TELEGRAM 1

FIELD NAME							LENGTH [byte]	Type	Scale	Unit	Note	Description
DIF	DIFE	DIFE2	VIF	VIFE	VIFE2	VIFE3						
84h	90h	10h	FFh	80h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Total Positive Active Energy
84h	90h	10h	FFh	81h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Total Positive Reactive Energy
84h	80h	20h	FFh	80h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Positive Active Energy Phase 1
84h	90h	20h	FFh	80h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Positive Active Energy Phase 2
84h	A0h	20h	FFh	80h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Positive Active Energy Phase 3
84h	80h	20h	FFh	81h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Positive Reactive Energy Phase 1
84h	90h	20h	FFh	81h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Positive Reactive Energy Phase 2
84h	A0h	20h	FFh	81h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Positive Reactive Energy Phase 3
02h			FFh	92h	2Bh		2	signed integer	1		*Note 2*	KTA (Equivalent Current Trasformer Ratio)
84h	90h	10h	FFh	8Fh	21h		4	signed integer	1	min.	*Note 1*	Total Run Hour Counter

TELEGRAM 2

FIELD NAME							LENGTH [byte]	Type	Scale	Unit	Note	Description
DIF	DIFE	DIFE2	VIF	VIFE	VIFE2	VIFE3						
84h	10h		FFh	80h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Positive Active Energy Tariff 1
84h	20h		FFh	80h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Positive Active Energy Tariff 2
84h	30h		FFh	80h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Positive Active Energy Tariff 3
84h	80h	10h	FFh	80h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Positive Active Energy Tariff 4
84h	10h		FFh	81h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Positive Reactive Energy Tariff 1
84h	20h		FFh	81h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Positive Reactive Energy Tariff 2
84h	30h		FFh	81h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Positive Reactive Energy Tariff 3
84h	80h	10h	FFh	81h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Positive Reactive Energy Tariff 4
84h	10h		FFh	8Fh	21h		4	signed integer	1	min.	*Note 1*	Run Hour Counter Tariff 1
84h	20h		FFh	8Fh	21h		4	signed integer	1	min.	*Note 1*	Run Hour Counter Tariff 2
84h	30h		FFh	8Fh	21h		4	signed integer	1	min.	*Note 1*	Run Hour Counter Tariff 3
84h	80h	10h	FFh	8Fh	21h		4	signed integer	1	min.	*Note 1*	Run Hour Counter Tariff 4

TELEGRAM 3

FIELD NAME							LENGTH [byte]	Type	Scale	Unit	Note	Description
DIF	DIFE	DIFE2	VIF	VIFE	VIFE2	VIFE3						
84h	A0h	10h	FFh	80h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Partial Positive Active Energy
84h	A0h	10h	FFh	80h	86h	3Ch	4	signed integer	0.01	kWh	*Note 1*	Partial Negative Active Energy
84h	A0h	10h	FFh	81h	86h	3Bh	4	signed integer	0.01	kWh	*Note 1*	Partial Positive Reactive Energy
84h	A0h	10h	FFh	81h	86h	3Ch	4	signed integer	0.01	kWh	*Note 1*	Partial Negative Reactive Energy
84h	90h	10h	FFh	82h	06h		4	signed integer	0.01	kWh	*Note 1*	Total Apparent Energy
84h	90h	10h	FFh	80h	86h	3Ch	4	signed integer	0.01	kWh	*Note 1*	Total Negative Active Energy

84h	90h	10h	FFh	81h	86h	3Ch	4	signed integer	0.01	kWh	*Note 1*	Total Negative Reactive Energy

