

MS1 – 7423 Ed06

DEFINITION OF THE MODBUS INTERFACE FOR ENERIUM 100/200/300 V2 POWER MONITORS



TABLE OF CONTENTS

1. FOREWORD	6
2. INTRODUCTION TO MODBUS.....	7
2.1 DEFINITIONS	7
2.2 VARIANTS OF THE PROTOCOL.....	7
2.3 PHYSICAL (TRANSPORT) LAYER.....	7
2.3.1 RS-485 Bus.....	7
2.3.2 Over an Ethernet network.....	7
2.3.3 Optical link	7
2.4 DESCRIPTION OF THE PROTOCOL.....	8
2.4.1 MODBUS Transactions	8
2.4.2 MODBUS/RTU/ASCII addressing	8
2.4.3 In Modbus/TCP	8
2.4.4 MODBUS/RTU frames.....	9
2.4.5 MODBUS/ASCII frames.....	9
2.4.6 Modbus/TCP Frames.....	10
2.5 MODBUS.....	10
2.5.1 Coding.....	10
2.5.2 Local communication	11
2.5.3 Remote Communication	11
2.5.4 Supported functions.....	11
3. STATUS WORDS.....	13
3.1 DIGITAL OUTPUT	13
3.1.1 Alarm relay status word	13
3.1.2 Pulse output status word	13
3.1.3 Digital output status word (Alarm & Forcing)	13
3.2 DIGITAL INPUT	13
3.3 ANALOGUE OUTPUTS	14
3.4 ANALOGUE INPUTS.....	14
3.5 ALARMS.....	14
4. COMMAND WORDS.....	15
4.1 FOREWORD	15
4.2 SYSTEM PARAMETERS.....	15
4.2.1 Modification of system date / time	15
4.3 RS485 COMMUNICATION PARAMETERS	15
4.3.1 Slave number.....	15
4.3.2 RS485 data rate.....	15
4.3.3 RS485 parity	15
4.3.4 Number of RS485 stop bits.....	15
4.3.5 Response time (timeout - used in RTU mode)	16
4.3.6 Mode (RTU or ASCII)	16
4.3.7 Data bits.....	16
4.3.8 Timeout (used in ASCII mode)	16
4.3.9 All RS485 parameters.....	16

4.4	ETHERNET COMMUNICATION PARAMETERS.....	17
4.4.1	Device IP Address	17
4.4.2	Gateway IP address	17
4.4.3	Subnet mask	17
4.4.4	All Ethernet parameters	17
4.5	HMI.....	17
4.5.1	Language	17
4.5.2	Automatic scrolling	17
4.5.3	Pause time	18
4.5.4	List of scrolling screens	18
4.5.5	Custom screens	18
4.5.6	Changing the password	19
4.5.7	Value of the contrast and backlight of the LCD	19
4.5.8	Display a specific screen	19
4.5.9	Value of the backlight in standby mode	19
4.6	ALARMS.....	19
4.6.1	Configuration of an elementary alarm	19
4.6.2	Configuration of a global alarm	20
4.6.3	Reset of the alarms	20
4.6.4	Reset of the alarms buffer	20
4.6.5	Reset of the alarm status word	21
4.6.6	Global alarm labelling	21
4.6.7	Reset of the timeouts of elementary alarms	21
4.6.8	Setting of parameters for blinking of backlight	21
4.6.9	Alarms FIFO	21
4.7	DIGITAL OUTPUTS	21
4.7.1	Configuration of a digital output board	21
4.7.2	Minimum width of pulses	22
4.7.3	Forced control of a digital output	22
4.7.4	Reset of the pulse outputs	22
4.8	METROLOGY.....	22
4.8.1	Primary PT	22
4.8.2	Secondary PT	23
4.8.3	Primary CT	23
4.8.4	Secondary CT	23
4.8.5	Line frequency (50-60Hz products only)	23
4.8.6	Period of integration of the average	23
4.8.7	Initialisation of the Energies Index	23
4.8.8	Reset of the minima	24
4.8.9	Reset of the maxima	24
4.8.10	Reset of the averages	24
4.8.11	Reset of the energies	24
4.8.12	Reset of all time counters	24
4.8.13	Reset of the operating time counter	24
4.8.14	Reset of the voltage-present time counter	24
4.8.15	Reset of the current-present time counter	24
4.8.16	Initialisation of the operating time counter	24
4.8.17	Initialisation of the voltage-present time counter	24
4.8.18	Initialisation of the current-present time counter	24
4.8.19	Choice of type of wiring 3 or 4-wire	25
4.8.20	Primary CT IN	25
4.8.21	Secondary CT IN	25
4.8.22	Calculation of neutral current	25
4.8.23	Declared voltage Uc (300 and 310 only)	25
4.9	RECORDING CURVES	25
4.9.1	Configuration of recording curves	25
4.9.2	Reading of a recording curve	26
4.9.3	Stopping a recording curve	26

4.9.4	Erasing a recording curve.....	26
4.10	LOAD CURVES.....	26
4.10.1	Configuration of Load Curve.....	26
4.10.2	Reading of Load Curve.....	27
4.10.3	Erasing a Load Curve.....	27
4.10.4	Load curve - Digital outputx Unit	27
4.11	DIGITAL INPUTS	27
4.11.1	Setting a digital input	27
4.11.2	Setting of the external synchronisation of the clock	28
4.11.3	Resetting the pulse counter (digital input energy index)	28
4.11.4	Reset of the synchronisation status word.....	28
4.11.5	Setting an input label	28
4.11.6	Setting the unit of an input	28
4.11.7	Initialisation of an energy index with a specific value	29
4.12	ANALOGUE OUTPUTS.....	29
4.12.1	Setting an Analogue output board	29
4.12.2	Setting an Analogue output board	29
4.12.3	Test Mode for an Analogue output board	30
4.12.4	Management of overshoots for the analogue output.....	30
4.13	CONFIGURATION OF THE METROLOGY LED	31
4.13.1	Assignment of a quantity to the metrology LED	31
4.14	CONFIGURATION OF DIPS / OUTAGES / OVERVOLTAGE / OVERCURRENT (FOR ENERIUM 300 ONLY)	31
4.14.1	Activation of dips, outages, overvoltage / overcurrent.....	31
4.14.2	Modification of voltage thresholds	31
4.14.3	Modification of current thresholds.....	32
4.14.4	Modification of time thresholds	32
4.14.5	Modification of outages transitions	32
4.14.6	Reset of dips, outages, overvoltage / overcurrent.....	32
4.15	EN50160 STATISTICS TABLE (ENERIUM 300 ONLY)	33
4.15.1	Modification of frequency thresholds	33
4.15.2	Modification of voltage thresholds	33
4.15.3	Modification of U unbalance threshold	34
4.15.4	Modification of THD threshold	34
4.15.5	Modification of harmonics thresholds voltage.....	34
4.15.6	Reset of EN50160 statistics.....	37
4.16	CONFIGURATION OF AN ANALOGUE INPUT	37
4.16.1	Setting of an analogue input board.....	37
4.16.2	Setting of the label of an analogue input board	38
4.16.3	Setting of the unit of an analogue input board.....	38
4.17	CONFIGURATION OF WAVEFORMS (ENERIUM 300 ONLY)	38
4.17.1	Setting of waveforms	38
4.17.2	Triggering of waveforms (In Rush Mode)	39
4.17.3	Erasure of waveforms.....	39
4.17.4	Pausing Power Quality measurement	39
4.17.5	Recovery of a waveform period.....	39
5.	APPENDIX 1: STANDARDISED TYPES	41
6.	APPENDIX 3: MODBUS ADDRESSING.....	52
6.1	BASE REGISTER MAP (R/-/-) (FACTORY ZONE).....	52
6.2	COMMAND WORDS ZONE (R/W)	52
6.3	CONFIGURATION OF MEASUREMENTS.....	52

6.4	CONFIGURATION OF MODBUS RS-485 COMMUNICATION.....	52
6.5	CONFIGURATION OF MODBUS TCP COMMUNICATION.....	52
6.6	CONFIGURATION OF ELEMENTARY ALARMS (R/-S).....	53
6.7	CONFIGURATION OF GLOBAL ALARMS (R/-S)	54
6.8	CONFIGURATION OF THE HMI (R/-S)	54
6.9	CONFIGURATION OF DIGITAL OUTPUTS (R/-S).....	55
6.10	CONFIGURATION OF DIGITAL INPUTS (R/-S).....	55
6.11	CONFIGURATION OF ANALOGUE OUTPUTS (R/-S).....	55
6.12	CONFIGURATION OF THE METROLOGY LED (R/-S).....	56
6.13	1s MEASUREMENTS (R/-/-)	56
6.14	10s MEASUREMENTS (R/-/-).....	57
6.15	MINIMA FOR 1s VALUES (R/-S-OUTAGE-PROOF)	57
6.16	MINIMA OF THE MEAN VALUES (R/-S-OUTAGE-PROOF)	58
6.17	MAXIMA FOR 1s VALUES (R/-S-OUTAGE-PROOF)	58
6.18	MAXIMA OF THE MEAN VALUES (R/-S-OUTAGE-PROOF)	60
6.19	HARMONICS (R/-/-)	61
6.20	AVERAGE (R/-/-).....	62
6.21	HARMONICS AVERAGES	64
6.22	ENERGIES IN KWH, KVARH KVAH, 32-BIT (R/-S-OUTAGE-PROOF)	64
6.23	ENERGIES IN 64 BITS (R/-S-OUTAGE-PROOF)	64
6.24	STATUS WORDS (R/-S).....	65
6.25	FIFO STACK OF ELEMENTARY ALARMS (R/-S-OUTAGE-PROOF)	65
6.26	CONFIGURATION OF RECORDING CURVES (R/-S)	65
6.27	STATUS OF THE RECORDING CURVES (R/-/-).....	66
6.28	DATA OF RECORDING CURVES.....	66
6.29	CONFIGURATION OF LOAD CURVES (R/-S).....	66
6.30	LOAD CURVES (R/-S-OUTAGE-PROOF).....	67
6.31	FIFO STACK OF LOAD CURVES (R/-S-OUTAGE-PROOF).....	67
6.32	CONFIGURATION OF ANALOGUE INPUTS	67
6.33	ANALOGUE INPUTS	68
6.34	CONFIGURATION, DIPS / OUTAGES / OVERVOLTAGE / OVERCURRENT (FOR ENERIUM 300 ONLY)	68
6.35	DIPS / OUTAGES / OVERVOLTAGE / OVERCURRENT (FOR ENERIUM 300 ONLY)	68
6.36	DIPS / OUTAGES / OVERVOLTAGE / OVERCURRENT UNDERWAY (FOR ENERIUM 300 ONLY)	69
6.37	CONFIGURATION OF EN50160 STATISTICS TABLE (FOR ENERIUM 300 ONLY)	70
6.38	EN50160 STATISTICS TABLE (FOR ENERIUM 300 ONLY).....	71
6.39	CONFIGURATION OF WAVEFORMS (FOR ENERIUM 300 ONLY)	77
6.40	WAVEFORMS (FOR ENERIUM 300 ONLY).....	77

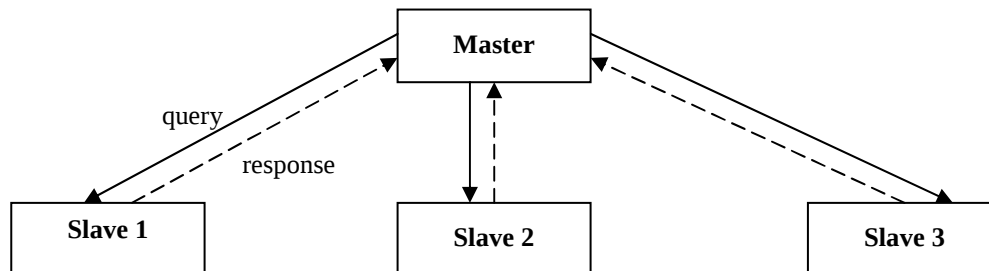
1. FOREWORD

- ❑ The information in this document is intended solely for programmers who wish to use the information measured and stored by ENERIUM type 100/200 power monitor, with a view to use by a supervision and/or energy management system, using an RS-485 field bus with the Modbus protocol in RTU or ACSII mode, or an Ethernet network with the Modbus/TCP protocol in RTU mode.
- ❑ **The mapping complies with the "Modbus protocol & mapping standard" document, version 1.6**
- ❑ The following chapter provides a short introduction to the MODBUS protocol used by the ENERIUM type 100/200/300 monitor, to configure and use the product.
- ❑ Full protocol specifications are available on the website <http://www.MODBUS.org>.
- ❑ **This document is intended for experienced users who are familiar with the MODBUS protocol and who have already used MODBUS drivers.**

2. INTRODUCTION TO MODBUS

2.1 DEFINITIONS

- ❑ The MODBUS protocol (trademark registered by MODICON) is a dialogue protocol based on a hierarchical structure of the "client / server" or "master / slave" type between devices connected by a bus (e.g.: RS-485) or a network (e.g.: Ethernet).



- ❑ The master sends a query and waits for a response. Two slaves cannot interact directly. The master / slave dialogue can be represented schematically in the form of successive point-to-point links
- ❑ Note the terminology: the master device is also called a MODBUS Client and the slave device is called a MODBUS Server.

2.2 VARIANTS OF THE PROTOCOL

- ❑ There are different transmission modes:
 - RTU: (Remote Terminal Unit); data is coded using the natural hexadecimal system
 - ASCII (American Standard Code for Information Interchange), in which each byte is coded as two ASCII characters.

2.3 PHYSICAL (TRANSPORT) LAYER

2.3.1 RS-485 Bus

- ❑ When the term MODBUS is used alone, or MODBUS/ASCII or MODBUS/RTU, the physical layer is generally an RS-485 multi-point link. In this case, two rules must be followed:
 - The master communicates with a slave and waits for a response.
 - The master communicates with all slaves, without waiting for a response (broadcasting).
- ❑ In this case, the communication is described as "half-duplex", and data cannot be sent and received at the same time.

2.3.2 Over an Ethernet network

- ❑ For an Ethernet-type network, the Modbus/TCP protocol is used, which is a minor variation on the standard Modbus, with Modbus frames encapsulated in TCP/IP frames. Therefore, the slave address is no longer used, because there is another way to identify the product on the network: the IP address.

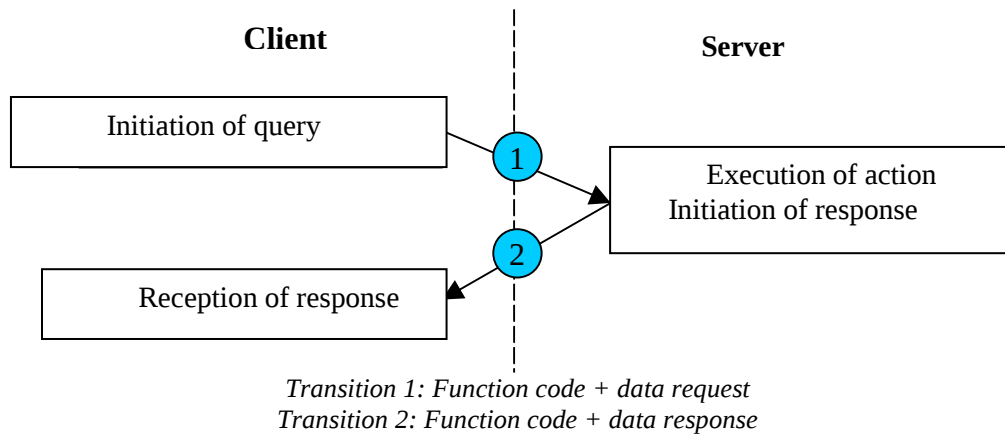
2.3.3 Optical link

- ❑ The Enerium 100/200 has a USB optical head enabling exactly the same Modbus operations to be conducted as through an RS-485 or Ethernet network. In this case it is not a bus but a point-to-point link. That is why any slave address may be used (see below), to communicate through the front panel.

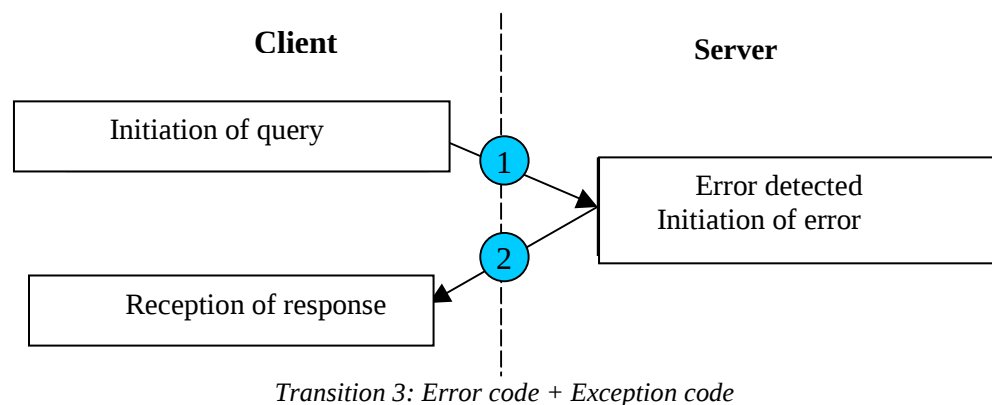
2.4 DESCRIPTION OF THE PROTOCOL

2.4.1 MODBUS Transactions

- A client sends a query to the server. The server carries out the action related to the query and prepares a response. The server then returns the response and the client receives the response from the server.



- The server may detect an error when receiving the client query, or while it is being processed. In this case, an exception is sent back to the client.



2.4.2 MODBUS/RTU/ASCII addressing

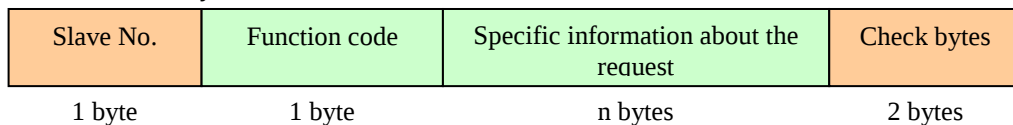
- The slave address is between 1 and 247.
- The address 0 is reserved for "broadcast" messages (a message addressed to several devices of the same bus).
- The addresses from 248 to 255 are reserved.
- Two clients cannot have the same address.

