Unit 10
	VIF	1	6E	Dimensionless (2000 / 5 => 400)
	Value	4	xxxxxxxx	Current ratio (KTA)

VT ratio	DIF	1	84	Instantaneous Value, 32-bit Integer
	DIFE (1)	1	C0	
	DIFE (2)	1	C0	
	DIFE (3)	1	80	
	DIFE (4)	1	40	Unit 11
	VIF	1	6E	Dimensionless (= 10 always)
	Value	4	xxxxxxxx	Voltage ratio (KTV)
PF 1	DIF	1	82	Instantaneous Value, 16-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	80	
	DIFE (3)	1	C0	
	DIFE (4)	1	40	Unit 12
	VIF	1	EE	Dimensionless (1.00 => 100)
	VIFE (1)	1	3B	
	Value	2	xxxx	Phase Power Factor
PF1 -	DIF	1	82	Instantaneous Value, 16-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	80	
	DIFE (3)	1	C0	
	DIFE (4)	1	40	Unit 12
	VIF	1	EE	Dimensionless (1.00 => 100)
	VIFE (1)	1	3C	
	Value	2	xxxx	
PF2	DIF	1	82	Instantaneous Value, 16-bit Integer
	DIFE (1)	1	C0	
	DIFE (2)	1	80	
	DIFE (3)	1	C0	
	DIFE (4)	1	40	Unit 13
	VIF	1	EE	Dimensionless (1.00 => 100)
	VIFE (1)	1	3B	
	Value	2	xxxx	Phase Power Factor
PF2 -	DIF	1	82	Instantaneous Value, 16-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	80	
	DIFE (3)	1	C0	
	DIFE (4)	1	40	Unit 13
	VIF	1	EE	Dimensionless (1.00 => 100)
	VIFE (1)	1	3C	
	Value	2	xxxx	
PF3	DIF	1	82	Instantaneous Value, 16-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	80	
	DIFE (3)	1	C0	
	DIFE (4)	1	40	Unit 14
	VIF	1	EE	Dimensionless (1.00 => 100)
	VIFE (1)	1	3B	
	Value	2	xxxx	Phase Power Factor
PF3 -	DIF	1	82	Instantaneous Value, 16-bit Integer
	DIFE (1)	1	80	
	DIFE (2)	1	80	
	DIFE (3)	1	C0	
	DIFE (4)	1	40	Unit 14
	VIF	1	EE	Dimensionless (1.00 => 100)
	VIFE (1)	1	3C	
	Value	2	xxxx	

DIF	1	0F	Indicating that this is the last telegram
Value	5	0000000000	PAD bytes
Checksum	1	CS	
Stop	1	16	

4. MODE 3 PROTOCOL

This is the traditional IME protocol. There are many differences with respect the mode 2 protocol that is more standard and mainly they concern the way to communicate the energy values. In mode 3 the energy registers are transmitted in BCD format instead of double WORD as in mode 2.

4.1 Request for Data (REQ_UD2)

REQ_UD2	
CODE	**Description**
10h	Start
5B/7Bh	C field : Request for Data
PADR	A field : device address 0..250 /254
CS	CheckSum = (10h+5B/7Bh+PADR) mod 100h
16h	Stop

When Master sends this telegram to a Slave, it answers a Standard Frame with RSP_UD multi-telegram, where the last DIF in the user data part of the telegram is 0x1F to indicate that there are more data in the next telegram.

Answer to Request for Data (REQ_UD2)