TELEGRAM 4

FIELD NAME							LENGTH [byte]	Type	Scale	Unit	Note	Description
DIF	DIFE	DIFE2	VIF	VIFE	VIFE2	VIFE3						
84h	B0h	10h	FFh	84h	2Bh		4	signed integer	1	kW	*Note 3*	Three-phase Active Power
84h	B0h	10h	FFh	84h	2Bh		4	signed integer	1	kVar	*Note 3*	Three-phase Reactive Power
84h	80h	20h	FFh	84h	2Bh		4	signed integer	1	kW	*Note 3*	Active Power L1
84h	90h	20h	FFh	84h	2Bh		4	signed integer	1	kW	*Note 3*	Active Power L2
84h	A0h	20h	FFh	85h	2Bh		4	signed integer	1	kW	*Note 3*	Active Power L3
84h	80h	20h	FFh	85h	2Bh		4	signed integer	1	kVar	*Note 3*	Reactive Power L1
84h	90h	20h	FFh	85h	2Bh		4	signed integer	1	kVar	*Note 3*	Reactive Power L2
84h	A0h	20h	FFh	85h	2Bh		4	signed integer	1	kVar	*Note 3*	Reactive Power L3

TELEGRAM 5

FIELD NAME							LENGTH [byte]	Type	Scale	Unit	Note	Description
DIF	DIFE	DIFE2	VIF	VIFE	VIFE2	VIFE3						
84h	80h	20h	FFh	89h	59h		4	signed integer	0.001	A		Current Line 1
84h	90h	20h	FFh	89h	59h		4	signed integer	0.001	A		Current Line 2
84h	A0h	20h	FFh	89h	59h		4	signed integer	0.001	A		Current Line 3
84h	80h	20h	FFh	87h	48h		4	signed integer	0.1	V		1-N Voltage
84h	90h	20h	FFh	87h	48h		4	signed integer	0.1	V		2-N Voltage
84h	A0h	20h	FFh	87h	48h		4	signed integer	0.1	V		3-N Voltage
84h	80h	20h	FFh	88h	48h		4	signed integer	0.1	V		1-2 Voltage
84h	90h	20h	FFh	88h	48h		4	signed integer	0.1	V		2-3 Voltage
84h	A0h	20h	FFh	88h	48h		4	signed integer	0.1	V		3-1 Voltage
02h			FFh	8Ah	48h		4	signed integer	0.1	Hz		Frequency

TELEGRAM 6

FIELD NAME							LENGTH [byte]	Type	Scale	Unit	Note	Description
DIF	DIFE	DIFE2	VIF	VIFE	VIFE2	VIFE3						
84h	B0h	10h	FFh	86h	2Bh		4	signed integer	1	kVA	*Note 3*	Three-phase Apparent Power
84h	80h	20h	FFh	86h	2Bh		4	signed integer	1	kVA	*Note 3*	Apparent Power L1
84h	90h	20h	FFh	86h	2Bh		4	signed integer	1	kVA	*Note 3*	Apparent Power L2
84h	A0h	20h	FFh	86h	2Bh		4	signed integer	1	kVA	*Note 3*	Apparent Power L3
82h	B0h	10h	FFh	8Bh	28h		2	signed integer	0.001			Three-Phase Power Factor
82h	B0h	10h	FFh	8Bh	28h		2	signed integer	0.001			Power Factor L1
82h	B0h	10h	FFh	8Bh	28h		2	signed integer	0.001			Power Factor L2
82h	B0h	10h	FFh	8Bh	28h		2	signed integer	0.001			Power Factor L3
82h	B0h	10h	FFh	8Ch	28h		2	signed integer			*Note 4*	Three-Phase Power Factor Sector

82h	B0h	10h	FFh	8Ch	28h		2	signed integer			*Note 4*	Power Factor Sector L1
82h	B0h	10h	FFh	8Ch	28h		2	signed integer			*Note 4*	Power Factor Sector L2
82h	B0h	10h	FFh	8Ch	28h		4	signed integer			*Note 4*	Power Factor Sector L3