2.4.3 In Modbus/TCP

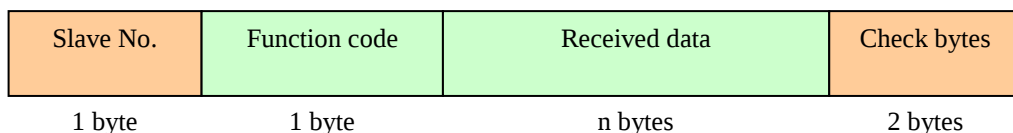
- Addressing is left to the TCP/IP layer, so a specific slave can be chosen thanks to its IP address.

2.4.4 MODBUS/RTU frames

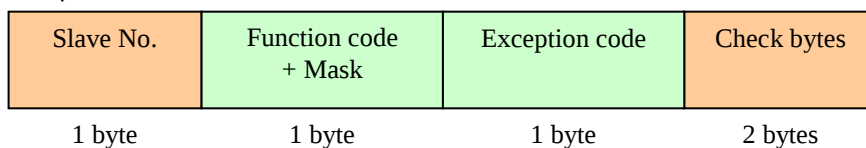
- ❑ The data of the frame is coded in Big Endian format (high-order bits first). The maximum size of a MODBUS/RTU frame is 255 bytes. Therefore, the maximum number of words which can be read (function 3) is 125, and the maximum number of words which can be sent (function 16) is 123.
- ❑ Query
 - The first byte contains the number of the slave to which the frame is sent.
 - The second byte contains a function code telling the slave addressed what type of action is requested.
 - The data contains additional information which the slave needs to execute this function.
 - The check bytes field enables the slave to check the full content of the query. In MODBUS, the error check takes the shape of a 16-bit CRC with a polynomial with a value of 0xA001. It should be noted that the two check bytes are transmitted in Little Endian format.



- ❑ Response



- ❑ Exception response



- The response frame contains the function code plus the high-order bit set to 1. For example, if the function code of the query is 0x03, an exception response will return the function 0x83.
- The standardised exception codes are the following:

Exception code	MODBUS Name	Comments
0x01	Illegal Function Code	Function not supported by the product
0x02	Illegal Data Address	Address prohibited
0x03	Illegal Data Value	Incorrect data
0x04	Server Failure	The MODBUS server has generated an error
0x05	Acknowledge	Acknowledgement
0x06	Server Busy	The server is busy
0x07	No acknowledge	No acknowledgement
0x08	Write Error	Write fault
0x09	Overlapped Area	Overlap of zone
0x0A	Gateway problem	Impossible to access the gateway
0x0B	Gateway problem	Exception generated by the gateway

2.4.5 MODBUS/ASCII frames

- ❑ In ASCII mode, a frame always starts with the character ":" (3A in hexadecimal) and ends with "carriage return - line feed" (CRLF) (CR = 0x0D and LF= 0x0A).
- ❑ The characters which can be transmitted are 0-9, A-F.
- ❑ A maximum time between two characters is defined in the system receiving the frame, and if the device which receives this frame sees a longer time, it will consider an error to have occurred. In the ENERIUM 100/200, this time is called the ASCII timeout.

Start of frame ": »	Slave No.	Function code	Data	Check bytes (LRC)	End of frames "CRLF"
1 char	2 chars	2 chars	N chars	2 chars	2 chars

Where 1 char = 7 or 8-bit

- ❑ The data of the frame is coded in Big Endian format (high-order bits first). The maximum number of words which can be read (function 3) is 125, and the maximum number of words which can be sent (function 16) is 125.
- ❑ The data in a MODBUS / ASCII frame is identical to that in a MODBUS/RTU frame, except each byte is represented by two ASCII bytes created by "converting" as follows:
 - Example: Decimal 165
 - Hexadecimal 0xA5 (Values in MODBUS/RTU)
 - ASCII 'A' – '5' (the Hex value is considered as two ASCII characters)
 - Hexadecimal 0x41 – 0x35 (Hex values of the two ASCII characters)

2.4.6 Modbus/TCP Frames

- ❑ In this mode, the frames are removed from the two CRC bytes (the integrity of data is checked by the TCP/IP layer) and a new header is appended to the start of the frame. This header is called MBAP and contains the following information:

MBAP header	Function code + mask	Exception code
7 bytes	1 byte	1 byte

FIELD	SIZE	DESCRIPTION	CLIENT	SERVER
TRANSACTION IDENTIFIER	2 BYTES	IDENTIFIES THE MODBUS TRANSACTION	INITIALIZED BY THE CLIENT	REPRODUCED BY THE SERVER IN THE RESPONSE FRAME
PROTOCOL IDENTIFIER	2 BYTES	0 = MODBUS PROTOCOL	INITIALIZED BY THE CLIENT	REPRODUCED BY THE SERVER IN THE RESPONSE FRAME
LENGTH	2 BYTES	NUMBER OF BYTES THAT FOLLOW	INITIALIZED BY THE CLIENT IN THE QUERY	INITIALIZED BY THE SERVER IN THE RESPONSE
UNIT IDENTIFIER	1 BYTE	MODBUS ADDRESS FOR A REMOTE SLAVE	INITIALIZED BY THE CLIENT (PUT 0xFF BY DEFAULT)	REPRODUCED BY THE SERVER IN THE RESPONSE FRAME

- ❑ Modbus/TCP uses reserved port number 502 and must therefore be freely accessible on the network, but the standard specifies that any Modbus/TCP server must be able to use a second listening port because certain security configurations prohibit port 502.

2.5 MODBUS

2.5.1 Coding

- ❑ All data is transmitted in Big Endian format (high order first). "Floating" quantities are coded in accordance with IEEE standard 754, single precision.

2.5.2 Local communication

- ❑ Optical communication via the front panel is point-to-point communication.
- ❑ The link is established with the ENERDIS optical head.
- ❑ The communication parameters are fixed (38,400 bauds, 8, N, 1),
- ❑ The mode is also fixed (MODBUS/RTU),
- ❑ The slave address is not tested, so all slave numbers from 1 to 255 can be used.

2.5.3 Remote Communication

- ❑ Depending on the product ordered, remote communication is either by conventional Modbus/RTU on an RS-485 bus or via Modbus/TCP over a TCP/IP network.

2.5.4 Supported functions

- ❑ Refer to the official documentation for details of the functions supported:
 - **Function 3:** function used to read the MODBUS mapping, for example to recover the measured quantities or curves

→ Request:

Slave No.	3 or 4	First word address	Number of words	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes

→ Response:

Slave No.	3 or 4	Number of bytes read	Value of the first word		Value of the last word	CRC
1 byte	1 byte	2 bytes	2 bytes		2 bytes	2 bytes

- **Function 4:** Identical to function 3
- **Function 16:** to send the command words described in this document

→ Request:

Slave No.	16	Address of the first word to force	Number of words to force	Number of bytes to force	Value of words to force	CRC
1 byte	1 byte	2 bytes	2 bytes	1 byte	2 bytes	2 bytes

→ Response:

Slave No.	16	First word address forced	Number of forced words	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes

- **Function 8:** function only useful for RS-485 links, used to obtain statistics (counters) on the packets processed and the errors detected. It is possible to read 9 registers:

SUB-FUNCTION	CODE
0x0A	Reset of the counters
0x0B	Frames received without CRC error
0x0C	Frames received with CRC error
0x0D	Number of exception responses
0x0E	Frames sent to the station (without broadcast)
0x0F	Requests for broadcasts received
0x10	NAQ responses
0x11	Slave not ready responses

SUB-FUNCTION	CODE
0x12	Characters not processed
0x13	Number of responses without Function 8

3. STATUS WORDS

3.1 DIGITAL OUTPUT

3.1.1 Alarm relay status word

- If the digital output is configured in Relay mode, the status word associated with the digital output is an unsigned 16-bit integer. Only the first 8 bits have meaning. Each of these bits indicates the status of the relay associated with the global alarm of the same number. If the relay is active, then bit Rx has the value 1. If the relay is idle, then bit Rx has the value 0.

Example: the global alarm 3 a has been assigned to a relay output. If the global alarm is active, the associated relay R3 will be active, and vice-versa.

Bit 15								Bit 0							
								Status of relay outputs associated with alarms							
								R8	R7	R6	R5	R4	R3	R2	R1

3.1.2 Pulse output status word

- If the digital output is configured in pulse output mode, the status word associated with the digital output is an unsigned 16-bit integer. Only bits 15 and 14 have meaning. If the pulse output of channel 1 is saturated, the corresponding S bit has the value 1; otherwise, it is 0. If channel 1 is in overflow (then there is a loss of pulses), it is the corresponding D bit that is 1; otherwise, it is 0.

Bit 15								Bit 0							
SLOT A				SLOT B				SLOT C				SLOT D			
Channel 1		Channel 2		Channel 1		Channel 2		See 1		Channel 2		Channel 1		Channel 2	
D	S	D	S	D	S	D	S	D	S	D	S	D	S	D	S

3.1.3 Digital output status word (Alarm & Forcing)

- If the digital output is configured to forcing, the status word associated with the digital output is an unsigned 16-bit integer. Only bits 15 and 14 have meaning. These bits indicate the status of the associated relay. If the corresponding S bit has the value 1, the relay is active, if not the S bit is 0 and the relay is inactive.

Bit 15								Bit 0							
SLOT A				SLOT B				SLOT C				SLOT D			
Channel 1		Channel 2		Channel 1		Channel 2		Channel 1		Channel 2		Channel 1		Channel 2	
-	S	-	S	-	S	-	S	-	S	-	S	-	S	-	S

3.2 DIGITAL INPUT

- The ENERIUM 100/200/300 has four digital inputs.

Bit 15								Bit 0							
SLOT A				SLOT B				SLOT C				SLOT D			
Channel 1		Channel 2		Channel 1		Channel 2		Channel 1		Channel 2		Channel 1		Channel 2	
-	S	-	S	-	S	-	S	-	S	-	S	-	S	-	S

- Meaning of the status of inputs
 - S: status of the input (1: closed, 0: open).

3.3 ANALOGUE OUTPUTS

- The ENERIUM 100/200/300 has four analogue outputs (the protocol used is MODBUS/TCP).

Bit 15												Bit 0			
SLOT A				SLOT B				SLOT C				SLOT D			
Channel 1		Channel 2		Channel 1		Channel 2		Channel 1		Channel 2		Channel 1		Channel 2	
HS	LS	HS	LS	HS	LS	HS	LS	HS	LS	HS	LS	HS	LS	HS	LS

- Meaning of the status of outputs
 - HS: High Saturation, at 1 if the value is higher than the maximum output
 - LS: Low Saturation, at 1 if the value is lower than the minimum output

3.4 ANALOGUE INPUTS

- The ENERIUM 100/200/300 has four analogue inputs (the protocol used is MODBUS/TCP).

Bit 15												Bit 0			
SLOT A				SLOT B				SLOT C				SLOT D			
Channel 1		Channel 2		Channel 1		Channel 2		Channel 1		Channel 2		Channel 1		Channel 2	
S	-	S	-	S	-	S	-	S	-	S	-	S	-	S	-

- Meaning of the status of outputs
 - S: Saturation

3.5 ALARMS

- The ENERIUM 100/200/300 has 16 elementary alarms, 8 global alarms and storage for global alarms.

Bit 31																Bit 0															
Store Elementary AL								Status Elementary AL								Status Elementary AL															
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

- Active/ON = bit set to 1 & Inactive/OFF = bit set to 0.
- "Status Elementary AL" gives the status of each elementary alarm at time T with no storage.
- "Status Global AL" gives the status of each global alarm at time T with no storage.
- "Store Global AL" indicates whether the global alarm has already been activated.
- Only a MODBUS command can reset this status word.
- This status word is saved and restored after line power is restored.

4. COMMAND WORDS

4.1 FOREWORD

- ❑ The use of a command word not authorized on a version of the product causes a "Data Error" type exception, 0x03.
- ❑ All of the associated parameters must lie within the limits of the specified formats. Any other value causes a "Data Error" type exception, 0x03.
- ❑ In the rest of this chapter, all of the Fxx types are defined in §3 of this same document.

4.2 SYSTEM PARAMETERS

- ❑ The MODBUS commands for access to system data all start with the number 0x01XX.

4.2.1 Modification of system date / time

- Command word: 0x0104
- The date is in Unix format: number of seconds since 01/01/1970 coded in an unsigned 32-bit word.
- Associated parameter No. 1:
 - o Type F15

4.3 RS485 COMMUNICATION PARAMETERS

- ❑ MODBUS commands for access to communication data all start with the number 0x02XX.

4.3.1 Slave number

- Command word: 0x0200
- Associated parameter:
 - o Type F9

4.3.2 RS485 data rate

- Command word: 0x0201
- Associated parameter:
 - o Type F10

4.3.3 RS485 parity

- Command word: 0x0202
- Associated parameter:
 - o Type F11

4.3.4 Number of RS485 stop bits

- Command word: 0x0203
- Associated parameter:
 - o Type F12

4.3.5 Response time (timeout - used in RTU mode)

- Command word: 0x0204
- Associated parameter:
 - o Type F13

4.3.6 Mode (RTU or ASCII)

- Command word: 0x0205
- Associated parameter:
 - o Type F64

4.3.7 Data bits

- Command word: 0x0206
- Associated parameter (unsigned 16-bit integer):
 - o 8 in RTU mode
 - o 7 or 8 in ASCII mode

4.3.8 Timeout (used in ASCII mode)

- Command word: 0x0207
- Associated parameter (unsigned 16-bit integer):
 - o 1,000 to 10,000 (ms)

4.3.9 All RS485 parameters

- **Note:** This command word is used to change in a single frame all of the parameters associated with the RS485 communication configuration.
- Command word: 0x0208
- Associated parameter No. 1: slave number
 - o Type F9
- Associated parameter No. 2: data rate
 - o Type F10
- Associated parameter No. 3: mode
 - o Type F64
- Associated parameter No. 4: data bits (unsigned 16-bit integer)
 - o 8 in RTU mode
 - o 7 or 8 in ASCII mode
- Associated parameter No. 5: parity
 - o Type F11
- Associated parameter No. 6: stop bits
 - o Type F12
- Associated parameter No. 7: response time (useful in RTU mode)
 - o Type F13
- Associated parameter No. 8: timeout (useful in ASCII mode)
 - o 1,000 to 10,000 (ms)

4.4 ETHERNET COMMUNICATION PARAMETERS

4.4.1 Device IP Address

- Command word: 0x0220
- Associated parameter:
 - o Type F68
- E.g.: 0x0E07D424 corresponds to address 14.7.212.36

4.4.2 Gateway IP address

- Command word: 0x0221
- Associated parameter:
 - o Type F68

4.4.3 Subnet mask

- Command word: 0x0222
- Associated parameter:
 - o Type F68

4.4.4 All Ethernet parameters

- Command word: 0x0223
- Associated parameter No. 1: device IP Address
 - o Type F68
- E.g.: 0x0E07D424 corresponds to address 14.7.212.36
- Associated parameter No. 2: subnet mask
 - o Type F68
- Associated parameter No. 3: gateway IP Address
 - o Type F68

4.5 HMI

- The MODBUS commands for access to HMI data all start with the number 0x03XX.

HMI commands are only available for the ENERIUM 100, 200 and 300.

4.5.1 Language

- Command word: 0x0300
- Associated parameter:
 - o Type F2

4.5.2 Automatic scrolling

- Command word: 0x0301
- Associated parameter:
 - o Type F3

4.5.3 Pause time

- Command word: 0x0302
- Associated parameter:
 - o Type F5

4.5.4 List of scrolling screens

- Command word: 0x0303
- 16 screens in total, two per 16-bit word. Type F6. With 0xAA, 0xBB, 0xCC etc., as the screen number to display, 0xAA being the first screen displayed and 0xPP the last screen.
- Associated parameter No. 1:
 - o 0xAABB
- Associated parameter No. 2:
 - o 0xCCDD
- Associated parameter No. 3:
 - o 0xEEFF
- Associated parameter No. 4:
 - o 0xGGHH
- Associated parameter No. 5:
 - o 0xIIJJ
- Associated parameter No. 6:
 - o 0xKKLL
- Associated parameter No. 7:
 - o 0xMMNN
- Associated parameter No. 8:
 - o 0xOOPP

4.5.5 Custom screens

- Command word: 0x0304
- The associated options are valid for a single screen only, in other words only one screen is configured per frame / command word.
- Associated parameters No. 1:
 - o Number of the custom screen to be configured [0..2]
- Associated parameters Nos. 2 to 5:
 - o The four Modbus addresses of the four values to be displayed on this screen (parameter 2 corresponds to the highest quantity on the display).
- Associated parameters No. 6 and No. 7:
- Size of values: Type F7
 - o 0xAABB
 - o 0xCCDD
- Associated parameters No. 8 and No. 9:
- Precision of the values: Type F8
 - o 0xAABB
 - o 0xCCDD
- Associated parameters Nos. 10 to 21:
 - o Title of the screen, one character per byte (24 bytes in total): Type F1
- Associated parameters Nos. 22 to 35:
 - o The four labels (length: seven characters per label) one after another, one character

per byte (14 words in total): Type F1

- Associated parameters Nos. 36 to 43:
 - The four units (length: four characters per unit) one after another, one character per byte (8 words in total): Type F1

4.5.6 Changing the password

- Command word: 0x0305
- The password is in four bytes, stored in two words of two bytes.
- Associated parameters No. 1:
 - Types F1 (limited to between '0' (0x30) and 'z' (0x7A)]
- Associated parameters No. 2:
 - Types F1 (limited to between '0' (0x30) and 'z' (0x7A)]

4.5.7 Value of the contrast and backlight of the LCD

- Command word: 0x0306
- Associated parameters No. 1:
 - Types F4 : in the form 0xAABB where AA = contrast and BB backlight (lookup mode)

4.5.8 Display a specific screen

- Command word: 0x0307
- Associated parameters No. 1: Type of screen
 - Types F59
- Associated parameters No. 2: Sub-type
 - Types F60
- The value of the sub-type is only valid outside the main screen. For the main screen, specify sub-type = 0.
- Associated parameters No. 3: Index
 - Types F61

4.5.9 Value of the backlight in standby mode

- Command word: 0x030A
- Associated parameters No. 1:
 - Type F4 (backlight): [0..255]

4.6 ALARMS

- ❑ The MODBUS commands for setting alarms all start with the number 0x04XX.
- ❑ The alarms can be configured only if an output is materially present and only if it is configured in Relay mode.

4.6.1 Configuration of an elementary alarm

- There are 16 elementary alarms to configure. This command is used to completely configure ONE elementary alarm.