Position	Description	Byte	Data type
1	Active Total Energy	6	Type A , 12 BCD digits
2	Active Positive Power 3-phase	4	Type H , IEEE Real
3	Reactive Total Energy	6	Type A , 12 BCD digits
4	Reactive Positive Power 3-phase	4	Type H , IEEE Real
5	Active Partial Energy	6	Type A , 12 BCD digits
6	Error flags	1	Type B , 8-bit Integer
7	Current I1	4	Type H , IEEE Real
8	Current I2	4	Type H , IEEE Real
9	Current I3	4	Type H , IEEE Real
10	Voltage L1	4	Type H , IEEE Real
11	Voltage L2	4	Type H , IEEE Real
12	Voltage L3	4	Type H , IEEE Real
13	Active Power L1	4	Type H , IEEE Real with sign
14	Active Power L2	4	Type H , IEEE Real with sign
15	Active Power L3	4	Type H , IEEE Real with sign
16	Reactive Power L1	4	Type H , IEEE Real with sign
17	Reactive Power L2	4	Type H , IEEE Real with sign
18	Reactive Power L3	4	Type H , IEEE Real with sign
19	Voltage L1-L2	4	Type H , IEEE Real
20	Voltage L2-L3	4	Type H , IEEE Real
21	Voltage L3-L1	4	Type H , IEEE Real
22	Frequency	4	Type H , IEEE Real
23	Current Transform Ratio KTA	2	Type B , 16-bit Integer
24	Voltage Transform Ratio KTV	2	Type B , 16-bit Integer

4.2 EXAMPLES OF TELEGRAMS 1,2,3

4.2.1 Telegram 1

Example of the 1st telegram (all values are hexadecimal).

	RSP_UD			
	Field Name	**Byte n.**	Value	**Meaning**
	Start	1	68	Start byte
	L-f	1	LEN	Frame number byte
	L-f	1	LEN	Frame number byte
	Start	1	68	Start byte
	C-f	1	08	RSP_UD
	A-f	1	PADR	0..250
	CI-f	1	72	Variable structure ,LSB is transmitted first
	Secondary address	4	IDENT	XXXXXXXX (8 BCD digits)
	Manufacturer code	2	A5 25	"IME" = 25A5
	Device version	1	GEN	Version
	Medium	1	02	Electricity
	Access number	1	TC	incremented by 1 for any answered telegram
	Status	1	STAT	Status for EN 1434-3 (*)
	Signature	2	00 00	Not used
3-phase Et +	DIF	1	8E	Instantaneous Value, size 12 BCD digits
	DIFE	1	50	Tariff 1 Unit 1 Storage number 0
	VIF	1	04/05	Units kWh with resolution 0,01k/0,1k Wh
	Value	6	xxxxxxxxxxx	3-phase Active Positive Energy
P +	DIF	1	85	Instantaneous Value, 32-bit Real
	DIFE	1	50	Tariff 1 Unit 1 Storage number 0
	VIF	1	2B	Power W
	Value	4	xxxxxxxx	3-phase Active Positive Power
3-phase Er +	DIF	1	8E	Instantaneous Value, size 12 BCD digits
	DIFE	1	90	Tariff 1
	DIFE	1	40	Unit 2
	VIF	1	04/05	Units kVArh with resolution 0,01k/0,1k VArh
	Value	6	xxxxxxxxxxx	3-phase Reactive Positive Energy
Q +	DIF	1	85	Instantaneous Value, 32-bit Real
	DIFE	1	90	Tariff 1
	DIFE	1	40	Unit 2
	VIF	1	2B	Power Var
	Value	4	xxxxxxxx	3-phase Reactive Positive Power
Part Et +	DIF	1	8E	Instantaneous Value, size 12 BCD digits
	DIFE	1	60	Tariff 2 Unit 1 Storage number 0
	VIF	1	04/05	Units kWh with resolution 0,01k/0,1k Wh
	Value	6	xxxxxxxxxxx	3-phase Partial Active Energy

Err flags	DIF	1	01	Instantaneous Value, 8-bit integer
	VIF	1	FD	Error flags (**Not used - 00**)
	VIFE	1	17	
	Value	1	Yy	Error on 8 bit B7..B0
	DIF	1	1F	more records will follow in next telegram
	Value	5	0000000000	PAD bytes
	Checksum	1	CS	
	Stop	1	16	

4.2.2 Telegram 2

Example of the 2nd telegram (all values are hexadecimal).