TELEGRAM 7

FIELD NAME							LENGTH [byte]	Type	Scale	Unit	Note	Description
DIF	DIFE	DIFE2	VIF	VIFE	VIFE2	VIFE3						
84h	B0h	10h	FFh	8Dh	2Bh		4	signed integer	1	kW	*Note 3*	Three-Phase Average Active Power
84h	B0h	10h	FFh	85h	ABh	39h	4	signed integer	1	kVar	*Note 3*	Three-Phase Average Reactive Power
84h	B0h	10h	FFh	86h	ABh	39h	4	signed integer	1	kVA	*Note 3*	Three-Phase Average Apparent Power
84h	B0h	10h	FFh	8Eh	2Bh		4	signed integer	1	kW	*Note 3*	Maximum Total Active Power Requirement
84h	B0h	10h	FFh	85h	ABh	3Ah	4	signed integer	1	kVar	*Note 3*	Maximum Total Reactive Power Requirement
84h	B0h	10h	FFh	85h	ABh	3Ah	4	signed integer	1	kVA	*Note 3*	Maximum Total Apparent Power Requirement
84h	10h		FFh	8Eh	2Bh		4	signed integer	1	kW	*Note 3*	Maximum Total Active Power Requirement Tariff 1
84h	20h		FFh	8Eh	2Bh		4	signed integer	1	kW	*Note 3*	Maximum Total Active Power Requirement Tariff 2
84h	30h		FFh	8Eh	2Bh		4	signed integer	1	kW	*Note 3*	Maximum Total Active Power Requirement Tariff 3
84h	80h	10h	FFh	8Eh	2Bh		4	signed integer	1	kW	*Note 3*	Maximum Total Active Power Requirement Tariff 4

TELEGRAM 8

FIELD NAME							LENGTH [byte]	Type	Scale	Unit	Note	Description
DIF	DIFE	DIFE2	VIF	VIFE	VIFE2	VIFE3						
84h	80h	20h	FFh	95h	D9h	3Ah	4	signed integer	0.001	A		Maximum Thermal Current Line 1
84h	90h	20h	FFh	95h	D9h	3Ah	4	signed integer	0.001	A		Maximum Thermal Current Line 2
84h	A0h	20h	FFh	95h	D9h	3Ah	4	signed integer	0.001	A		Maximum Thermal Current Line 3
84h	80h	20h	FFh	87h	C8h	35h	4	signed integer	0.1	V		Minimum Voltage 1-N
84h	90h	20h	FFh	87h	C8h	35h	4	signed integer	0.1	V		Minimum Voltage 2-N
84h	A0h	20h	FFh	87h	C8h	35h	4	signed integer	0.1	V		Minimum Voltage 3-N
84h	80h	20h	FFh	87h	C8h	3Ah	4	signed integer	0.1	V		Maximum Voltage 1-N
84h	90h	20h	FFh	87h	C8h	3Ah	4	signed integer	0.1	V		Maximum Voltage 2-N
84h	A0h	20h	FFh	87h	C8h	3Ah	4	signed integer	0.1	V		Maximum Voltage 3-N
82h	80h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Total Harmonic Distorsion I1
82h	90h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Total Harmonic Distorsion I2
82h	A0h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Total Harmonic Distorsion I3
82h	80h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Total Harmonic Distorsion V1
82h	90h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Total Harmonic Distorsion V2
82h	A0h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Total Harmonic Distorsion V3

TELEGRAM 9

FIELD NAME							LENGTH [byte]	Type	Scale	Unit	Note	Description
DIF	DIFE	DIFE2	VIF	VIFE	VIFE2	VIFE3						

82h	80h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 3 V1
82h	80h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 5 V1
82h	80h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 7 V1
82h	80h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 9 V1
82h	80h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 11 V1
82h	80h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 13 V1
82h	80h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 15 V1
82h	90h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 3 V2
82h	90h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 5 V2
82h	90h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 7 V2
82h	90h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 9 V2
82h	90h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 11 V2
82h	90h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 13 V2
82h	90h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 15 V2
82h	A0h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 3 V3
82h	A0h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 5 V3
82h	A0h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 7 V3
82h	A0h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 9 V3
82h	A0h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 11 V3
82h	A0h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 13 V3
82h	A0h	20h	FFh	98h	2Ah		2	signed integer	0.1	%		Harmonic 15 V3