- Command word: 0x0400
- Associated parameter No. 1: Number of the elementary alarm
 - o Type F20
- Associated parameter No. 2: Quantity to be monitored
 - o Type F17
- Associated parameter No. 3: Threshold type
 - o Type F18
- Associated parameter Nos. 4 and 5: Threshold value
 - o Int32
- Associated parameter No. 6: Timeout
 - o Type F19
- Remark: For it to be possible to configure the elementary alarms for the Enerium 100/200/300, the digital output must first be configured in Relay mode (otherwise the command word will not function).

4.6.2 Configuration of a global alarm

- There are eight global alarms. This command is used to completely configure ONE global alarm.
- Command word: 0x0401
- Associated parameter No. 1: Global alarm No.
 - o Type F21
- Associated parameter Nos. 2 and 3: Associated equation
 - o Type F22
- 0x00CCBBAA
- "AA": Type F20
- "BB": Type F20
- "CC": 0= "AND" – 1 = "OR"

4.6.3 Reset of the alarms

- Command word: 0x0402
- This command performs:
 - o A reset of the alarm status word.
 - o A reset of the timeouts of the elementary alarms.
 - o A reset of the record of events and of the information in preparation (e.g. duration, start date, etc.).
 - o A reset of the events counter.
 - o Erasure of the alarms configuration.

4.6.4 Reset of the alarms buffer

- Command word: 0x0403
- This command performs:
 - o A reset of the buffer, without resetting the information in preparation (e.g.: duration, start date, etc.).
 - o A reset of the events counter.

4.6.5 Reset of the alarm status word

- Command word: 0x0404
- This command performs:
 - o A reset of the alarm status word.

4.6.6 Global alarm labelling

- This command enables a label to be assigned to a global alarm.
- Command word: 0x0405
- Associated parameter No. 1: Global alarm No.
 - o Type F21
- Associated parameter Nos. 2 to 17: Label
 - o Type F1

4.6.7 Reset of the timeouts of elementary alarms

- Command word: 0x0406
- This command performs:
 - o A reset of the timeouts of all elementary alarms, including active timeouts.

4.6.8 Setting of parameters for blinking of backlight

- Command word: 0x0407
- Associated parameter No. 1:
 - o Type F73

4.6.9 Alarms FIFO

- The alarms FIFO is a circular buffer. It is 64 records in size (duration, starting date, etc.); when the 64th record is reached, index 0 is overwritten by the 65th record.
- The events counter indicates the number of events that have occurred since the last reset. This counter runs from 0 to 65472.

4.7 DIGITAL OUTPUTS

- The MODBUS commands for setting digital outputs all start with the number 0x05XX.

4.7.1 Configuration of a digital output board

- This command word enables the output of a board to be configured.
 - o Command word: 0x0500
- Associated parameter No. 1: Selection of the slot
 - o Type F23
- If the chosen slot is not a digital output, the product returns a "Data Error" type exception, 0x3.
- Associated parameter No. 2: Selection of the output
 - o Type F24
- Associated parameter No. 3: Mode of the output

- o Type F38
- Associated parameter No. 4: Weight of the output pulse
 - o Type F26

! the parameter is in a signed quantity for future development with a weight of type 0.1 or 0.01

- Associated parameter No. 5: Level of activation of the output
 - o Type F27
- **Note:** the level of activation is only valid in the Alarm Relay mode. In other modes (Pulse and Forced), the outputs are always considered to be NO.
- Associated parameter No. 6: (Quantity associated with the output).
 - o Quantity number: Type F21 in Relay mode or Type F28 in Pulse mode

4.7.2 Minimum width of pulses

- Command word: 0x0501
- Associated parameter No. 1: Pulse width
 - o Type F29
- The minimum width of pulses is a parameter common to all digital outputs of the product.

4.7.3 Forced control of a digital output

- Command word: 0x0502
- Associated parameter No. 1: Selection of the slot
 - o Type F23
- Associated parameter No. 2: Selection of the output
 - o Type F24
- Associated parameter No. 3: Status of the forced pin
 - o Type F30
- **Note:** Control in Forced mode does not change the configuration of the corresponding board. After 10 minutes, the mode returns to normal mode, except for the PLC output mode.

4.7.4 Reset of the pulse outputs

- Command word: 0x0503
- This commands resets all the generation indexes of the pulse outputs, as well as the overshoots index for a given board.
- Associated parameter No. 1: Selection of the slot
 - o Type F23
- Associated parameter No. 2: Selection of the output
 - o Type F24

4.8 METROLOGY

- The MODBUS commands for setting Metrology parameters all start with the number 0x06XX.

! Primary PT x Primary CT limited to 693 Megavolts.

4.8.1 Primary PT

- Command word: 0x0601

- Associated parameter No. 1:
 - Value of the primary PT (unsigned 32-bit integer), comprised between 100 and 650,000 (in steps of 1).

4.8.2 Secondary PT

- Command word: 0x0602
- Associated parameter No. 1:
 - Value of the secondary PT (unsigned 32-bit integer), comprised between 100 and 480 (in steps of 1).

4.8.3 Primary CT

- Command word: 0x0603
- Associated parameter No. 1:
 - Value of the primary CT (unsigned 32-bit integer), comprised between 100 and 25,000 (in steps of 1).

4.8.4 Secondary CT

- Command word: 0x0604
- Associated parameter No. 1:
 - Value of the secondary CT (unsigned 32-bit integer), comprised between 1 and 5 (in steps of 1).

4.8.5 Line frequency (50-60Hz products only)

- Command word: 0x0605
- Associated parameter No. 1:
 - Type F34

4.8.6 Period of integration of the average

- Command word: 0x0606
- Associated parameter No. 1: In seconds
 - Type F33

4.8.7 Initialisation of the Energies Index

- Command word for initialisation of active energy in receiver mode: 0x0610
- Command word for initialisation of active energy in generator mode: 0x0611
- Command word for initialisation of reactive energy in quadrant 1: 0x0612
- Command word for initialisation of reactive energy in quadrant 2: 0x0613
- Command word for initialisation of reactive energy in quadrant 3: 0x0614
- Command word for initialisation of reactive energy in quadrant 4: 0x0615
- Command word for initialisation of apparent energy in receiver mode: 0x0616
- Command word for initialisation of apparent energy in generator mode: 0x0617
- Associated parameter No. 1:
 - Initialisation value (MWh/Mvarh/MVAh) (unsigned 32-bit integer)
 - Min = 0 / Max = 999,999,999
- Associated parameter No. 2:
 - Initialisation value (kWh/kvarh/kVAh) (unsigned 32-bit integer)

- Min = 0 / Max = 999,999

4.8.8 Reset of the minima

- Command word: 0x0620

4.8.9 Reset of the maxima

- Command word: 0x0621

4.8.10 Reset of the averages

- Command word: 0x0622

4.8.11 Reset of the energies

- Command word: 0x0623

4.8.12 Reset of all time counters

- Command word: 0x0624

4.8.13 Reset of the operating time counter

- Command word: 0x0625

4.8.14 Reset of the voltage-present time counter

- Command word: 0x0626

4.8.15 Reset of the current-present time counter

- Command word: 0x0627

4.8.16 Initialisation of the operating time counter

- Command word: 0x0628
- Associated parameter No. 1:
 - o Value in unsigned 32-bit integer from 0 to 2,000,000,000 inclusive

4.8.17 Initialisation of the voltage-present time counter

- Command word: 0x0629
- Associated parameter No. 1:
 - o Value in unsigned 32-bit integer from 0 to 2,000,000,000 inclusive

4.8.18 Initialisation of the current-present time counter

- Command word: 0x062A
- Associated parameter No. 1:
 - o Value in unsigned 32-bit integer from 0 to 2,000,000,000 inclusive

4.8.19 Choice of type of wiring 3 or 4-wire

- Command word: 0x062B
- Associated parameter No. 1:
 - o Type F74

4.8.20 Primary CT IN

- Command word: 0x062D
- Associated parameter No. 1:
 - o Value of the primary CT IN (unsigned 32-bit integer)
- The value of the primary CT IN must be comprised between 100 and 25,000 (in steps of 1)

4.8.21 Secondary CT IN

- Command word: 0x062E
- Associated parameter No. 1:
 - o Value of the secondary CT IN (unsigned 32-bit integer)
- The value of the primary CT IN must be comprised between 1 and 5 (in steps of 1)

4.8.22 Calculation of neutral current

- Command word: 0x0631
- Associated parameter No. 1: Boolean
 - o F3
- **Note:** If the neutral current is not calculated, then it is measured.

4.8.23 Declared voltage Uc (300 and 310 only)

- Command word: 0x0632
- Associated parameter No. 1:
 - o Voltage Uc (unsigned 32-bit integer)
- Note: This voltage is used for the EN50160 and dips / outages statistics.

4.9 RECORDING CURVES

- The MODBUS commands for setting the parameters for recordings all start with the value 0x07XX

4.9.1 Configuration of recording curves

- Command word: 0x0700
- Associated parameter No. 1: Curve number
 - o Type F47
- Associated parameter No. 2: Sync type
 - o Type F48
- Associated parameter No. 3: Samples interval
 - o Type F50
- Associated parameter No. 4: Start date of recording, modes 0 and 1 only
 - o Type F15

- Associated parameter No. 5: Mode
 - o Type F51
- Associated parameter No. 6: Number of quantities to be recorded at each point
 - o 1 (uint16) if ENERIUM 100, 110, 200, 210, 300 and 310
- Associated parameter No. 7: Quantity 1
 - o Type F52

4.9.2 Reading of a recording curve

- Command word: 0x0701
- Associated parameter No. 1: Curve number
 - o Type F47
- Associated parameter No. 2: Block number
 - o Type F49

4.9.3 Stopping a recording curve

- Command word: 0x0702
- Associated parameter No. 1:
 - o Type F47
- This command word is used to stop a recording curve while retaining the possibility of reading its content. It is particularly useful in the "Start-up without Stop" mode.

4.9.4 Erasing a recording curve

- Command word: 0x0703
- Associated parameter No. 1:
 - o Type F47
- This command word is used to erase all the recorded points of a recording curve. The commands stops the curve first.

4.10 LOAD CURVES

- ❑ The MODBUS commands for setting the parameters for recordings all start with the value of 0x07XX.
- ❑ The command words are only active in the ENERIUM 200/300 versions. For ENERIUM 100, the Modbus error MODBUS_ILLEGAL_DATA is sent back.

4.10.1 Configuration of Load Curve

- Command word: 0x0704
- Associated parameter No. 1: (Samples interval)
 - o Type F55
- Associated parameter No. 2: (Quantities recorded)
 - o Type F56

4.10.2 Reading of Load Curve

- Command word: 0x0705
- Associated parameter No. 1: Identification number of existing configuration in the FifoldCC FIFO
 - o Unsigned 16-bit integer
- Associated parameter No. 2:
 - o Always 0x0000
- Associated parameter No. 3: Reading start date
 - o Type F15

4.10.3 Erasing a Load Curve

- Command word: 0x0706
- Associated parameter No. 1: Confirmation of erasure
 - o Type F3
- The erasure of the Load Curve leads to the load curve FIFO to be reset.

4.10.4 Load curve - Digital outputx Unit

- Command word: 0x0708
- Associated parameter No. 1: Selection of SLOT
 - o Type F23
- Associated parameter No. 2: Selection of channel
 - o Type F24
- Associated parameter Nos. 3 to 6: Unit
 - o Type F1

4.11 DIGITAL INPUTS

- ❑ The MODBUS commands for setting digital inputs all start with the number 0x08XX.

4.11.1 Setting a digital input

- This command word enables the input of a board to be configured.
 - o Command word: 0x0800
- Associated parameter No. 1: Selection of the slot associated with this configuration
 - o Type F23
- If the chosen slot is not a digital input, the product returns an exception of the type "Data Error" 0x3.
- Associated parameter No. 2: Choice of input
 - o Type F24
- Associated parameter No. 3: Mode of input
 - o Type F25
- Associated parameter No. 4 (MSB) and No. 5 (LSB): Weight of output pulse 1
 - o Pulse weight [0.0001..999.9999] in steps of 0.0001. The value is expressed in 1/10,000 (e.g.: 4,620,666 is equivalent to a weight of 462.0666)

4.11.2 Setting of the external synchronisation of the clock

- This command word enables one and only one digital input to be assigned as a sync input.
 - o Command word: 0x0801
- Associated parameter No. 1: Selection of the slot associated with this configuration
 - o Type F23
- Associated parameter No. 2: Input used for synchronisation
 - o Type F24
- **Note:** this configuration is independent from the configuration of digital input boards. The user must therefore check that the configurations are consistent to obtain the desired behaviour.

4.11.3 Resetting the pulse counter (digital input energy index)

- This command word enables the pulse counter of a specified input and board to be reset
- Command word: 0x0802
- Associated parameter No. 1: Selection of the slot associated with this configuration
 - o Type F23
- If the chosen slot is not a digital input, the product returns an exception of the type "Data Error" 0x3.
- Associated parameter No. 2: Choice of input
 - o Type F24

4.11.4 Reset of the synchronisation status word

- This command word enables the status word indicating that there has been a loss of synchronisation with the external Time Signal to be reset.
- Command word: 0x0803

4.11.5 Setting an input label

- This command word enables the label of a digital input to be modified.
- Command word: 0x0804
- Associated parameter No. 1: Selection of the slot associated with this configuration
 - o Type F23
- Associated parameter No. 2: Choice of input
 - o Type F24
- Associated parameter Nos. 3 to 18: Input label, ASCII characters
 - o Type F1 (32 bytes in total)

4.11.6 Setting the unit of an input

- This command word enables the unit of a digital input to be modified.
- Command word: 0x0805
- Associated parameter No. 1: Selection of the slot associated with this configuration
 - o Type F23
- Associated parameter No. 2: Choice of input
 - o Type F24
- Associated parameter Nos. 3 to 6: Input label, ASCII characters

- o Type F1 (8 bytes in total)

4.11.7 Initialisation of an energy index with a specific value

- This command word enables an energy index to be initialised at a specific value.
- Command word: 0x0806
- Associated parameter No. 1: Selection of the slot associated with this configuration
 - o Type F23
- Associated parameter No. 2: Choice of input
 - o Type F24
- Associated parameter Nos. 3 and 4: MSB value of the 64-bit energy index
 - o $0 \leq \text{MSB} \leq 9,999,999$
- Associated parameter Nos. 5 and 6: LSB value of the 64-bit energy index
 - o $0 \leq \text{MSB} \leq 9,999,999$

4.12 ANALOGUE OUTPUTS

- The MODBUS commands for setting Analogue outputs all start with the number 0x09XX.

4.12.1 Setting an Analogue output board

- Command word: 0x0900
- Associated parameter No. 1: Selection of slot
 - o Type F23
- Associated parameter No. 2: Selection of channel
 - o Type F24
- Associated parameter No. 3: Quantity associated with the output
 - o Type F43
- Associated parameter No. 4: Type of quantity
 - o Type F44
- Associated parameter No. 5: Emin
 - o Minimum value of the quantity (int32). In the case of the Cos or PF, there are 2 16-bit words, PF for the value and pf for the type (F39).
- Associated parameter No. 6: Emax
 - o Maximum value of the quantity (int32). Ditto.
- Emax must always be greater than Emin.
- Associated parameter No. 7: Smin
 - o Minimum value of the analogue output as a 16-bit integer, expressed in μA . This value must not be less than -22,000.
- Associated parameter No. 8: Smax
 - o Maximum value of the analogue output as a 16-bit integer, expressed in μA . This value must not be greater than 22,000.

4.12.2 Setting an Analogue output board

- Command word: 0x0910
- Associated parameter No. 1: Selection of slot
 - o Type F23

- Associated parameter No. 2: Selection of channel
 - o Type F24
- Associated parameter No. 3: Quantity associated with the output
 - o Type F43
- Associated parameter No. 4: Type of quantity
 - o Type F44
- Associated parameter No. 5: Transfer function
 - o Type F62
- Associated parameter No. 6: Emin
 - o Minimum value of the quantity (int32). In the case of the Cos or PF, there are 2 16-bit words, PF for the value and pf for the type (F39).
- Associated parameter No. 7: Ecass
 - o Break value of the quantity (int32). Ditto.
- Associated parameter No. 8: Emax
 - o Maximum value of the quantity (int32). Ditto.
- Emax must always be greater than Emin
- Associated parameter No. 9: Smin
 - o Minimum value of the analogue output as a 16-bit integer, expressed in μA . This value must not be greater than - 20,000.
- Associated parameter No. 10: Scass
 - o Break value of the analogue output as a 16-bit integer, expressed in μA . This value must not be greater than 20,000.
- Associated parameter No. 11: Smax
 - o Break value of the analogue output as a 16-bit integer, expressed in μA . This value must not be greater than 20,000.

!! In the event of a simple slope the following is required: $S_{\text{max}} - S_{\text{min}} \geq 4\text{mA}$

**!! In the event of a double slope the following is required: $S_{\text{max}} - S_{\text{min}} \geq 4\text{mA}$
 $S_{\text{cas}} - S_{\text{min}} \geq 2\text{mA}$
 $S_{\text{max}} - S_{\text{cas}} \geq 2\text{mA}$**

!! In the event of a quadratic slope the following is required: $S_{\text{max}} - S_{\text{min}} \geq 4\text{mA}$

4.12.3 Test Mode for an Analogue output board

- Command word: 0x0901
- Associated parameter No. 1: Selection of slot
 - o Type F23
- Associated parameter No. 2: Selection of channel
 - o Type F24
- Associated parameter No. 3: Forcing or no forcing (no = return to normal mode)
 - o Type F30
- Associated parameters No. 4:
 - o Value of the current to force, expressed in μA (signed 16-bit integer)
- **Note:** Management in forced mode does not change the configuration of the corresponding board. After 10 minutes, the mode returns to normal mode.

4.12.4 Management of overshoots for the analogue output

- Command word: 0x0904

- Associated parameter No. 1: Analogue output overshoot
 - Type F35 This command word has no influence on the product configuration. It just enables the PC software to know if the thresholds take into account an overshoot of 10% or not

4.13 CONFIGURATION OF THE METROLOGY LED

- The MODBUS commands for configuration of the metrology LED all start with the number 0x0AXX.

4.13.1 Assignment of a quantity to the metrology LED

- Command word: 0x0A00
- Associated parameter: Assigned quantity
 - Type F46

4.14 CONFIGURATION OF DIPS / OUTAGES / OVERVOLTAGE / OVERCURRENT (FOR ENERIUM 300 ONLY)

- The MODBUS commands for configuration of the dips / overvoltage / overcurrent all start with the number 0x0AXX.