	RSP_UD			
	Field Name	**Byte n.**	Value	**Meaning**
	Start	1	68	Start byte
	L-f	1	LEN	Frame number byte
	L-f	1	LEN	Frame number byte
	Start	1	68	Start byte
	C-f	1	08	RSP_UD
	A-f	1	PADR	0..250
	CI-f	1	72	Variable structure,LSB is trasmitted first
	Secondary address	4	IDENT	XXXXXXXX (8 BCD digits)
	Manufacturer code	2	A5 25	"IME" = 25A5
	Device version	1	GEN	Version
	Medium	1	02	Electricity
	Access number	1	TC	incremented by 1 for any aswered telegram
	Status	1	STAT	Status for EN 1434-3 (*)
	Signature	2	00 00	Not used
I 1	DIF	1	05	Instantaneous Value, 32-bit Real
	VIF	1	FD	Extension of VIF-codes
	VIFE	1	DA	Units A with resolution mA
	VIFE	1	FF	Next byte is manufacturer specific
	VIFE	1	01	Line 1
	Value	4	XXXXXXXX	Current L1
I 2	DIF	1	05	Instantaneous Value, 32-bit Real
	VIF	1	FD	Extension of VIF-codes
	VIFE	1	DA	Units A with resolution mA
	VIFE	1	FF	Next byte is manufacturer specific
	VIFE	1	02	Line 2
	Value	4	XXXXXXXX	Current L2
I 3	DIF	1	05	Instantaneous Value, 32-bit Real
	VIF	1	FD	Extension of VIF-codes
	VIFE	1	DA	Units A with resolution mA
	VIFE	1	FF	Next byte is manufacturer specific
	VIFE	1	03	Line 3
	Value	4	XXXXXXXX	Current L3
L1 - N	DIF	1	05	Instantaneous Value, 32-bit Real
	VIF	1	FD	Extension of VIF-codes
	VIFE	1	C8	Units V with resolution 100 mV
	VIFE	1	FF	Next byte is manufacturer specific
	VIFE	1	01	Line 1
	Value	4	XXXXXXXX	Voltage L1-N
L2 - N	DIF	1	05	Instantaneous Value, 32-bit Real
	VIF	1	FD	Extension of VIF-codes
	VIFE	1	C8	Units V with resolution 100 mV
	VIFE	1	FF	Next byte is manufacturer specific
	VIFE	1	02	Line 2
	Value	4	XXXXXXXX	Voltage L2-N
L3 - N	DIF	1	05	Instantaneous Value, 32-bit Real
	VIF	1	FD	Extension of VIF-codes
	VIFE	1	C8	Units V with resolution 100 mV
	VIFE	1	FF	Next byte is manufacturer specific
	VIFE	1	03	Line 3
	Value	4	XXXXXXXX	Voltage L3-N
	DIF	1	1F	more records will follow in next telegram
	Value	5	0000000000	PAD bytes
	Checksum	1	CS	

Stop	1	16	

4.2.3 Telegram 3

Example of the 3rd telegram (all values are hexadecimal).