TELEGRAM 10

FIELD NAME							LENGTH [byte]	Type	Scale	Unit	Note	Description
DIF	DIFE	DIFE2	VIF	VIFE	VIFE2	VIFE3						
82h	80h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 3 I1
82h	80h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 5 I1
82h	80h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 7 I1
82h	80h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 9 I1
82h	80h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 11 I1
82h	80h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 13 I1
82h	80h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 15 I1
82h	90h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 3 I2
82h	90h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 5 I2
82h	90h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 7 I2
82h	90h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 9 I2
82h	90h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 11 I2
82h	90h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 13 I2

82h	90h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 15 I2
82h	A0h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 3 I3
82h	A0h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 5 I3
82h	A0h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 7 I3
82h	A0h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 9 I3
82h	A0h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 11 I3
82h	A0h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 13 I3
82h	A0h	20h	FFh	97h	2Ah		2	signed integer	0.1	%		Harmonic 15 I3

Note 1

*Direct meter (KTA*KTV = 1): always 0,01 kWh/kvarh*
Indirect meter: see table below

Transformer ratio	Measurement unit	Scale
1 ≤ KTA*KTV < 10	kWh/kvarh	0.01
10 ≤ KTA*KTV < 100	kWh/kvarh	0.1
100 ≤ KTA*KTV < 1000	kWh/kvarh	1
1000 ≤ KTA*KTV < 10000	MWh/Mvarh	0.01
10000 ≤ KTA*KTV < 100000	MWh/Mvarh	0.1
100000 ≤ KTA*KTV < 1000000	MWh/Mvarh	1

Note 2

Current range of a Rogowski coil is reported to an equivalent current trasformation ratio (KTA) of a /5A current transformer:
Equivalent KTA = Current Range / 5
1) 630A --> 126
2) 1600A --> 320
3) 3200A --> 640
4) 6300A --> 1260

Note 3

*Direct meter (KTA*KTV = 1): always 1 W/var/VA*
Indirect meter: see table below

*The VIFE2 changes value according to the KTA*KTV product. See table "VIFE2 details"*

Transformer ratio	Measurement unit	Scale
KTA*KTV < 5000	W/var/VA	1
KTA*KTV ≥ 5000	kW/kvar/kVA	0.01

Note 4

0: Resistive
1: Inductive

LIST OF COMMANDS AND ANSWERS

From master to slave

SND_NKE

Byte (HEX)	Length (Byte)	Description
10h	1	Start Field
40h	1	Control Field
From 0h To Fah	1	Primary Address
CKS	1	Checksum
16h	1	Stop Character

REQ_UD2

Byte (HEX)	Length (Byte)	Description
10h	1	Start
5Bh/7Bh	1	Control Field (FcBit)
From 0h To Fah	1	Primary Address
CKS	1	Checksum
16h	1	Stop Character

SWITCHING BAUD RATE

Byte (HEX)	Length (Byte)	Description
68h	1	Start
L	1	Frame Byte Length
L	1	Frame Byte Length
68h	1	Start
53h/73h	1	Control Field
From 0h To FAh	1	Primary Address
From B8h To BDh	1	Baud Rate Code (From 300 Bit/s To 9600 Bit/s)
CKS	1	Checksum
16h	1	Stop Character

APPLICATION RESET

Byte (HEX)	Length (Byte)	Description
68h	1	Start
L	1	Frame Byte Length
L	1	Frame Byte Length
68h	1	Start
53h/73h	1	Control Field
From 0h To FAh	1	Primary Address
50h	1	CI Field
CKS	1	Checksum
16h	1	Stop Character

REFER ALSO TO: http://www.m-bus.com/ - MBUS basic of serial bus
- MBUS protocol and layers specifications