4.14.1 Activation of dips, outages, overvoltage / overcurrent

!! The quantities monitored are 3V and 3I in four-wire mode

!! The quantities monitored are 3U and 3I in three-wire mode

- Command word: 0x0660
- Associated parameter No. 1: Dips, outages activation
 - Type F63

4.14.2 Modification of voltage thresholds

- Command word: 0x0661
- Associated parameter No. 1:
 - Hysteresis (16-bit unsigned integer)
- The value of the hysteresis must be comprised between 1 and 5. Unit: %
- Associated parameter No. 2:
 - Outage threshold (16-bit unsigned integer)
- The value of the outage threshold must be comprised between 0 and 10. Unit %

!! The value corresponds to a percentage of Voltage Uc for Us in three-wire mode

!! The value corresponds to a percentage of Voltage Uc x $\sqrt{3}$ for Us in four-wire mode

!! The value corresponds to a percentage of Voltage Uc for Vs in three-wire mode
 $\sqrt{3}$

!! The value corresponds to a percentage of Voltage Uc for Vs in four-wire mode

- Associated parameter No. 3:
 - Dips threshold (unsigned 16-bit integer)
- The value of the dips threshold must be between 0 and 95. Unit %

!! The value corresponds to a percentage of Voltage Uc for Us in three-wire mode

!! The value corresponds to a percentage of Voltage Uc x $\sqrt{3}$ for Us in four-wire mode

//! The value corresponds to a percentage of Voltage U_c for V_s in three-wire mode
 $\sqrt{3}$

//! The value corresponds to a percentage of Voltage U_c for V_s in four-wire mode

- Associated parameter No. 4:
 - Overvoltage threshold (unsigned 16-bit integer)
- The value of the dips threshold must be between 105 and 120. Unit %

//! The value corresponds to a percentage of Voltage U_c for U_s in three-wire mode

//! The value corresponds to a percentage of Voltage $U_c \times \sqrt{3}$ for U_s in four-wire mode

//! The value corresponds to a percentage of Voltage U_c for V_s in three-wire mode
 $\sqrt{3}$

//! The value corresponds to a percentage of Voltage U_c for V_s in four-wire mode

4.14.3 Modification of current thresholds

- Command word: 0x0662
- Associated parameter No. 1:
 - Hysteresis (16-bit unsigned integer)
- The value of the hysteresis must be comprised between 1 and 5. Unit: %
- Associated parameter No. 2:
 - Overcurrent threshold (unsigned 16-bit integer)
- The value of the hysteresis must be between 105 and 120. Unit: %

//! The value corresponds to a percentage of the primary CT

4.14.4 Modification of time thresholds

- Command word: 0x0663
- Associated parameter No. 1:
 - Delay between very short outage and short outage (unsigned 16-bit integer)
- The value must be comprised between 200 and 1,000. Unit: ms
- Associated parameter No. 2:
 - Delay between short outage and long outage (unsigned 32-bit integer)
- The value must be comprised between 60,000 and 300,000. Unit: ms

4.14.5 Modification of outages transitions

- Command word: 0x0664
- Associated parameter:
 - Number of half periods covered by the transition for one outage (unsigned 16-bit integer)
- The value must be comprised between 0 and 5.

4.14.6 Reset of dips, outages, overvoltage / overcurrent

- Command word: 0x0665

4.15 EN50160 STATISTICS TABLE (ENERIUM 300 ONLY)

□ The MODBUS commands for the EN50160 statistics table all start with the number 0x067X.

4.15.1 Modification of frequency thresholds

- Command word: 0x0670
- Associated parameter No. 1:
 - Threshold 1, high (signed 16-bit integer)
- The value must be comprised between 10 and 30, in steps of 10. Unit: 1/10%
- Associated parameter No. 2:
 - Threshold 1, low (signed 16-bit integer)
- The value must be comprised between -10 and -30, in steps of 10. Unit: 1/10%
- Associated parameter No. 3:
 - Threshold, compliance (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 4:
 - Threshold 2, high (signed 16-bit integer)
- The value must be comprised between 40 and 150, in steps of 10. Unit: 1/10%
- Associated parameter No. 5:
 - Threshold 2, low (signed 16-bit integer)
- The value must be comprised between -40 and -150, in steps of 10. Unit: 1/10%
- Associated parameter No. 6:
 - Threshold 2, compliance (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%

4.15.2 Modification of voltage thresholds

- Command word: 0x0671
- Associated parameter No. 1:
 - Threshold 1, high (signed 16-bit integer)
- The value must be comprised between 50 and 100, in steps of 10. Unit: 1/10%
- Associated parameter No. 2:
 - Threshold 1, low (signed 16-bit integer)
- The value must be comprised between -50 and -100, in steps of 10. Unit: 1/10%
- Associated parameter No. 3:
 - Threshold 2, compliance (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 4:
 - Threshold 2, high (signed 16-bit integer)
- The value must be comprised between 100 and 200, in steps of 10. Unit: 1/10%
- Associated parameter No. 5:
 - Threshold 2, low (signed 16-bit integer)
- The value must be comprised between -100 and -200, in steps of 10. Unit: 1/10%
- Associated parameter No. 6:
 - Threshold 2, compliance (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%

4.15.3 Modification of U unbalance threshold

- Command word: 0x0672
- Associated parameter No. 1:
 - Threshold (16-bit unsigned integer)
- The value must be comprised between 10 and 50, in steps of 5. Unit: 1/10%
- Associated parameter No. 2:
 - Compliance threshold (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%

4.15.4 Modification of THD threshold

- Command word: 0x0673
- Associated parameter:
 - Threshold (16-bit unsigned integer)
- The value must be comprised between 10 and 150, in steps of 10. Unit: 1/10%
- Associated parameter No. 2:
 - Compliance threshold (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%

4.15.5 Modification of harmonics thresholds voltage

- Command word: 0x0674
- Associated parameter No. 1:
 - Threshold, rank 2 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 2:
 - Compliance threshold, rank 2 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 3:
 - Threshold, rank 3 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 4:
 - Compliance threshold, rank 3 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 5:
 - Threshold, rank 4 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 6:
 - Compliance threshold, rank 4 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 7:
 - Threshold, rank 5 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 8:
 - Compliance threshold, rank 5 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 9:

- o Threshold, rank 6 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 10:
 - o Compliance threshold, rank 6 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 11:
 - o Threshold, rank 7 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 12:
 - o Compliance threshold, rank 7 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 13:
 - o Threshold, rank 8 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 14:
 - o Compliance threshold, rank 8 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 15:
 - o Threshold, rank 9 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 16:
 - o Compliance threshold, rank 9 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 17:
 - o Threshold, rank 10 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 18:
 - o Compliance threshold, rank 10 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 19:
 - o Threshold, rank 11 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 20:
 - o Compliance threshold, rank 11 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 21:
 - o Threshold, rank 12 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 22:
 - o Compliance threshold, rank 12 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 23:
 - o Threshold, rank 13 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 24:
 - o Compliance threshold, rank 13 (16-bit unsigned integer)

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- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
 - Associated parameter No. 25:
 - o Threshold, rank 14 (16-bit unsigned integer)
 - The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
 - Associated parameter No. 26:
 - o Compliance threshold, rank 14 (16-bit unsigned integer)
 - The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
 - Associated parameter No. 27:
 - o Threshold, rank 15 (16-bit unsigned integer)
 - The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
 - Associated parameter No. 28:
 - o Compliance threshold, rank 15 (16-bit unsigned integer)
 - The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
 - Associated parameter No. 29:
 - o Threshold, rank 16 (16-bit unsigned integer)
 - The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
 - Associated parameter No. 30:
 - o Compliance threshold, rank 16 (16-bit unsigned integer)
 - The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
 - Associated parameter No. 31:
 - o Threshold, rank 17 (16-bit unsigned integer)
 - The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
 - Associated parameter No. 32:
 - o Compliance threshold, rank 17 (16-bit unsigned integer)
 - The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
 - Associated parameter No. 33:
 - o Threshold, rank 18 (16-bit unsigned integer)
 - The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
 - Associated parameter No. 34:
 - o Compliance threshold, rank 18 (16-bit unsigned integer)
 - The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
 - Associated parameter No. 35:
 - o Threshold, rank 19 (16-bit unsigned integer)
 - The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
 - Associated parameter No. 36:
 - o Compliance threshold, rank 19 (16-bit unsigned integer)
 - The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
 - Associated parameter No. 37:
 - o Threshold, rank 20 (16-bit unsigned integer)
 - The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
 - Associated parameter No. 38:
 - o Compliance threshold, rank 20 (16-bit unsigned integer)
 - The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
 - Associated parameter No. 39:
 - o Threshold, rank 21 (16-bit unsigned integer)
 - The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%

- Associated parameter No. 40:
 - Compliance threshold, rank 21 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 41:
 - Threshold, rank 22 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 42:
 - Compliance threshold, rank 22 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 43:
 - Threshold, rank 23 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 44:
 - Compliance threshold, rank 23 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 45:
 - Threshold, rank 24 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 46:
 - Compliance threshold, rank 24 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%
- Associated parameter No. 47:
 - Threshold, rank 25 (16-bit unsigned integer)
- The value must be comprised between 5 and 150, in steps of 5. Unit: 1/10%
- Associated parameter No. 48:
 - Compliance threshold, rank 25 (16-bit unsigned integer)
- The value must be comprised between 0 and 1,000, in steps of 1. Unit: 1/10%

4.15.6 Reset of EN50160 statistics

- Command word: 0x0675

4.16 CONFIGURATION OF AN ANALOGUE INPUT

- The MODBUS commands for the configuration of an analogue input all start with the number 0x0BXX.

4.16.1 Setting of an analogue input board

- Command word: 0x0B01
- Associated parameter No. 1: Selection of SLOT
 - Type F23
- Associated parameter No. 2: Selection of channel
 - Type F24

- Associated parameter No. 3: Emin
 - Minimum value of the input as an unsigned 16-bit integer, expressed in μA . This value must not be less than 22,000.
- Associated parameter No. 4: Emax
 - Maximum value of the input as an unsigned 16-bit integer, expressed in μA . This value must not be less than 22,000 and greater than Emin.
- Associated parameter Nos. 5 and 6: Min. value
 - Minimum value associated with Emin as a signed 32-bit integer.
- Associated parameter Nos. 7 and 8: Max. value
 - Maximum value associated with Emax as a signed 32-bit integer. Max. value must be greater than Min. value.

4.16.2 Setting of the label of an analogue input board

- Command word: 0x0B02
- Associated parameter No. 1: Selection of SLOT
 - Type F23
- Associated parameter No. 2: Selection of channel
 - Type F24
- Associated parameter Nos. 3 to 18: Label
 - Type F1 (32 bytes in total)

4.16.3 Setting of the unit of an analogue input board

- Command word: 0x0B03
- Associated parameter No. 1: Selection of SLOT
 - Type F23
- Associated parameter No. 2: Selection of channel
 - Type F24
- Associated parameter Nos. 3 to 6: Unit
 - Type F1 (8 bytes in total)

4.17 CONFIGURATION OF WAVEFORMS (ENERIUM 300 ONLY)

- The MODBUS commands for configuration of the waveforms all start with the number 0x068X.

4.17.1 Setting of waveforms

- Command word: 0x0680
- Associated parameters Nos. 1 to 4: waveforms quantities
 - Type F75
- Associated parameter No. 5: Activation, Command Word Event
 - Type F63
- Associated parameter No. 6: Activation, Sync Input Event
 - Type F63
- Associated parameter No. 7: Activation, Overvoltage Event
 - Type F63.

-
- Associated parameter No. 8: Activation, Overcurrent Event
 - o Type F63.
 - Associated parameter No. 9: Activation, Dips Event
 - o Type F63.
 - Associated parameter No. 10: Activation, Very Short Outage
 - o Type F63.
 - Associated parameter No. 11: Activation, Short Outage
 - o Type F63.
 - Associated parameter No. 12: Activation, Long Outage
 - o Type F63.
 - Associated parameter No. 13: Activation, Very Short Outage Event preceded by a dip
 - o Type F63.
 - Associated parameter No. 14: Activation, Very Short Outage Event preceded by a dip
 - o Type F63.
 - Associated parameter No. 15: Activation, Very Long Outage Event preceded by a dip
 - o Type F63.

Remark: For the configuration of quantities (parameters 1 to 4), the unused quantities must be placed in the last position, otherwise the product will return an error. Example of correct configuration: V1 – V2 – I3 – NONE and example of incorrect configuration V1 – NONE – V2 – I3.

4.17.2 Triggering of waveforms (In Rush Mode)

- Command word: 0x0681

Note: The waveform is only triggered if the configuration is triggered with a command word.

4.17.3 Erasure of waveforms

- Command word: 0x0682

4.17.4 Pausing Power Quality measurement

Command word to pause dips, outages and waveforms features to enable recovery without damage to data.

- Command word: 0x0683
- Setting No. 1: Activation or deactivation of the pause system.
 - o Type F3.

Remark: The mode deactivates automatically after an hour.

4.17.5 Recovery of a waveform period

To recover the waveforms, a specific Modbus function has been implemented. All the information characterizing a waveform is available in the Mapping; see 6.40.

Based on this information, the client must recover the periods of a waveform quantity by quantity and period by period using specific Modbus function 102. The structure of the query is shown below:

Id of the slave	Function	Id of the waveform	Id of the quantity	Number of the period
Uint8	102 (uint8)	Uint32	Uint16	Uint16
1 byte	1 byte	4 bytes	2 bytes	2 bytes

The response to the query shall be presented in the following manner:

Id of the slave	Function	Number of bytes	Id of the waveform	Id of the quantity	Number of the period	Gain	Ratio	Frequency	Number of points per cycle	Points No. 1	.	Points No. 64
Uint8	102 (uint8)	Uint8	Uint32	Uint16	Uint16	Float	Float	Uint16 (1/100)	Uint16 (=64)	Uint16		Uint16
1 byte	1 byte	1 byte	4 bytes	2 bytes	2 bytes	4 bytes	4 bytes	2 bytes	2 bytes	2 bytes		2 bytes

We therefore have the following information:

- Start date
- The spacing between each point of a period thanks to the frequency given for each period (timestamping of points every millisecond). The spacing between each point in milliseconds:
$$\frac{1000}{\text{Frequency} \times \text{Number of points per cycle}}$$
- The points are in gross values
- The gain and ratio provide the physical value of each point
$$\text{Real_value} = \text{Gross_value} \times \text{Gain} \times \text{Ratio}$$
- In the mapping, the cycle outage time indicates the time when the recording was stopped between period No. 145 and 146 (the first period was No. 0). This duration is given in milliseconds. If it is at 0 then there has been no outage in the recording of waveforms

5. APPENDIX 1: STANDARDISED TYPES

- ❑ The standardised types are tested by the product at the time of any MODBUS query. If they do not match the limits, ENERIUM 100/200 returns an error message.

TYPE	DESIGNATION	FORMAT	MIN. LIMIT	MAX. LIMIT
F1	Two ASCII characters in a 16-bit word 0xAABB	Unsigned 16-bit integer	0x2020	0x9F9F
F2	Language 0 = Français 1 = English 2 = Deutsch 3 = Español 4 = Italiano	Unsigned 16-bit integer	0	4
F3	Boolean 0 = FALSE 1 = TRUE	Unsigned 16-bit integer	0	1
F4	LCD Settings 0xAA = contrast 0xBB = backlight	Unsigned 16-bit integer	0x00	0xFF
F5	Timeout of 1 to 10s in steps of 1s	Unsigned 16-bit integer	1	10
F6	Predefined screens: one number per byte 0xAABB 0x00 = NO SCREEN 0x01 = Ph-N voltage 0x02 = Ph-Ph voltage 0x03 = Current 0x04 = Max. average current 0x05 = Power 0x06 = Average power 0x07 = THD, Ph-Ph voltage 0x08 = THD, current 0x09 = Harmonics, Ph-Ph 0x0A = Harmonics, current 0x0B = Active energy EP+ 0x0C = Active energy EP- 0x0D = Reactive energy EQ1 0x0E = Reactive energy EQ2 0x0F = Reactive energy EQ3 0x10 = Reactive energy EQ4 0x11 = Apparent energy ES+ 0x12 = Apparent energy ES- 0x13 = Product information 0x14 = Time counters 0x15 = Date / time 0x16 = Alarms 0x17 = Custom screens 1 0x18 = Custom screens 2 0x19 = Custom screens 3 0x1A = Harmonics V1 0x1B = Harmonics V2 0x1C = Harmonics V3 0x1D = Harmonics U12 0x1E = Harmonics U23 0x1F = Harmonics U31 0x20 = Harmonics I1 0x21 = Harmonics I2 0x22 = Harmonics I3 0x23 = Harmonics In 0x24 = Phasors 3V 0x25 = Phasors 3U 0x26 = Phasors 3I 0x27 = Voltage event 0x28 = Current event 0x29 = Frequency, 3V, 3U, and unbalance statistics 0x2A = Phase and line voltage THD statistics 0x2B = Harmonics statistics V1 0x2C = Harmonics statistics V2 0x2D = Harmonics statistics V3 0x2E = Harmonics statistics U12 0x2F = Harmonics statistics U23 0x30 = Harmonics statistics U31	Unsigned 16-bit integer	List	

TYPE	DESIGNATION	FORMAT	MIN. LIMIT	MAX. LIMIT
F7	Size, in number of words 0xAABB	Unsigned 16-bit integer	1	2
F8	Precision of the four values to be displayed (in number of digits after the decimal point)	Unsigned 16-bit integer	0	4
F9	MODBUS slave number	Unsigned 16-bit integer	1	247
F10	MODBUS Communication data rate 24 = 2400 48 = 4800 96 = 9,600 (default) 192 = 19200 384 = 38400 1152 = 115200	Unsigned 16-bit integer	List	
F11	RS485 Parity 0 = No parity (default) 1 = Odd 2 = Even	Unsigned 16-bit integer	0	2
F12	Stop bits 0 = 1 Stop bit (default) 1 = 2 Stop bit	Unsigned 16-bit integer	0	1
F13	Response time (timeout), in steps of 50ms	Unsigned 16-bit integer	0	500
F14	Software version in the form 0xAABB 0xAA: major version 0xBB: revision	Unsigned 16-bit integer	0x0000	0xFFFF
F15	Date: number of seconds since 1970-01-01 00:00:00	Unsigned 32-bit integer		