	RSP_UD			
	Field Name	**Byte n.**	Value	**Meaning**
	Start	1	68	Start byte
	L-f	1	LEN	Frame number byte
	L-f	1	LEN	Frame number byte
	Start	1	68	Start byte
	C-f	1	08	RSP_UD
	A-f	1	PADR	0..250
	CI-f	1	72	Variable structure,LSB is trasmitted first
	Secondary address	4	IDENT	XXXXXXXX (8 BCD digits)
	Manufacturer code	2	A5 25	"IME" = 25A5
	Device version	1	GEN	Version
	Medium	1	02	Electricity
	Access number	1	TC	incremented by 1 for any aswered telegram
	Status	1	STAT	Status for EN 1434-3 (*)
	Signature	2	00 00	Not used
P1	DIF	1	85	Instantaneous Value, 32-bit Real
	DIFE	1	40	Unit 1
	VIF	1	AB/AD	Power W/ 0,1 kW
	VIFE	1	FF	Next byte is manufacturer specific
	VIFE	1	01	Active Power Line 1
	Value	4	xxxxxxxx	b31 = sign| b30-b23 exponent| b22-b0 value
P 2	DIF	1	85	Instantaneous Value, 32-bit Real
	DIFE	1	40	Unit 1
	VIF	1	AB/AD	Power W/ 0,1 kW
	VIFE	1	FF	Next byte is manufacturer specific
	VIFE	1	02	Active Power Line 2
	Value	4	xxxxxxxx	b31 = sign| b30-b23 exponent| b22-b0 value
P 3	DIF	1	85	Instantaneous Value, 32-bit Real
	DIFE	1	40	Unit 1
	VIF	1	AB/AD	Power W/ 0,1 kW
	VIFE	1	FF	Next byte is manufacturer specific
	VIFE	1	03	Active Power Line 3
	Value	4	xxxxxxxx	b31 = sign| b30-b23 exponent| b22-b0 value
Q 1	DIF	1	85	Instantaneous Value, size 32-bit Real
	DIFE	1	80	
	DIFE	1	40	Unit 2
	VIF	1	AB/AD	Power Var / 0,1 kVAr
	VIFE	1	FF	Next byte is manufacturer specific
	VIFE	1	01	Reactive Power L1
	Value	4	xxxxxxxx	b31 = sign| b30-b23 exponent| b22-b0 value
Q 2	DIF	1	85	Istantaneous Value, size 32-bit Real
	DIFE	1	80	
	DIFE	1	40	Unit 2
	VIF	1	AB/AD	Power VAr/ 0,1 kVAr
	VIFE	1	FF	Next byte is manufacturer specific
	VIFE	1	02	Reactive Power L2
	Value	4	xxxxxxxx	b31 = sign| b30-b23 exponent| b22-b0 value

Q 3	DIF	1	85	Instantaneous Value, size 32-bit Real
	DIFE	1	80	
	DIFE	1	40	Unit 2
	VIF	1	AB/AD	Power Var / 0,1 kVAr
	VIFE	1	FF	Next byte is manufacturer specific
	VIFE	1	03	Reactive Power L3
	Value	4	xxxxxxxx	b31 = sign| b30-b23 exponent| b22-b0 value
L1 – L2	DIF	1	05	Instantaneous Value, size 32-bit Real
	VIF	1	FD	Extension of VIF-codes
	VIFE	1	C8	Units V with resolution 0,1V
	VIFE	1	FF	Next byte is manufacturer specific
	VIFE	1	04	
	Value	4	xxxxxxxx	Voltage L1-L2
L2 – L3	DIF	1	05	Instantaneous Value, size 32-bit Real
	VIF	1	FD	Extension of VIF-codes
	VIFE	1	C8	Units V with resolution 0,1V
	VIFE	1	FF	Next byte is manufacturer specific
	VIFE	1	05	
	Value	4	xxxxxxxx	Voltage L2-L3
L3 – L1	DIF	1	05	Instantaneous Value, size 32-bit Real
	VIF	1	FD	Extension of VIF-codes
	VIFE	1	8	Units V with resolution 0,1V
	VIFE	1	FF	Next byte is manufacturer specific
	VIFE	1	06	
	Value	4	xxxxxxxx	Voltage L3-L1

Frequency	DIF	1	05	Instantaneous Value, size 32-bit Real
	VIF	1	FF	Next byte is Manufacturer specific
	VIFE	1	5A	Units Hz with resolution 0.1 Hz
	Value	4	xxxxxxxx	Frequency
KTA	DIF	1	02	Instantaneous Value, size 16-bit integer
	VIF	1	FD	
	VIFE	1	3A	dimensionless
	Value	2	xxxx	Current Transform KTA
KTV	DIF	1	02	Instantaneous Value, size 16-bit integer
	VIF	1	FD	
	VIFE	1	3A	dimensionless
	Value	2	xxxx	Voltage Transform KTV *10
	DIF	1	0F	Indicating that this is the last telegram
	Value	5	0000000000	PAD bytes
	Checksum	1	CS	
	Stop	1	16	