From slave to master

ANSWER

Byte (HEX)	Length (Byte)	Description
E5h	1	ACK

ANSWER

Byte (HEX)	Length (Byte)	Description
68h	1	Start
L	1	Frame Byte Length
L	1	Frame Byte Length
68h	1	Start
08h	1	Control Field
From 0h To FAh	1	Primary Address
72h	1	72h: LSB Trasmitted First
From 0h To 5F5E0FFh (DEC 99999999)	4	ID (Secondary Address) - 8 BCD Digits
xxxxh	2	Manufacturer Code
xxh	1	Device Version
02h	1	Electricity
xxh	1	Incremented by 1 for every telegram answered
xxh	1	Status[1]
0000h	2	Signature (Not Used)
Data	x	**See The Telegrams Tables**
1Fh/0Fh	1	Information of next telegrams
0000000000h	5	PAD Bytes
CKS	1	Checksum
16h	1	Stop Character

[1] Status byte indicates some possible errors in the device:

No error	00h
Permanent Error	08h
Temporarry Error	10h

ANSWER

Byte (HEX)	Length (Byte)	Description
E5h	1	ACK

ANSWER

Byte (HEX)	Length (Byte)	Description
E5h	1	ACK

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From master to slave

SELECTION THROUGH SECONDARY ADDRESS

Byte (HEX)	Length (Byte)	Description
68h	1	Start
L	1	Frame Byte Length
L	1	Frame Byte Length
68h	1	Start
53h/73h	1	Control Field
FDh	1	Primary Address
52h	1	CI Field
From 0h To 5F5E0FFh (DEC 99999999)	4	ID (Secondary Address) - 8 BCD Digits
xxxxh	1	Manufacturer Code
xxh	1	Device Version
02h	1	Electricity
CKS	1	Checksum
16h	1	Stop Character

In the selection command is allowed to use the wildcard searching procedure (EN1434-3)

From slave to master

ANSWER

Byte (HEX)	Length (Byte)	Description
E5h	1	ACK

CHANGING PRIMARY ADDRESS

Byte (HEX)	Length (Byte)	Description
68h	1	Start Field
L	1	Frame Byte Length
L	1	Frame Byte Length
68h	1	Start
53h/73h	1	Control Field
From 0h To Fah	1	Primary Address
51h	1	CI Field
01h	1	DIF
7Ah	1	VIF
From 0h To FAh	1	New Address
CKS	1	Checksum
16h	1	Stop Character

ANSWER

Byte (HEX)	Length (Byte)	Description
E5h	1	ACK

CHANGING ID (Secondary Address)

Byte (HEX)	Length (Byte)	Description
68h	1	Start Field
L	1	Frame Byte Length
L	1	Frame Byte Length
68h	1	Start
53h/73h	1	Control Field
From 0h To Fah	1	Primary Address
51h	1	CI Field
0Ch	1	DIF
79h	1	VIF
From 0h To 5F5E0FFh (DEC 99999999)	4	ID (Secondary Address) - 8 BCD Digits
CKS	1	Checksum
16h	1	Stop Character

ANSWER

Byte (HEX)	Length (Byte)	Description
E5h	1	ACK

Telegram Selection

Byte (HEX)	Length (Byte)	Description
68h	1	Start Field
L	1	Frame Byte Length
L	1	Frame Byte Length
68h	1	Start
53h/73h	1	Control Field
From 0h To Fah	1	Primary Address
51h	1	CI Field
08h	1	Selection
79h	1	Configuration
xxxx	4	Bitmap (*)
CKS	1	Checksum
16h	1	Stop Character

Byte (HEX)	Length (Byte)	Description
E5h	1	ACK

(*)Bitmap: Word 16 bit
Example = MSB 00000001 LSB 00000101
With this bitmap, in the following REQ_UD2 commands the device it will answer only with first, third and nineth telegram

REFER ALSO TO: http://www.m-bus.com/ - MBUS basic of serial bus
- MBUS protocol and layers specifications

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STARTING CONFIGURATION PARAMETERS

Parameter	Value	Programmabilty
Primary Address	0	YES
ID (Secondary Address)	00000000	YES
Baud Rate	2400	YES
Parity	EVEN	NO