TYPE	DESIGNATION	FORMAT	MIN. LIMIT	MAX. LIMIT
F17	Quantity assigned to an elementary alarm	Unsigned 16-bit integer	0	65
	0 = None			
	1 = V1			
	2 = V2			
	3 = V3			
	4 = Vearth			
	5 = U12			
	6 = U23			
	7 = U31			
	8 = I1			
	9 = I2			
	10 = I3			
	11 = In			
	12 = Pt			
	13 = Qt			
	14 = St			
	15 = Cos phiT			
	16 = Type Cos PhiT			
	17 = FPt			
	18 = Type FPt			
	19 = Avg Pt, Receiver mode			
	20 = Avg Pt, Generator mode			
	21 = Avg Qt, Receiver mode			
	22 = Avg Qt, Receiver mode			
	23 = Avg St			
	24 = Frequency			
	25 = U unbalance			
	26 = Fct time counter			
	27 = Pres. V time counter			
	28 = Pres. I time counter			
	29 = Digital A1			
	30 = Digital A2			
	31 = Digital B1			
	32 = Digital B2			
	33 = Digital C1			
	34 = Digital C2			
	35 = Digital D1			
	36 = Digital D2			
	37 = PhiT Tangent			
	38 = Avg PhiT Tangent, Receiver mode			
	39 = Avg PhiT Tangent, Generator mode			
	40 = Slot A channel 1 analogue input			
	41 = Slot A channel 2 analogue input			
	42 = Slot B channel 1 analogue input			
	43 = Slot B channel 2 analogue input			
	44 = Slot C channel 1 analogue input			
	45 = Slot C channel 2 analogue input			
	46 = Slot D channel 1 analogue input			
	47 = Slot D channel 2 analogue input			
	48 = Slot A channel 1 analogue input avg			
	49 = Slot A channel 2 analogue input avg			
	50 = Slot B channel 1 analogue input avg			
	51 = Slot B channel 2 analogue input avg			
	52 = Slot C channel 1 analogue input avg			
	53 = Slot C channel 2 analogue input avg			
	54 = Slot D channel 1 analogue input avg			
	55 = Slot D channel 2 analogue input avg			
	56 = THD I1			
	57 = THD I2			
	58 = THD I3			
	59 = THD In			
	60 = THD V1			
	61 = THD V2			
	62 = THD V3			
	63 = THD U12			
	64 = THD U23			
	65 = THD U31			
F18	Type of Alarm threshold	Unsigned 16-bit integer	0	2
	0 = Min.			
	1 = Max.			
F19	2 = Change of status			
	Timeout (in steps of 1s)	Signed 16-bit integer	0	60

TYPE	DESIGNATION	FORMAT	MIN. LIMIT	MAX. LIMIT
F20	Elementary alarm number 0 = No alarm 1 = Elementary alarm No. 1 2 = Elementary alarm No. 2 3 = Elementary alarm No. 3 4 = Elementary alarm No. 4 5 = Elementary alarm No. 5 6 = Elementary alarm No. 6 7 = Elementary alarm No. 7 8 = Elementary alarm No. 8 9 = Elementary alarm No. 9 10 = Elementary alarm No. 10 11 = Elementary alarm No. 11 12 = Elementary alarm No. 12 13 = Elementary alarm No. 13 14 = Elementary alarm No. 14 15 = Elementary alarm No. 15 16 = Elementary alarm No. 16	Unsigned 16-bit integer	0	16
F21	Global alarm number 0 = No alarm 1 = Global alarm No. 1 2 = Global alarm No. 2 3 = Global alarm No. 3 4 = Global alarm No. 4 5 = Global alarm No. 5 6 = Global alarm No. 6 7 = Global alarm No. 7 8 = Global alarm No. 8	Unsigned 16-bit integer	0	8
F22	Logic function 0x00CCBBAA "AA": Type F20 "BB": Type F20 "CC": 00 = "AND" function 01 = "OR" function	Unsigned 64-bit integer		
F23	Selection of slot 0 = None 1 = Slot A 2 = Slot B 3 = Slot C 4 = Slot D	Unsigned 16-bit integer	0	4
F24	Selection of channel 0 = Channel 1 1 = Channel 2	Unsigned 16-bit integer	0	1
F25	Mode of digital input / output 0 = Status Relay Mode 1 = Counting Pulses Mode	Unsigned 16-bit integer	0	1
F26	Pulse weight 0 = 1 (10 ⁰) 1 = 10 (10 ¹) 2 = 100 (10 ²) 3 = 1k (10 ³) 4 = 10k (10 ⁴) 5 = 100k (10 ⁵)	Signed 16-bit integer	0	5
F27	Contact type 0 = NO 1 = NC	Unsigned 16-bit integer	0	1
F28	Energy assigned to a Pulse output 0 = No energy 1 = EP+ 2 = EP- 3 = ES+ 4 = ES- 5 = EQ1 6 = EQ2 7 = EQ3 8 = EQ4	Unsigned 16-bit integer	0	8

TYPE	DESIGNATION	FORMAT	MIN. LIMIT	MAX. LIMIT
F29	Pulse width (ms) 30 50 150 200 250 300 350 400 450 500	Unsigned 16-bit integer	List	
F30	Forcing of a digital output 0 = Forced Open / Forced 1 = Forced Closed / Forced 2 = Return to normal mode / Not forced	Unsigned 16-bit integer	0	2
F33	Integration period for average values, in seconds 60 seconds (1 minute) 120 seconds (2 minutes) 180 seconds (3 minutes) 240 seconds (4 minutes) 300 seconds (5 minutes) 360 seconds (6 minutes) 600 seconds (10 minutes) 720 seconds (12 minutes) 900 seconds (15 minutes) 1200 seconds (20 minutes) 1800 seconds (30 minutes) 3600 seconds (60 minutes)	Unsigned 16-bit integer	List	
F34	Line frequency (Write Cfg 50-60Hz) 0 = 50 Hz 1 = 60 Hz	Unsigned 16-bit integer	0	1
F35	Overshoot used on the analogue output 0 = 0% 10 = 10%	Unsigned 16-bit integer		
F36	Time synchronisation 0 = No loss of synchronisation 1 = Last sync pulse outside allowed $\pm 5s$ range. 2 = Last sync pulse within the allowed range, but at least one pulse outside the range in the past			
F38	Mode of digital output 0 = Mode of alarm output 1 = Pulse output counting mode 2 = PLC output mode	Unsigned 16-bit integer	0	2
F39	Quadrant 0 = inductive 1 = capacitive	Unsigned 16-bit integer	0	1
F42	Pulse weight (Digital output) in 1/10,000	Unsigned 32-bit integer	1	9999999

TYPE	DESIGNATION	FORMAT	MIN. LIMIT	MAX. LIMIT
F43	Quantity associated with an analogue output 0 = none 1 = V1 (10 periods) 2 = V2 3 = V3 4 = Vt 5 = U12 6 = U23 7 = U31 8 = I1 9 = I2 10 = I3 11 = In 12 = P1 13 = P2 14 = P3 15 = Pt 16 = Q1 17 = Q2 18 = Q3 19 = Qt 20 = S1 21 = S2 22 = S3 23 = St 24 = FP1 25 = FP2 26 = FP3 27 = FPt 28 = Cos Phi 1 29 = Cos Phi 2 30 = Cos Phi 3 31 = Cos Phi T 32 = Frequency 33 = Phi T Tangent	Unsigned 16-bit integer		
F44	Type of quantity 0 = Signed 1 = Unsigned 2 = Power factor	Unsigned 16-bit integer	0	2
F45	Reserved			
F46	Quantity assigned to the metrological LED 0 = Total active energy 1 = Total reactive energy 2 = Total apparent energy	Unsigned 16-bit integer	0	3
F47	Number of the recording curve	Unsigned 16-bit integer	0	3
F48	Type of synchronisation 0 = on a specific date 1 = on a board, Slot A Digital Input 1 2 = on a board, Slot A Digital Input 2 3 = on a board, Slot B Digital Input 1 4 = on a board, Slot B Digital Input 2 5 = on a board, Slot C Digital Input 1 6 = on a board, Slot C Digital Input 2 7 = on a board, Slot D Digital Input 1 8 = on a board, Slot D Digital Input 2 9 = on global alarm 1 10 = on global alarm 2 11 = on global alarm 3 12 = on global alarm 4 13 = on global alarm 5 14 = on global alarm 6 15 = on global alarm 7 16 = on global alarm 8	Unsigned 16-bit integer	List	
F49	Block number to be read in the curve	Unsigned 16-bit integer	0	7

TYPE	DESIGNATION	FORMAT	MIN. LIMIT	MAX. LIMIT
F50	Delay between samples, in seconds Authorised values: From 1 to 60 seconds 120 seconds (2 minutes) 180 seconds (3 minutes) 240 seconds (4 minutes) 300 seconds (5 minutes) 360 seconds (6 minutes) 600 seconds (10 minutes) 720 seconds (12 minutes) 900 seconds (15 minutes) 1200 seconds (20 minutes) 1800 seconds (30 minutes) 3,600 seconds (60 minutes)	Unsigned 16-bit integer	List	
F51	Operating mode. Enables the type of synchronisation to be associated with a starting or stopping action. When the association is assigned to a stop, starting is automatically assigned to the date given as a parameter. 0 = No stop (circular buffer) 1 = Stop when buffer full 2 = Circular buffer with stop on sync 3 = circular buffer with 75% filling of the buffer after sync 4 = circular buffer with 50% filling of the buffer after sync	Unsigned 16-bit integer	0	4
F52	Quantity to be recorded 0 = No quantity 1 = I1 2 = I2 (1s) 3 = I3 4 = In 5 = Pt 6 = Qt 7 = St 8 = FPt 9 = U unbalance 10 = Avg V1 11 = Avg V2 12 = Avg V3 13 = Avg U12 14 = Avg U23 15 = Avg U31 16 = Avg I1 17 = Avg I2 18 = Avg I3 19 = Avg In 20 = Avg P1, Receiver mode 21 = Avg P1, Generator mode 22 = Avg P2, Receiver mode 23 = Avg P2, Generator mode 24 = Avg P3, Receiver mode 25 = Avg P3, Generator mode 26 = Avg Pt, Receiver mode 27 = Avg Pt, Generator mode 28 = Avg FP1, Receiver mode 29 = Avg FP1, Generator mode 30 = Avg FP2, Receiver mode 31 = Avg FP2, Generator mode 32 = Avg FP3, Receiver mode 33 = Avg FP3, Generator mode 34 = Avg FPt, Receiver mode 35 = Avg FPt, Generator mode 36 = Avg Cos phi 1, Receiver mode 37 = Avg Cos phi 1, Generator mode 38 = Avg Cos phi 2, Receiver mode 39 = Avg Cos phi 2, Generator mode 40 = Avg Cos phi 3, Receiver mode 41 = Avg Cos phi 3, Generator mode 42 = Avg Cos phi t, Receiver mode 43 = Avg Cos phi t, Generator mode 44 = Avg F	Unsigned 16-bit integer	0	85

TYPE	DESIGNATION	FORMAT	MIN. LIMIT	MAX. LIMIT
	45 = Avg Crest I1			
	46 = Avg Crest I2			
	47 = Avg Crest I3			
	48 = Avg Crest V1			
	49 = Avg Crest V2			
	50 = Avg Crest V3			
	51 = Avg THD V1			
	52 = Avg THD V2			
	53 = Avg THD V3			
	54 = Avg THD I1			
	55 = Avg THD I2			
	56 = Avg THD I3			
	57 = Avg THD U12			
	58 = Avg THD U23			
	59 = Avg THD U31			
	60 = Avg Tan Phi t, Receiver mode			
	61 = Avg Tan Phi t, Generator mode			
	62 = V1			
	63 = V2			
	64 = V3			
	65 = Vt			
	66 = U12			
	67 = U23			
	68 = U31			
	69 = Slot A channel 1 analogue input			
	70 = Slot A channel 2 analogue input			
	71 = Slot B channel 1 analogue input			
	72 = Slot B channel 2 analogue input			
	73 = Slot C channel 1 analogue input			
	74 = Slot C channel 2 analogue input			
	75 = Slot D channel 1 analogue input			
	76 = Slot D channel 2 analogue input			
	77 = Slot A channel 1 analogue input avg			
	78 = Slot A channel 2 analogue input avg			
	79 = Slot B channel 1 analogue input avg			
	80 = Slot B channel 2 analogue input avg			
	81 = Slot C channel 1 analogue input avg			
	82 = Slot C channel 2 analogue input avg			
	83 = Slot D channel 1 analogue input avg			
	84 = Slot D channel 2 analogue input avg			
	85 = Avg THD In			
	86 = Frequency 10s			
	87 = THD V1			
	88 = THD V2			
	89 = THD V3			
	90 = THD U12			
	91 = THD U23			
	92 = THD U31			
	93 = THD I1			
	94 = THD I2			
	95 = THD I3			
	96 = THD In			
F53	Status of a recording curve 0 = curve inactive 1 = being programmed 2 = in operation 3 = curve stopped	Unsigned 16-bit integer	0	3
F54	Validation flag. Indicates that the corresponding board has been tested and calibrated where applicable 1 = board validated Other values = board not validated	Unsigned 16-bit integer	0x0000	0xFFFF
F55	Period of integration for the load curve, in seconds. Authorised values: 300 seconds (5 minutes) 600 seconds (10 minutes) 720 seconds (12 minutes) 900 seconds (15 minutes) 1200 seconds (20 minutes) 1800 seconds (30 minutes) 3600 seconds (60 minutes)	Unsigned 16-bit integer	List	

TYPE	DESIGNATION	FORMAT	MIN. LIMIT	MAX. LIMIT
F56	Quantities available in the load curve. Bits [11..0]. Only the first 8 active in the list will be read. If there is no quantity in this list, this configuration is the command to stop recording the load curve. Bit00 = SLOT D channel 2 Bit01 = SLOT D channel 1 Bit02 = SLOT C channel 2 Bit03 = SLOT C channel 1 Bit04 = SLOT B channel 2 Bit05 = SLOT B channel 1 Bit06 = SLOT A channel 2 Bit07 = SLOT A channel 1 Bit08 = Q3 Bit09 = Q2 Bit10 = Q4 Bit11 = Q1 Bit12 = S- Bit13 = S+ Bit14 = P- Bit15 = P+	Unsigned 16-bit integer	List	
F57	Assignment of Digital input / output for Load curve (Lc) mapping read 0xAABBCCDD AA: Lc-Digital1 BB: Lc-Digital2 CC: Lc-Digital3 DD: Lc-Digital4	Unsigned 32-bit integer	List	
	Values: 00 None 01 slot A counter 1 02 slot A counter 2 03 slot B counter 1 04 slot B counter 2 05 slot C counter 1 06 slot C counter 2 07 slot D counter 1 08 slot D counter 2			
F58	Assignment of Digital input / output for Lc 0 None 1 slot A counter 1 2 slot A counter 2 3 slot B counter 1 4 slot B counter 2 5 slot C counter 1 6 slot C counter 2 7 slot D counter 1 8 slot D counter 2	Unsigned 16-bit integer	0	7
F59	Type of screen 0 = Measurement screen 1 = Energy screen 2 = Service screen 3 = Alarm screen 4 = Customer screen 6 = Harmonics screen 7 = Phasor screen 8 = Power quality screen (only for ENERIUM 300) 0x0F = main menu	Unsigned 16-bit integer	0	
F60	Sub-type of screen 0x00: normal 0x01 = sub-menu	Unsigned 16-bit integer	0	1

TYPE	DESIGNATION	FORMAT	MIN. LIMIT	MAX. LIMIT
F61	Screen index	Unsigned 16-bit integer		
	Measurement screen			
	• In 4-wire mode		0	9
	• In 3-wire mode		1	9
	Energy screen		0	7
	Service screen		0	2
	Alarm screen		0	1
	Customer screen		0	2
	Harmonics screen (only ENERIUM 200 and 300)			
	• In 4-wire mode		0	9
	• In 3-wire mode		3	9
	Phasor screen			
	• In 4-wire mode		0	2
	• In 3-wire mode		1	2
	Power quality screen (only for ENERIUM 300)			
	• In 4-wire mode		0	9
	• In 3-wire mode		0	9 except 4, 5, 6
	Main screen (ENERIUM 100)		0	7
	Main screen (ENERIUM 200)		0	7
	Main screen (ENERIUM 300)		0	8
F62	Type of transfer function	Unsigned 16-bit integer	List	
	0 = Simple linear law			
	1 = Double linear law			
	2 = Quadratic			
F63	Activation	Unsigned 16-bit integer	0	1
	0 = Deactivate			
	1 = Activate			
F64	Modbus mode	Unsigned 16-bit integer	0	1
	0 = RTU			
	1 = ASCII			
F65	Reserved	Unsigned 16-bit integer	0	1
F66	Connection diagram number	Unsigned 32-bit integer	List	
	0x33303120 = TD301			
	0x33303220 = TD302			
	0x33303320 = TD303			
	0x33303420 = TD304			
	0x33313420 = TD314			
	0x33313520 = TD315			
	0x33313559 = TD315Y			
	0x33313720 = TD317			
	0x33313759 = TD317Y			
	0x33313820 = TD318			
	0x33313859 = TD318Y			
	0x33323020 = TD320			
	0x33323044 = TD320D			
	0x33323059 = TD320Y			
	0x33323120 = TD321			
	0x33323144 = TD321D			
	0x33323220 = TD322			
	0x33323320 = TD323			
	0x33323420 = TD324			
	0x33323444 = TD324D			
	0x33333420 = TD334			
	0x33333720 = TD337			
	0x33333759 = TD337Y			
	0x33333820 = TD338			
	0x33333859 = TD338Y			
	(other cases prohibited)			
F67	Quantities Dips - Outages - Overvoltage	Unsigned 16-bit integer	0	1
	0 = V1			
	1 = V2			
	2 = V3			
	3 = U12			
	4 = U23			
	5 = U31			
	6 = I1			
	7 = I2			
	8 = I3			
F68	IP address	Unsigned 32-bit integer		
	0xAABBCCDD			
	→ 0xAA.0xBB.0xCC.0xDD			
	E.g.: 0x0E076405 = 14.7.100.5			

TYPE	DESIGNATION	FORMAT	MIN. LIMIT	MAX. LIMIT
F69	Type of event (Only for the ENERIUM 300) 0 = none 1 = overvoltage or overcurrent 2 = dip 3 = very short outage 4 = short outage 5 = long outage 6 = very short outage preceded by a dip 7 = short outage preceded by a dip 8 = long outage preceded by a dip 9 = saturation Nbr. of events in 100ms 10 = monitoring of stopped outages / dips	Unsigned 32-bit integer		
F72	Load curve event flags Bit00 to 09: Number of current load curve identification (LcId) Bit10 = Configuration change Bit11 = Date change Bit12 = Outage of auxiliary power supply Bit13 = Curve stop Bit14 = Curve start Bit15 = External sync (1=Sync ok or no sync 0=error, sync outside window)	Unsigned 16-bit integer		
F73	Activation of backlight blinking in the event of alarm 0 = no blinking 1 = backlight blinking	Unsigned 16-bit integer	0	1
F74	Type of wiring 0 = 4-wire mode 1 = 3-wire mode	Unsigned 16-bit integer	0	1
F75	Quantity associated with a waveform 0 = no quantity 1 = V1 2 = V2 3 = V3 4 = U12 5 = U23 6 = U31 7 = I1 8 = I2 9 = I3 10 = In	Unsigned 16-bit integer	0	10
F76	Type of triggering for waveforms 0 = no trigger 1 = triggered by command word (In Rush mode) 2 = triggered by sync pulse input 3 = triggered by outage or dip event	Unsigned 16-bit integer	0	3
F77	Waveform status 0 = Waveform free 1 = Waveform underway 2 = Waveform Completed and Available	Unsigned 16-bit integer	0	2
F78	Trigger for dips / outages waveforms (only for ENERIUM 300) 0 = none 1 = overcurrent 2 = overvoltage 3 = dip 4 = very short outage 5 = short outage 6 = long outage 7 = very short outage preceded by a dip 8 = short outage preceded by a dip 9 = long outage preceded by a dip 10 = saturation Nbr. of events in 100ms 11 = monitoring of stopped outages / dips	Unsigned 16-bit integer	0	11

6. APPENDIX 3: MODBUS ADDRESSING

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
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6.1 BASE REGISTER MAP (R/-) (FACTORY ZONE)

0003h	Serial number	MSB [31..16]	1
0004h	Serial number	LSB [15..0]	1
000Ah	Firmware version	F14 (DSP software version only)	1
001Eh	MAC Address XX:--:--:--:--	Unsigned	1
001Fh	MAC Address --:XX:--:--:--	Unsigned	1
0020h	MAC Address --:--:XX:--:--	Unsigned	1
0021h	MAC Address --:--:--:XX:--	Unsigned	1
0022h	MAC Address --:--:--:--:XX:--	Unsigned	1
0023h	MAC Address --:--:--:--:--:XX	Unsigned	1

6.2 COMMAND WORDS ZONE (R/W)

D000h	MODBUS code	Unsigned	1
D001h	Arguments		122

6.3 CONFIGURATION OF MEASUREMENTS

6800h	Primary PT	Unsigned	2
6802h	Secondary PT	Unsigned	2
6804h	Primary CT	Unsigned	2
6806h	Secondary CT	Unsigned	2
6808h	Line frequency	F32	1
6809h	Period of integration of average values	F33	1
680Ah	Type of wiring 3/4 wires	F74	1
680Bh	Reserved	Unsigned	1
680Ch	Reserved	Unsigned	2
680Eh	Primary CT IN	Unsigned	2
6810h	Secondary CT IN	Unsigned	2
6FD4h	Calculation of current In 0: Measured 1: Calculated	Unsigned	2
6FD5h	Sample simulation mode	F63	1
6FD6h	Declared Voltage Uc	Unsigned	2
6FD8h	Pause Power Quality measurement (waveforms, dips / outages)	F3	1

6.4 CONFIGURATION OF MODBUS RS-485 COMMUNICATION

6812h	MODBUS Address	F9	1
6813h	COM RS485 Parity	F11	1
6814h	COM RS485 stop bits	F12	1
6815h	RS485 (RTU) response time	F13	1
6816h	RS485 data rate	F10	1
6817h	ModBus mode RTU / ASCII	F64	1

6.5 CONFIGURATION OF MODBUS TCP COMMUNICATION

6818h	Device IP Address	F68	2
681Ah	Subnet mask	F68	2
681Ch	Gateway IP address	F68	2

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
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6.6 CONFIGURATION OF ELEMENTARY ALARMS (R/-S)

6842h	Alarm 1 Quantity	F17	1
6843h	Alarm 1 Type	F18	1
6844h	Alarm 1 Threshold	Signed	2
6846h	Alarm 1 Timeout	F19	1
6847h	(empty)	-	1
6848h	Alarm 2 Quantity	F17	1
6849h	Alarm 2 Type	F18	1
684Ah	Alarm 2 Threshold	Signed	2
684Ch	Alarm 2 Timeout	F19	1
684Dh	(empty)	-	1
684Eh	Alarm 3 Quantity	F17	1
684Fh	Alarm 3 Type	F18	1
6850h	Alarm 3 Threshold	Signed	2
6852h	Alarm 3 Timeout	F19	1
6853h	(empty)	-	1
6854h	Alarm 4 Quantity	F17	1
6855h	Alarm 4 Type	F18	1
6856h	Alarm 4 Threshold	Signed	2
6858h	Alarm 4 Timeout	F19	1
6859h	(empty)	-	1
685Ah	Alarm 5 Quantity	F17	1
685Bh	Alarm 5 Type	F18	1
685Ch	Alarm 5 Threshold	Signed	2
685Eh	Alarm 5 Timeout	F19	1
685Fh	(empty)	-	1
6860h	Alarm 6 Quantity	F17	1
6861h	Alarm 6 Type	F18	1
6862h	Alarm 6 Threshold	Signed	2
6864h	Alarm 6 Timeout	F19	1
6865h	(empty)	-	1
6866h	Alarm 7 Quantity	F17	1
6867h	Alarm 7 Type	F18	1
6868h	Alarm 7 Threshold	Signed	2
686Ah	Alarm 7 Timeout	F19	1
686Bh	(empty)	-	1
686Ch	Alarm 8 Quantity	F17	1
686Dh	Alarm 8 Type	F18	1
686Eh	Alarm 8 Threshold	Signed	2
6870h	Alarm 8 Timeout	F19	1
6871h	(empty)	-	1
6872h	Alarm 9 Quantity	F17	1
6873h	Alarm 9 Type	F18	1
6874h	Alarm 9 Threshold	Signed	2
6876h	Alarm 9 Timeout	F19	1
6877h	(empty)	-	1
6878h	Alarm 10 Quantity	F17	1
6879h	Alarm 10 Type	F18	1
687Ah	Alarm 10 Threshold	Signed	2
687Ch	Alarm 10 Timeout	F19	1
687Dh	(empty)	-	1
687Eh	Alarm 11 Quantity	F17	1
687Fh	Alarm 11 Type	F18	1
6880h	Alarm 11 Threshold	Signed	2
6882h	Alarm 11 Timeout	F19	1
6883h	(empty)	-	1
6884h	Alarm 12 Quantity	F17	1
6885h	Alarm 12 Type	F18	1

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
6886h	Alarm 12 Threshold	Signed	2
6888h	Alarm 12 Timeout	F19	1
6889h	(empty)	-	1
688Ah	Alarm 13 Quantity	F17	1
688Bh	Alarm 13 Type	F18	1
688Ch	Alarm 13 Threshold	Signed	2
688Eh	Alarm 13 Timeout	F19	1
688Fh	(empty)	-	1
6890h	Alarm 14 Quantity	F17	1
6891h	Alarm 14 Type	F18	1
6892h	Alarm 14 Threshold	Signed	2
6894h	Alarm 14 Timeout	F19	1
6895h	(empty)	-	1
6896h	Alarm 15 Quantity	F17	1
6897h	Alarm 15 Type	F18	1
6898h	Alarm 15 Threshold	Signed	2
689Ah	Alarm 15 Timeout	F19	1
689Bh	(empty)	-	1
689Ch	Alarm 16 Quantity	F17	1
689Dh	Alarm 16 Type	F18	1
689Eh	Alarm 16 Threshold	Signed	2
68A0h	Alarm 16 Timeout	F19	1
68A1h	(empty)	-	1

6.7 CONFIGURATION OF GLOBAL ALARMS (R/-S)

6902h	Global Alarm 1 Equation	F22	2
6904h	Global Alarm 1 Label	F1	16
6914h	Global Alarm 2 Equation	F22	2
6916h	Global Alarm 2 Label	F1	16
6926h	Global Alarm 3 Equation	F22	2
6928h	Global Alarm 3 Label	F1	16
6938h	Global Alarm 4 Equation	F22	2
693Ah	Global Alarm 4 Label	F1	16
694Ah	Global Alarm 5 Equation	F22	2
694Ch	Global Alarm 5 Label	F1	16
695Ch	Global Alarm 6 Equation	F22	2
695Eh	Global Alarm 6 Label	F1	16
696Eh	Global Alarm 7 Equation	F22	2
6970h	Global Alarm 7 Label	F1	16
6980h	Global Alarm 8 Equation	F22	2
6982h	Global Alarm 8 Label	F1	16
6AAFh	Blinking of backlight for global alarm	F73	1

6.8 CONFIGURATION OF THE HMI (R/-S)

6A22h	Language	F2	1
6A23h	Scrolling	F3	1
6A24h	Timeout	F5	1
6A25h	List of scrolling screens	F6	8
6A2Dh	Password	F1	2
6A2Fh	Contrast / Backlight	F4	1
6A30h	Custom screen 1: title	F1	12
6A3Ch	Custom screen 1: labels	F1	14
6A4Ah	Custom screen 1: units	F1	8
6A52h	Custom screen 2: title	F1	12
6A5Eh	Custom screen 2: labels	F1	14
6A6Ch	Custom screen 2: units	F1	8
6A74h	Custom screen 3: title	F1	12
6A80h	Custom screen 3: labels	F1	14

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
6A8Eh	Custom screen 3: units	F1	8
6A96h	Custom screen 1: size of the 4 data items on screen	F7	2
6A98h	Custom screen 1: precision of the 4 data items on screen	F8	2
6A9Ah	Custom screen 1: MODBUS addresses of data to display	4*UInt16	4
6A9Eh	Custom screen 2: size of the 4 data items on screen	F7	2
6AA0h	Custom screen 2: precision of the 4 data items on screen	F8	2
6AA2h	Custom screen 2: MODBUS addresses of data to display	4*UInt16	4
6AA6h	Custom screen 3: size of the 4 data items on screen	F7	2
6AA8h	Custom screen 3: precision of the 4 data items on screen	F8	2
6AAAh	Custom screen 3: MODBUS addresses of data to display	4*UInt16	4
6AAEh	Backlight level in standby mode	[0..255]	1

6.9 CONFIGURATION OF DIGITAL OUTPUTS (R/-S)

6AB6h	Pulse width (common to all boards)	F29	1
	SLOT A	-	
6AB7h	Mode of output 1	F38	1
6AB8h	Weight of output 1	F26	1
6AB9h	Level of activation of output 1	F27	1
6ABAh	Energy or Alarm associated with output 1	[0..8] or F28	1
6ABBh	Mode of output 2	F38	1
6ABCh	Weight of output 2	F26	1
6ABDh	Level of activation of output 2	F27	1
6ABEh	Energy or Alarm associated with output 2	[0..8] or F28	1
6ABFh	SLOT B		8
6AC7h	SLOT C		8
6ACFh	SLOT D		8

6.10 CONFIGURATION OF DIGITAL INPUTS (R/-S)

6B00h	Slot used for the Time sync	F23	1
6B01h	Input used for the Time sync	F24	1
	SLOT A	-	
6B02h	Weight of input 1	F42	2
6B04h	Mode of input 1	F25	1
6B05h	Label of input 1	F1	16
6B15h	Unit of input 1	F1	4
6B19h	(empty)	-	1
6B1Ah	Weight of input 2	F42	2
6B1Ch	Mode of input 2	F25	1
6B1Dh	Label of input 2	F1	16
6B2Dh	Unit of input 2	F1	4
6B31h	(empty)		1
6B32h	SLOT B		48
6B62h	SLOT C		48
6B92h	SLOT D		48

6.11 CONFIGURATION OF ANALOGUE OUTPUTS (R/-S)

6C8Ah	Overshoot value	F35	1
6C8Bh	Free for alignment	-	
	SLOT A	-	
6C8Ch	Output 1 quantity	F43	1
6C8Dh	Type of quantity	F44	1
6C8Eh	Output 1 min. quantity	Signed	2
6C90h	Output 1 max. quantity	Signed	2
6C92h	Output 1 min. current	[-22000..+22000]	1
6C93h	Output 1 max. current	[-22000..+22000]	1

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
6C94h	Output 2 quantity	F43	1
6C95h	Type of quantity	F44	1
6C96h	Output 2 min. quantity	Signed	2
6C98h	Output 2 max. quantity	Signed	2
6C9Ah	Output 2 min. current	[-22000..+22000]	1
6C9Bh	Output 2 max. current	[-22000..+22000]	1
6C9Ch	SLOT B		16
6CACH	SLOT C		16
6CBCh	SLOT D		16

6.12 CONFIGURATION OF THE METROLOGY LED (R/-S)

6840h	Quantity	F46	1
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6.13 1s MEASUREMENTS (R/-/-)

0500h	V1	Unsigned 1/100 (V)	2
0502h	V2	Unsigned 1/100 (V)	2
0504h	V3	Unsigned 1/100 (V)	2
0506h	Vearth	Unsigned 1/100 (V)	2
0508h	U12	Unsigned 1/100 (V)	2
050Ah	U23	Unsigned 1/100 (V)	2
050Ch	U31	Unsigned 1/100 (V)	2
050Eh	I1	Unsigned 1/10000 (A)	2
0510h	I2	Unsigned 1/10000 (A)	2
0512h	I3	Unsigned 1/10000 (A)	2
0514h	In	Unsigned 1/10000 (A)	2
0516h	P1	Signed (W)	2
0518h	P2	Signed (W)	2
051Ah	P3	Signed (W)	2
051Ch	Pt	Signed (W)	2
051Eh	Q1	Signed (var)	2
0520h	Q2	Signed (var)	2
0522h	Q3	Signed (var)	2
0524h	Qt	Signed (var)	2
0526h	S1	Unsigned (VA)	2
0528h	S2	Unsigned (VA)	2
052Ah	S3	Unsigned (VA)	2
052Ch	St	Unsigned (VA)	2
052Eh	FP1	Signed 1/100 (%)	1
052Fh	FP1 Quadrant	F39	1
0530h	FP2	Signed 1/100 (%)	1
0531h	FP2 Quadrant	F39	1
0532h	FP3	Signed 1/100 (%)	1
0533h	FP3 Quadrant	F39	1
0534h	FPt	Signed 1/100 (%)	1
0535h	FPt Quadrant	F39	1
0536h	Cos phi phase 1	Signed 1/10000 ()	1
0537h	Quadrant	F39	1
0538h	Cos phi phase 2	Signed 1/10000 ()	1
0539h	Quadrant	F39	1
053Ah	Cos phi phase 3	Signed 1/10000 ()	1
053Bh	Quadrant	F39	1
053Ch	Three-phase cos phi	Signed 1/10000 ()	1
053Dh	Quadrant	F39	1
053Eh	V1 Peak factor	Unsigned 1/10000 ()	1
053Fh	V2 Peak factor	Unsigned 1/10000 ()	1
0540h	V3 Peak factor	Unsigned 1/10000 ()	1
0541h	I1 Peak factor	Unsigned 1/10000 ()	1

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
0542h	I2 Peak factor	Unsigned 1/10000 ()	1
0543h	I3 Peak factor	Unsigned 1/10000 ()	1
0544h	Voltage unbalance	Signed 1/100 (%)	1
0545h	Frequency	Unsigned 1/100 (Hz)	1
0546h	Total tan phi	Signed 1/10000	2

6.14 10S MEASUREMENTS (R/-/-)

0548h	Frequency	Unsigned 1/100 (Hz)	1
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6.15 MINIMA FOR 1s VALUES (R/-/S-OUTAGE-PROOF)

0AE4h	Minima of V1	Unsigned 1/100 (V)	2
0AE6h	Date of minima of V1	F15	2
0AE8h	Minima of V2	Unsigned 1/100 (V)	2
0AEA h	Date of minima of V2	F15	2
0AEC h	Minima of V3	Unsigned 1/100 (V)	2
0AEE h	Date of minima of V3	F15	2
0AF0h	Minima of VT	Unsigned 1/100 (V)	2
0AF2h	Date of minima of VT	F15	2
0AF4h	Minima of U12	Unsigned 1/100 (V)	2
0AF6h	Date of minima of U12	F15	2
0AF8h	Minima of U23	Unsigned 1/100 (V)	2
0AFAh	Date of minima of U23	F15	2
0AFC h	Minima of U31	Unsigned 1/100 (V)	2
0AFEh	Date of minima of U31	F15	2
0B00h	Minima of I1	Unsigned 1/10000 (A)	2
0B02h	Date of minima of I1	F15	2
0B04h	Minima of I2	Unsigned 1/10000 (A)	2
0B06h	Date of minima of I2	F15	2
0B08h	Minima of I3	Unsigned 1/10000 (A)	2
0B0Ah	Date of minima of I3	F15	2
0B0Ch	Minima of In	Unsigned 1/10000 (A)	2
0B0Eh	Date of minima of In	F15	2
0B10h	Minima of Pt, receiver mode	Unsigned (W)	2
0B12h	Date of minima of Pt, receiver mode	F15	2
0B14h	Minima of Pt, generator mode	Unsigned (W)	2
0B16h	Date of minima of Pt, generator mode	F15	2
0B18h	Minima of Qt, receiver mode	Signed (var)	2
0B1Ah	Date of minima of Qt, receiver mode	F15	2
0B1Ch	Minima of Qt, generator mode	Signed (var)	2
0B1Eh	Date of minima of Qt, generator mode	F15	2
0B20h	Minima of frequency	Unsigned 1/100 (Hz)	2
0B22h	Date of minima of frequency	F15	2
0C44h	Minima of St	Unsigned (VA)	2
0C46h	Date of minima of St	F15	2
0C60h	Minimum analogue input for slot A, channel 1	Signed	2
0C62h	Date of minimum analogue input for slot A, channel 1	F15	2
0C64h	Minimum analogue input for slot A, channel 2	Signed	2
0C66h	Date of minimum analogue input for slot A, channel 2	F15	2
0C68h	Minimum analogue input for slot B, channel 1	Signed	2
0C6Ah	Date of minimum analogue input for slot B, channel 1	F15	2
0C6Ch	Minimum analogue input for slot B, channel 2	Signed	2
0C6Eh	Date of minimum analogue input for slot B, channel 2	F15	2
0C70h	Minimum analogue input for slot C, channel 1	Signed	2
0C72h	Date of minimum analogue input for slot C, channel 1	F15	2
0C74h	Minimum analogue input for slot C, channel 2	Signed	2
0C76h	Date of minimum analogue input for slot C, channel 2	F15	2
0C78h	Minimum analogue input for slot D, channel 1	Signed	2