SPECIAL PRIMARY ADDRESSES SUPPORTED

Address	Meaning	Description	Note
FFh	Broadcast Addressing	Address used by the master to send a broadcast frame to all slaves on the network	The device that receive the frame execute the command but doesn't respond anything
FEh	Test Addressing	Address used by the master for point to point tests on a slave	The slave's answer containts his own primary address
FDh	Optional Addressing	Address used by the master after a slave selection through his secondary address	The address can be used since the slave is in selection mode

DATA INFORMATION FORMAT (DIF) IN THE PROTOCOL

DIF	DIFE1	DIFE2	MEANING
8**n**h	10h		Tariff 1
8**n**h	20h		Tariff 2
8**n**h	30h		Tariff 3
8**n**h	80h	10h	Tariff 4
8**n**h	90h	10h	Total Register
8**n**h	A0h	10h	Partial Register
8**n**h	B0h	10h	1-Phase/3-Phase Measure
8**n**h	80h	20h	Line 1 / Line 12
8**n**h	90h	20h	Line 2 / Line 23
8**n**h	A0h	20h	Line 3 / Line 31

0x80 = Extension

0x0n = Data Format -->

Code	Meaning
01h	8 Bit
02h	16 Bit
03h	24 Bit
04h	32 Bit

VALUE INFORMATION FIELD (VIF) IN THE PROTOCOL[1]

VIF	VIFE1	VIFE2	VIFE3	MEASURE	RESOLUTION
FFh	80h	86h	3Bh	Positive Active Energy	1 kWh
FFh	80h	86h	3Ch	Negative Active Energy	1 kWh
FFh	81h	86h	3Bh	Positive Reactive Energy	1 kVarh
FFh	81h	86h	3Ch	Negative Reactive Energy	1 kVarh
FFh	82h	06h		Apparent Energy	1 kVah
FFh	84h	2Bh		Active Power	1 W
FFh	85h	2Bh		Reactive Power	1 Var
FFh	86h	2Bh		Apparent Power	1 VA
FFh	87h	48h		Phase Voltage	0,1 V
FFh	88h	48h		Chained Voltage	0,1 V
FFh	87h	C8h	3Ah	Maximum Voltage	0.1 V
FFh	87h	C8h	35h	Minimum Voltage	0.1 V
FFh	89h	59h		Current	1 mA
FFh	8Ah	48h		Frequency	1 Hz
FFh	8Bh	28h		Power Factor	0,001 (Adimensional)
FFh	8Ch	2Bh		Power Factor Sector	1 (Adimensional)[2]
FFh	8Dh	2Bh		Medium Active Power	W
FFh	8Eh	2Bh		Peak Maximum Demand	W
FFh	85h	2Bh	39h	Medium Reactive Power	1 Var
FFh	86h	2Bh	39h	Medium Apparent Power	1 VA
FFh	85h	2Bh	3Ah	Maximum Reactive Power	1 Var
FFh	86h	2Bh	3Ah	Maximum Apparent Power	1 VA
FFh	8Fh	21h		Time	1 Minute
FFh	92h	2Bh		KTA (Current Trasformer Ratio)	1 (Adimensional)
FFh	95h	D9h	3Ah	Maximum Thermal Current	1 mA

FFh	97h	D9h	3Ah	Harmonic Distorsion	0.1%
FFh	98h	D9h	3Ah	Harmonic Distorsion	0.1%

[1]VIF and VIFEs are manufacturer specifications

VIFE2 details:

VIFE2	Meaning
0xE000 **nnnn**	10^(nnnn-3) Wh Energy
0xE010 1**nnn**	10^(nnn-3) W Power (or adimensional)
0xE100 **nnnn**	10^(nnnn-9) V Voltage (or Hz Frequency)
0xE101 **nnnn**	10^(nnnn-12) A Current

[2]Possible value for power factor sector:

Value	Meaning
0	Resistive
1	Inductive
2	Capacitive

REFER ALSO TO: http://www.m-bus.com/ - MBUS basic of serial bus
- MBUS protocol and layers specifications

NOTE: File and printed copies of this document are not subject to document change control.