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
0C7Ah	Date of minimum analogue input for slot D, channel 1	F15	2
0C7Ch	Minimum analogue input for slot D, channel 2	Signed	2
0C7Eh	Date of minimum analogue input for slot D, channel 2	F15	2

6.16 MINIMA OF THE MEAN VALUES (R/-S-OUTAGE-PROOF)

0B24h	Minima of mean FPt, receiver mode	Unsigned 1/10000 ()	1
0B25h	Quadrant of the minima of mean FPt, receiver mode	F39	1
0B26h	Date of the minima of mean FPt, receiver mode	F15	2
0B28h	Minima of mean FPt, generator mode	Signed 1/10000 ()	1
0B29h	Quadrant of the minima of mean FPt, generator mode	F39	1
0B2Ah	Date of the minima of mean FPt, generator mode	F15	2
0B2Ch	Minima of the mean three-phase Cos Phi, receiver mode	Unsigned 1/10000 ()	1
0B2Dh	Quadrant of the minima of the mean three-phase Cos Phi, receiver mode	F39	1
0B2Eh	Date of the minima of the mean three-phase Cos Phi, receiver mode	F15	2
0B30h	Minima of the mean three-phase Cos Phi, generator mode	Signed 1/10000 ()	1
0B31h	Quadrant of the minima of the mean three-phase Cos Phi, generator mode	F39	1
0B32h	Date of the minima of the mean three-phase Cos Phi, generator mode	F15	2
0C4Ch	Minimum of mean tan phi, receiver mode	signed 1/10000 ()	2
0C4Eh	Date of the minimum of mean tan phi, receiver mode	F15	2
0C50h	Minimum of mean tan phi, generator mode	signed 1/10000 ()	2
0C52h	Date of the minimum of mean tan phi, generator mode	F15	2
0CE0h	Mean minimum analogue input for slot A, channel 1	Signed	2
0CE2h	Date of mean minimum analogue input for slot A, channel 1	F15	2
0CE4h	Mean minimum analogue input for slot A, channel 2	Signed	2
0CE6h	Date of mean minimum analogue input for slot A, channel 2	F15	2
0CE8h	Mean minimum analogue input for slot B, channel 1	Signed	2
0CEAh	Date of mean minimum analogue input for slot B, channel 1	F15	2
0CECh	Mean minimum analogue input for slot B, channel 2	Signed	2
0CEEh	Date of mean minimum analogue input for slot B, channel 2	F15	2
0CF0h	Mean minimum analogue input for slot C, channel 1	Signed	2
0CF2h	Date of mean minimum analogue input for slot C, channel 1	F15	2
0CF4h	Mean minimum analogue input for slot C, channel 2	Signed	2
0CF6h	Date of mean minimum analogue input for slot C, channel 2	F15	2
0CF8h	Mean minimum analogue input for slot D, channel 1	Signed	2
0CFAh	Date of mean minimum analogue input for slot D, channel 1	F15	2
0CFCh	Mean minimum analogue input for slot D, channel 2	Signed	2
0CFEh	Date of mean minimum analogue input for slot D, channel 2	F15	2

6.17 MAXIMA FOR 1s VALUES (R/-S-OUTAGE-PROOF)

0B34h	Maxima of V1	Unsigned 1/100 (V)	2
0B36h	Date of maxima of V1	F15	2
0B38h	Maxima of V2	Unsigned 1/100 (V)	2
0B3Ah	Date of maxima of V2	F15	2
0B3Ch	Maxima of V3	Unsigned 1/100 (V)	2
0B3Eh	Date of maxima of V3	F15	2
0B40h	Maxima of VT	Unsigned 1/100 (V)	2
0B42h	Date of maxima of VT	F15	2
0B44h	Maxima of U12	Unsigned 1/100 (V)	2
0B46h	Date of maxima of U12	F15	2
0B48h	Maxima of U23	Unsigned 1/100 (V)	2
0B4Ah	Date of maxima of U23	F15	2
0B4Ch	Maxima of U31	Unsigned 1/100 (V)	2
0B4Eh	Date of maxima of U31	F15	2
0B50h	Maxima of I1	Unsigned 1/10000 (A)	2
0B52h	Date of maxima of I1	F15	2
0B54h	Maxima of I2	Unsigned 1/10000 (A)	2

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
0B56h	Date of maxima of I2	F15	2
0B58h	Maxima of I3	Unsigned 1/10000 (A)	2
0B5Ah	Date of maxima of I3	F15	2
0B5Ch	Maxima of In	Unsigned 1/10000 (A)	2
0B5Eh	Date of maxima of In	F15	2
0B60h	Maxima of P1, receiver mode	Unsigned (W)	2
0B62h	Date of maxima of P1, receiver mode	F15	2
0B64h	Maxima of P1, generator mode	Unsigned (W)	2
0B66h	Date of maxima of P1, generator mode	F15	2
0B68h	Maxima of P2, receiver mode	Unsigned (W)	2
0B6Ah	Date of maxima of P2, receiver mode	F15	2
0B6Ch	Maxima of P2, generator mode	Unsigned (W)	2
0B6Eh	Date of maxima of P2, generator mode	F15	2
0B70h	Maxima of P3, receiver mode	Unsigned (W)	2
0B72h	Date of maxima of P3, receiver mode	F15	2
0B74h	Maxima of P3, generator mode	Unsigned (W)	2
0B76h	Date of maxima of P3, generator mode	F15	2
0B78h	Maxima of Pt, receiver mode	Unsigned (W)	2
0B7Ah	Date of maxima of Pt, receiver mode	F15	2
0B7Ch	Maxima of Pt, generator mode	Unsigned (W)	2
0B7Eh	Date of maxima of Pt, generator mode	F15	2
0B80h	Maxima of Q1, receiver mode	Signed (var)	2
0B82h	Date of maxima of Q1, receiver mode	F15	2
0B84h	Maxima of Q1, generator mode	Signed (var)	2
0B86h	Date of maxima of Q1, generator mode	F15	2
0B88h	Maxima of Q2, receiver mode	Signed (var)	2
0B8Ah	Date of maxima of Q2, receiver mode	F15	2
0B8Ch	Maxima of Q2, generator mode	Signed (var)	2
0B8Eh	Date of maxima of Q2, generator mode	F15	2
0B90h	Maxima of Q3, receiver mode	Signed (var)	2
0B92h	Date of maxima of Q3, receiver mode	F15	2
0B94h	Maxima of Q3, generator mode	Signed (var)	2
0B96h	Date of maxima of Q3, generator mode	F15	2
0B98h	Maxima of Qt, receiver mode	Signed (var)	2
0B9Ah	Date of maxima of Qt, receiver mode	F15	2
0B9Ch	Maxima of Qt, generator mode	Signed (var)	2
0B9Eh	Date of maxima of Qt, generator mode	F15	2
0BA0h	Maxima of S1	Unsigned (VA)	2
0BA2h	Date of maxima of S1	F15	2
0BA4h	Maxima of S2	Unsigned (VA)	2
0BA6h	Date of maxima of S2	F15	2
0BA8h	Maxima of S3	Unsigned (VA)	2
0BAAh	Date of maxima of S3	F15	2
0BACH	Maxima of St	Unsigned (VA)	2
0BAEh	Date of maxima of St	F15	2
0BB0h	Maxima of frequency	Unsigned 1/100 (Hz)	2
0BB2h	Date of maxima of frequency	F15	2
0CA0h	Maximum analogue input for slot A, channel 1	Signed	2
0CA2h	Date of maximum analogue input for slot A, channel 1	F15	2
0CA4h	Maximum analogue input for slot A, channel 2	Signed	2
0CA6h	Date of maximum analogue input for slot A, channel 2	F15	2
0CA8h	Maximum analogue input for slot B, channel 1	Signed	2
0CAAh	Date of maximum analogue input for slot B, channel 1	F15	2
0CACH	Maximum analogue input for slot B, channel 2	Signed	2
0CAEh	Date of maximum analogue input for slot B, channel 2	F15	2
0CB0h	Maximum analogue input for slot C, channel 1	Signed	2
0CB2h	Date of maximum analogue input for slot C, channel 1	F15	2
0CB4h	Maximum analogue input for slot C, channel 2	Signed	2
0CB6h	Date of maximum analogue input for slot C, channel 2	F15	2
0CB8h	Maximum analogue input for slot D, channel 1	Signed	2
0CBAh	Date of maximum analogue input for slot D, channel 1	F15	2
0CBCh	Maximum analogue input for slot D, channel 2	Signed	2

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
0CBEh	Date of maximum analogue input for slot D, channel 2	F15	2

6.18 MAXIMA OF THE MEAN VALUES (R/-S-OUTAGE-PROOF)

0BB4h	Maxima of mean V1	Unsigned 1/100 (V)	2
0BB6h	Date of maxima of mean V1	F15	2
0BB8h	Maxima of mean V2	Unsigned 1/100 (V)	2
0BBAh	Date of maxima of mean V2	F15	2
0BBCh	Maxima of mean V3	Unsigned 1/100 (V)	2
0BBEh	Date of maxima of mean V3	F15	2
0BC0h	Maxima of mean VT	Unsigned 1/100 (V)	2
0BC2h	Date of maxima of mean VT	F15	2
0BC4h	Maxima of mean U12	Unsigned 1/100 (V)	2
0BC6h	Date of maxima of mean U12	F15	2
0BC8h	Maxima of mean U23	Unsigned 1/100 (V)	2
0BCAh	Date of maxima of mean U23	F15	2
0BCCCh	Maxima of mean U31	Unsigned 1/100 (V)	2
0BCEh	Date of maxima of mean U31	F15	2
0BD0h	Maxima of mean I1	Unsigned 1/10000 (A)	2
0BD2h	Date of maxima of mean I1	F15	2
0BD4h	Maxima of mean I2	Unsigned 1/10000 (A)	2
0BD6h	Date of maxima of mean I2	F15	2
0BD8h	Maxima of mean I3	Unsigned 1/10000 (A)	2
0BDAh	Date of maxima of mean I3	F15	2
0BDCh	Maxima of mean In	Unsigned 1/10000 (A)	2
0BDEh	Date of maxima of mean In	F15	2
0BE0h	Maxima of mean Pt, receiver mode	Unsigned (W)	2
0BE2h	Date of maxima of mean Pt, receiver mode	F15	2
0BE4h	Maxima of mean Pt, generator mode	Unsigned (W)	2
0BE6h	Date of maxima of mean Pt, generator mode	F15	2
0BE8h	Maxima of mean Qt, receiver mode	Signed (var)	2
0BEAh	Date of maxima of mean Qt, receiver mode	F15	2
0BECCh	Maxima of mean Qt, generator mode	Signed (var)	2
0BEEh	Date of maxima of mean Qt, generator mode	F15	2
0BF0h	Maxima of mean St	Unsigned (VA)	2
0BF2h	Date of maxima of mean St	F15	2
0BF4h	Maxima of mean FPt, receiver mode	Unsigned 1/10000 ()	1
0BF5h	Quadrant of the maxima of mean FPt, receiver mode	F39	1
0BF6h	Date of the maxima of mean FPt, receiver mode	F15	2
0BF8h	Maxima of mean FPt, generator mode	Signed 1/10000 ()	1
0BF9h	Quadrant of the maxima of mean FPt, generator mode	F39	1
0BFAh	Date of the maxima of mean FPt, generator mode	F15	2
0BFCh	Maxima of voltage unbalance mean	Unsigned 1/100 (%)	2
0BFEh	Date of the maxima of voltage unbalance mean	F15	2
0C00h	Maxima of mean THD, V1	Unsigned 1/100 (%)	2
0C02h	Date of maxima of mean THD, V1	F15	2
0C04h	Maxima of mean THD, V2	Unsigned 1/100 (%)	2
0C06h	Date of maxima of mean THD, V2	F15	2
0C08h	Maxima of mean THD, V3	Unsigned 1/100 (%)	2
0C0Ah	Date of maxima of mean THD, V3	F15	2
0C0Ch	Maxima of mean THD, U12	Unsigned 1/100 (%)	2
0C0Eh	Date of maxima of mean THD, U12	F15	2
0C10h	Maxima of mean THD, U23	Unsigned 1/100 (%)	2
0C12h	Date of maxima of mean THD, U23	F15	2
0C14h	Maxima of mean THD, U31	Unsigned 1/100 (%)	2
0C16h	Date of maxima of mean THD, U31	F15	2
0C18h	Maxima of mean THD, I1	Unsigned 1/100 (%)	2
0C1Ah	Date of maxima of mean THD, I1	F15	2
0C1Ch	Maxima of mean THD, I2	Unsigned 1/100 (%)	2
0C1Eh	Date of maxima of mean THD, I2	F15	2

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
0C20h	Maxima of mean THD, I3	Unsigned 1/100 (%)	2
0C22h	Date of maxima of mean THD, I3	F15	2
0C24h	Maxima of the mean crest factor of V1	Unsigned 1/10000 ()	2
0C26h	Date of the maxima of the mean crest factor of V1	F15	2
0C28h	Maxima of the mean crest factor of V2	Unsigned 1/10000 ()	2
0C2Ah	Date of the maxima of the mean crest factor of V2	F15	2
0C2Ch	Maxima of the mean crest factor of V3	Unsigned 1/10000 ()	2
0C2Eh	Date of the maxima of the mean crest factor of V3	F15	2
0C30h	Maxima of the mean crest factor of I1	Unsigned 1/10000 ()	2
0C32h	Date of the maxima of the mean crest factor of I1	F15	2
0C34h	Maxima of the mean crest factor of I2	Unsigned 1/10000 ()	2
0C36h	Date of the maxima of the mean crest factor of I2	F15	2
0C38h	Maxima of the mean crest factor of I3	Unsigned 1/10000 ()	2
0C3Ah	Date of the maxima of the mean crest factor of I3	F15	2
0C3Ch	Maxima of the mean three-phase Cos Phi, receiver mode	Unsigned 1/10000 ()	1
0C3Dh	Quadrant of the maxima of the mean three-phase Cos Phi, receiver mode	F39	1
0C3Eh	Date of the maxima of the mean three-phase Cos Phi, receiver mode	F15	2
0C40h	Maxima of the mean three-phase Cos Phi, generator mode	Signed 1/10000 ()	1
0C41h	Quadrant of the maxima of the mean three-phase Cos Phi, generator mode	F39	1
0C42h	Date of the maxima of the mean three-phase Cos Phi, generator mode	F15	2
0C48h	RESERVED		4
0C54h	Maximum of mean tan phi, receiver mode	signed 1/10000 ()	2
0C56h	Date of the maximum of mean tan phi, receiver mode	F15	2
0C58h	Maximum of mean tan phi, generator mode	signed 1/10000 ()	2
0C5Ah	Date of the maximum of mean tan phi, generator mode	F15	2
0C5Ch	Maxima mean THD In	Unsigned 1/100 (%)	2
0C5Eh	Date of maximum mean THD In	F15	2
0D20h	Mean maximum analogue input for slot A, channel 1	Signed	2
0D22h	Date of mean maximum analogue input for slot A, channel 1	F15	2
0D24h	Mean maximum analogue input for slot A, channel 2	Signed	2
0D26h	Date of mean maximum analogue input for slot A, channel 2	F15	2
0D28h	Mean maximum analogue input for slot B, channel 1	Signed	2
0D2Ah	Date of mean maximum analogue input for slot B, channel 1	F15	2
0D2Ch	Mean maximum analogue input for slot B, channel 2	Signed	2
0D2Eh	Date of mean maximum analogue input for slot B, channel 2	F15	2
0D30h	Mean maximum analogue input for slot C, channel 1	Signed	2
0D32h	Date of mean maximum analogue input for slot C, channel 1	F15	2
0D34h	Mean maximum analogue input for slot C, channel 2	Signed	2
0D36h	Date of mean maximum analogue input for slot C, channel 2	F15	2
0D38h	Mean maximum analogue input for slot D, channel 1	Signed	2
0D3Ah	Date of mean maximum analogue input for slot D, channel 1	F15	2
0D3Ch	Mean maximum analogue input for slot D, channel 2	Signed	2
0D3Eh	Date of mean maximum analogue input for slot D, channel 2	F15	2

6.19 HARMONICS (R/-/-)

0600h	Harmonics V1	Unsigned 1/100 (%)	51
0633h	Harmonics V2	Unsigned 1/100 (%)	51
0666h	Harmonics V3	Unsigned 1/100 (%)	51
0699h	Harmonics U12	Unsigned 1/100 (%)	51
06CCh	Harmonics U23	Unsigned 1/100 (%)	51
06FFh	Harmonics U31	Unsigned 1/100 (%)	51
0732h	Harmonics I1	Unsigned 1/100 (%)	51
0765h	Harmonics I2	Unsigned 1/100 (%)	51
0798h	Harmonics I3	Unsigned 1/100 (%)	51
07CBh	Rank, max. harmonics, V1	Unsigned ()	1
07CCh	Rank, max. harmonics, V2	Unsigned ()	1
07CDh	Rank, max. harmonics, V3	Unsigned ()	1
07CEh	Rank, max. harmonics, U12	Unsigned ()	1
07CFh	Rank, max. harmonics, U23	Unsigned ()	1

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
07D0h	Rank, max. harmonics, U31	Unsigned ()	1
07D1h	Rank, max. harmonics, I1	Unsigned ()	1
07D2h	Rank, max. harmonics, I2	Unsigned ()	1
07D3h	Rank, max. harmonics, I3	Unsigned ()	1
07D4h	Value, max. harmonics, V1	Unsigned 1/100 (%)	1
07D5h	Value, max. harmonics, V2	Unsigned 1/100 (%)	1
07D6h	Value, max. harmonics, V3	Unsigned 1/100 (%)	1
07D7h	Value, max. harmonics, U12	Unsigned 1/100 (%)	1
07D8h	Value, max. harmonics, U23	Unsigned 1/100 (%)	1
07D9h	Value, max. harmonics, U31	Unsigned 1/100 (%)	1
07DAh	Value, max. harmonics, I1	Unsigned 1/100 (%)	1
07DBh	Value, max. harmonics, I2	Unsigned 1/100 (%)	1
07DCh	Value, max. harmonics, I3	Unsigned 1/100 (%)	1
07DDh	THD V1	Unsigned 1/100 (%)	1
07DEh	THD V2	Unsigned 1/100 (%)	1
07DFh	THD V3	Unsigned 1/100 (%)	1
07E0h	THD U12	Unsigned 1/100 (%)	1
07E1h	THD U23	Unsigned 1/100 (%)	1
07E2h	THD U31	Unsigned 1/100 (%)	1
07E3h	THD I1	Unsigned 1/100 (%)	1
07E4h	THD I2	Unsigned 1/100 (%)	1
07E5h	THD I3	Unsigned 1/100 (%)	1
07F8h	Harmonics In	Unsigned 1/100 (%)	51
082Bh	Rank, max. harmonics, In	Unsigned ()	1
082Ch	Value, max. harmonics, In	Unsigned 1/100 (%)	1
082Dh	THD In	Unsigned 1/100 (%)	1

6.20 AVERAGE (R/-)

0900h	Average of V1	Unsigned 1/100 (V)	2
0902h	Average of V2	Unsigned 1/100 (V)	2
0904h	Average of V3	Unsigned 1/100 (V)	2
0906h	Average of VT	Unsigned 1/100 (V)	2
0908h	Average of U12	Unsigned 1/100 (V)	2
090Ah	Average of U23	Unsigned 1/100 (V)	2
090Ch	Average of U31	Unsigned 1/100 (V)	2
090Eh	Average of I1	Unsigned 1/10000 (A)	2
0910h	Average of I2	Unsigned 1/10000 (A)	2
0912h	Average of I3	Unsigned 1/10000 (A)	2
0914h	Average of In	Unsigned 1/10000 (A)	2
0916h	Average of P1, receiver mode	Unsigned (W)	2
0918h	Average of P1, generator mode	Unsigned (W)	2
091Ah	Average of P2, receiver mode	Unsigned (W)	2
091Ch	Average of P2, generator mode	Unsigned (W)	2
091Eh	Average of P3, receiver mode	Unsigned (W)	2
0920h	Average of P3, generator mode	Unsigned (W)	2
0922h	Average of Pt, receiver mode	Unsigned (W)	2
0924h	Average of Pt, generator mode	Unsigned (W)	2
0926h	Average of Q1, receiver mode	Signed (var)	2
0928h	Average of Q1, generator mode	Signed (var)	2
092Ah	Average of Q2, receiver mode	Signed (var)	2
092Ch	Average of Q2, generator mode	Signed (var)	2
092Eh	Average of Q3, receiver mode	Signed (var)	2
0930h	Average of Q3, generator mode	Signed (var)	2
0932h	Average of Qt, receiver mode	Signed (var)	2
0934h	Average of Qt, generator mode	Signed (var)	2
0936h	Average of S1	Unsigned (VA)	2
0938h	Average of S2	Unsigned (VA)	2
093Ah	Average of S3	Unsigned (VA)	2
093Ch	Average of St	Unsigned (VA)	2

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
093Eh	Average of FP1, receiver mode	Unsigned 1/100 (%)	1
093Fh	Quadrant of average FP1, receiver mode	F39	1
0940h	Average of FP1, generator mode	Signed 1/100 (%)	1
0941h	Quadrant of average FP1, generator mode	F39	1
0942h	Average of FP2, receiver mode	Unsigned 1/100 (%)	1
0943h	Quadrant of average FP2, receiver mode	F39	1
0944h	Average of FP2, generator mode	Signed 1/100 (%)	1
0945h	Quadrant of average FP2, generator mode	F39	1
0946h	Average of FP3, receiver mode	Unsigned 1/100 (%)	1
0947h	Quadrant of average FP3, receiver mode	F39	1
0948h	Average of FP3, generator mode	Signed 1/100 (%)	1
0949h	Quadrant of average FP3, generator mode	F39	1
094Ah	Average of FPt, receiver mode	Unsigned 1/100 (%)	1
094Bh	Quadrant of average FPt, receiver mode	F39	1
094Ch	Average of FPt, generator mode	Unsigned 1/100 (%)	1
094Dh	Quadrant of average FPt, generator mode	F39	1
094Eh	Average frequency	Unsigned 1/100 (Hz)	1
094Fh	Average of THD V1	Unsigned 1/100 (%)	1
0950h	Average of THD V2	Unsigned 1/100 (%)	1
0951h	Average of THD V3	Unsigned 1/100 (%)	1
0952h	Average of THD U12	Unsigned 1/100 (%)	1
0953h	Average of THD U23	Unsigned 1/100 (%)	1
0954h	Average of THD U31	Unsigned 1/100 (%)	1
0955h	Average of THD I1	Unsigned 1/100 (%)	1
0956h	Average of THD I2	Unsigned 1/100 (%)	1
0957h	Average of THD I3	Unsigned 1/100 (%)	1
0958h	Voltage unbalance average	Signed 1/100 (%)	1
0959h	Average of the mean crest factor of V1	Unsigned 1/10000 ()	1
095Ah	Average of the mean crest factor of V2	Unsigned 1/10000 ()	1
095Bh	Average of the mean crest factor of V3	Unsigned 1/10000 ()	1
095Ch	Average of the mean crest factor of I1	Unsigned 1/10000 ()	1
095Dh	Average of the mean crest factor of I2	Unsigned 1/10000 ()	1
095Eh	Average of the mean crest factor of I3	Unsigned 1/10000 ()	1
095Fh	Average of Cos Phi1, receiver mode	Unsigned 1/10000 ()	1
0960h	Quadrant of mean Cos Phi1, receiver mode	F39	1
0961h	Average of Cos Phi1, generator mode	Signed 1/10000 ()	1
0962h	Quadrant of mean Cos Phi1, generator mode	F39	1
0963h	Average of Cos Phi2, receiver mode	Unsigned 1/10000 ()	1
0964h	Quadrant of mean Cos Phi2, receiver mode	F39	1
0965h	Average of Cos Phi2, generator mode	Signed 1/10000 ()	1
0966h	Quadrant of mean Cos Phi2, generator mode	F39	1
0967h	Average of Cos Phi3, receiver mode	Unsigned 1/10000 ()	1
0968h	Quadrant of mean Cos Phi3, receiver mode	F39	1
0969h	Average of Cos Phi3, generator mode	Signed 1/10000 ()	1
096Ah	Quadrant of mean Cos Phi3, generator mode	F39	1
096Bh	Average of three-phase Cos Phi, receiver mode	Unsigned 1/10000 ()	1
096Ch	Quadrant of mean three-phase Cos Phi, receiver mode	F39	1
096Dh	Average of three-phase Cos Phi, generator mode	Signed 1/10000 ()	1
096Eh	Quadrant of mean three-phase Cos Phi, generator mode	F39	1
0970h	Total average of tan phi, receiver mode	Signed 1/100 (%)	2
0972h	Total average of tan phi, generator mode	Signed 1/100 (%)	2
0974h	Average of THD In	Unsigned 1/100 (%)	1
0975h	(empty)		
0976h	Average of analogue input for slot A, channel 1	Signed	2
0978h	Average of analogue input for slot A, channel 2	Signed	2
097Ah	Average of analogue input for slot B, channel 1	Signed	2
097Ch	Average of analogue input for slot B, channel 2	Signed	2
097Eh	Average of analogue input for slot C, channel 1	Signed	2
0980h	Average of analogue input for slot C, channel 2	Signed	2
0982h	Average of analogue input for slot D, channel 1	Signed	2
0984h	Average of analogue input for slot D, channel 2	Signed	2

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
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6.21 HARMONICS AVERAGES

1102h	Averages, harmonics, V1, rank 0 to 25	Unsigned 16-bit	26
111Ch	Averages, harmonics, V2, rank 0 to 25	Unsigned 16-bit	26
1136h	Averages, harmonics, V3, rank 0 to 25	Unsigned 16-bit	26
1150h	Averages, harmonics, U12, rank 0 to 25	Unsigned 16-bit	26
116Ah	Averages, harmonics, U23, rank 0 to 25	Unsigned 16-bit	26
1184h	Averages, harmonics, U31, rank 0 to 25	Unsigned 16-bit	26
119Eh	Averages, harmonics, I1, rank 0 to 25	Unsigned 16-bit	26
11B8h	Averages, harmonics, I2, rank 0 to 25	Unsigned 16-bit	26
11D2h	Averages, harmonics, I3, rank 0 to 25	Unsigned 16-bit	26
11ECh	Averages, harmonics, In, rank 0 to 25	Unsigned 16-bit	26

6.22 ENERGIES IN KWH, KVARH KVAH, 32-BIT (R/-S-OUTAGE-PROOF)

0996h	Active energy, receiver mode	Unsigned	2
0998h	Active energy, generator mode	Unsigned	2
099Ah	Reactive energy, Q1	Unsigned	2
099Ch	Reactive energy, Q2	Unsigned	2
099Eh	Reactive energy, Q3	Unsigned	2
09A0h	Reactive energy, Q4	Unsigned	2
09A2h	Apparent energy, receiver mode	Unsigned	2
09A4h	Apparent energy, generator mode	Unsigned	2

6.23 ENERGIES IN 64 BITS (R/-S-OUTAGE-PROOF)

0A00h	Time counter of the product in operation	Unsigned 1/100 h	2
0A02h	Time counter, voltage presence	Unsigned 1/100 h	2
0A04h	Time counter, current presence	Unsigned 1/100 h	2
0A06h	Active energy, receiver mode	Unsigned (Wh)	2
0A08h	Active energy, receiver mode	Unsigned (MWh)	2
0A0Ah	Active energy, generator mode	Unsigned (Wh)	2
0A0Ch	Active energy, generator mode	Unsigned (MWh)	2
0A0Eh	Reactive energy, Q1	Unsigned (varh)	2
0A10h	Reactive energy, Q1	Unsigned (Mvarh)	2
0A12h	Reactive energy, Q2	Unsigned (varh)	2
0A14h	Reactive energy, Q2	Unsigned (Mvarh)	2
0A16h	Reactive energy, Q3	Unsigned (varh)	2
0A18h	Reactive energy, Q3	Unsigned (Mvarh)	2
0A1Ah	Reactive energy, Q4	Unsigned (varh)	2
0A1Ch	Reactive energy, Q4	Unsigned (Mvarh)	2
0A1Eh	Apparent energy, receiver mode	Unsigned (VAh)	2
0A20h	Apparent energy, receiver mode	Unsigned (MVAh)	2
0A22h	Apparent energy, generator mode	Unsigned (VAh)	2
0A24h	Apparent energy, generator mode	Unsigned (MVAh)	2
0A26h	Pulse input energy, SLOT A1	Unsigned 1/10000 (Unit)	2
0A28h	Pulse input energy, SLOT A1	Unsigned kilo (Unit)	2
0A2Ah	Pulse input energy, SLOT A2	Unsigned 1/10000 (Unit)	2
0A2Ch	Pulse input energy, SLOT A2	Unsigned kilo (Unit)	2
0A2Eh	Pulse input energy, SLOT B1	Unsigned 1/10000 (Unit)	2
0A30h	Pulse input energy, SLOT B1	Unsigned kilo (Unit)	2
0A32h	Pulse input energy, SLOT B2	Unsigned 1/10000 (Unit)	2
0A34h	Pulse input energy, SLOT B2	Unsigned kilo (Unit)	2
0A36h	Pulse input energy, SLOT C1	Unsigned 1/10000 (Unit)	2
0A38h	Pulse input energy, SLOT C1	Unsigned kilo (Unit)	2
0A3Ah	Pulse input energy, SLOT C2	Unsigned 1/10000 (Unit)	2
0A3Ch	Pulse input energy, SLOT C2	Unsigned kilo (Unit)	2
0A3Eh	Pulse input energy, SLOT D1	Unsigned 1/10000 (Unit)	2

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
0A40h	Pulse input energy, SLOT D1	Unsigned kilo (Unit)	2
0A42h	Pulse input energy, SLOT D2	Unsigned 1/10000 (Unit)	2
0A44h	Pulse input energy, SLOT D2	Unsigned kilo (Unit)	2

6.24 STATUS WORDS (R/-S)

0200h	Alarm status word	See status word coding	2
0202h	Alarm relays status word	See status word coding	1
0203h	Sync Time Signal Loss status word	F36	1
0204h	Digital outputs status word (pulses)	See status word coding	1
0206h	Digital inputs status word	See status word coding	1
0208h	Analogue outputs status word	See status word coding	1
020Ah	Digital outputs status word (Alarm & forcing)	See status word coding	1
020Ch	Analogue inputs status word	See status word coding	1

6.25 FIFO STACK OF ELEMENTARY ALARMS (R/-S-OUTAGE-PROOF)

0F00h	Events counter	Unsigned	1
0F01h	Index of the next element to be recorded	Unsigned	1
0F02h	Duration, index 0	Seconds	2
0F04h	Start date, index 0	F15	2
0F06h	Extreme value, index 0	Signed	2
0F08h	Elementary alarm No., index 0	F20	1
0F09h	Quantity, elementary alarm, index 0	F17	1
0F0Ah	Alarms FIFO (index 1 to 63)	Unsigned	504

6.26 CONFIGURATION OF RECORDING CURVES (R/-S)

6DAEh	Type of synchronisation, Curve 1	F48	1
6DAFh	Frequency of acquisition, Curve 1	F50	1
6DB0h	Date of recording, Curve 1	F15	2
6DB2h	Mode / Number 1	F51 / 1	1
6DB3h	Quantity 1, Curve 1	F52	1
6DB4h	Reserved	UInt16	1
6DB5h	Reserved	UInt16	1
6DB6h	Reserved	UInt16	1
6DB7h	Reserved	UInt16	1
6DB8h	Number of blocks (For ENERIUM 300 only)	8 (/16/24)	1
6DB9h	<i>Free for alignment</i>	-	-
6DBAh	Type of synchronisation, Curve 2	F48	1
6DBBh	Frequency of acquisition, Curve 2	F50	1
6DBC	Date of recording, Curve 2	F15	2
6DBEh	Mode / Number 1	F51 / 1	1
6DBFh	Quantity 1, Curve 2	F52	1
6DC0h	Reserved	UInt16	1
6DC1h	Reserved	UInt16	1
6DC2h	Reserved	UInt16	1
6DC3h	Reserved	UInt16	1
6DC4h	Number of blocks (For ENERIUM 300 only)	8 (/16/24)	1
6DC5h	<i>Free for alignment</i>	-	-
6DC6h	Type of synchronisation, Curve 3	F48	1
6DC7h	Frequency of acquisition, Curve 3	F50	1
6DC8h	Date of recording, Curve 3	F15	2
6DCAh	Mode / Number 1	F51 / 1	1
6DCBh	Quantity 1, Curve 3	F52	1
6DCC	Reserved	UInt16	1
6DCDh	Reserved	UInt16	1
6DCEh	Reserved	UInt16	1

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
6DCFh	Reserved	Uint16	1
6DD0h	Number of blocks (For ENERIUM 300 only)	8 (/16/24)	1
6DD1h	<i>Free for alignment</i>	-	-
6DD2h	Type of synchronisation, Curve 4	F48	1
6DD3h	Frequency of acquisition, Curve 4	F50	1
6DD4h	Date of recording, Curve 4	F15	2
6DD6h	Mode / Number 1	F51 / 1	1
6DD7h	Quantity 1, Curve 4	F52	1
6DD8h	Reserved	Uint16	1
6DD9h	Reserved	Uint16	1
6DDAh	Reserved	Uint16	1
6DDBh	Reserved	Uint16	1
6DDCh	Number of blocks (For ENERIUM 300 only)	8 (/16/24)	1
6DDDh	<i>Free for alignment</i>	-	-

6.27 STATUS OF THE RECORDING CURVES (R/I-I-)

1300h	Status, Curve No. 1	F53	1
1301h	Level of filling, Curve No. 1	Unsigned integer, in %	1
1302h	Number of elements in buffer, Curve No. 1	Unsigned	1
1303h	Number of elements since event marker, Curve No. 1	Unsigned	1
1304h	Status, Curve No. 2	F53	1
1305h	Level of filling, Curve No. 2	Unsigned integer, in %	1
1306h	Number of elements in buffer, Curve No. 2	Unsigned	1
1307h	Number of elements since event marker, Curve No. 2	Unsigned	1
1308h	Status, Curve No. 3	F53	1
1309h	Level of filling, Curve No. 3	Unsigned integer, in %	1
130Ah	Number of elements in buffer, Curve No. 3	Unsigned	1
130Bh	Number of elements since event marker, Curve No. 3	Unsigned	1
130Ch	Status, Curve No. 4	F53	1
130Dh	Level of filling, Curve No. 4	Unsigned integer, in %	1
130Eh	Number of elements in buffer, Curve No. 4	Unsigned	1
130Fh	Number of elements since event marker, Curve No. 4	Unsigned	1
1310h	<i>Free for alignment</i>	-	16

6.28 DATA OF RECORDING CURVES

1320h	Curve No. / displayed block No.	F47 / F49	1
1321h	Level of filling, Curve No. x	Unsigned integer, in %	1
1322h	Number of elements in buffer, Curve No. x	Unsigned	1
1323h	Number of elements since event marker, Curve No. x	Unsigned	1
1324h	Consecutive element structures (1 date + n 32-bit quantities)	Same type as the quantity	2016

6.29 CONFIGURATION OF LOAD CURVES (R/I-S)

7000h	Load curve integration time	F55	1
7001h	Quantities set	F56	1
7002h	Load curve unit - SLOT A, channel 1	F1	4
7006h	Load curve unit - SLOT A, channel 2	F1	4
700Ah	Load curve unit - SLOT B, channel 1	F1	4
700Eh	Load curve unit - SLOT B, channel 2	F1	4
7012h	Load curve unit - SLOT C, channel 1	F1	4
7016h	Load curve unit - SLOT C, channel 2	F1	4
701Ah	Load curve unit - SLOT D, channel 1	F1	4
701Eh	Load curve unit - SLOT D, channel 2	F1	4

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
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6.30 LOAD CURVES (R/-S-OUTAGE-PROOF)

2300h	Date	F15	2
2302h	Quantities set	F56	1
2303h	Event flags + LcId number	F72	1
2304h	Quantity 1	Signed 32-bit	2
2306h	Quantity 2	Signed 32-bit	2
...			
(consecutive blocks, max. size = 11,520 words)			

6.31 FIFO STACK OF LOAD CURVES (R/-S-OUTAGE-PROOF)

6300h	LcId (load curve identifier)	Uint16	1
6301h	Status word, load curve	F56	1
6302h	LcId start date	F15	2
6304h	LcId end date	F15	2
6306h	Load curve integration time	F55	1
6307h	(Not used)	-	1
6308h	Stack (index 1 to 31)	-	248

6.32 CONFIGURATION OF ANALOGUE INPUTS

6E34h	Slot A channel 1: minimum analogue input (mA)	Uint16	1
6E35h	Slot A channel 1: maximum analogue input (mA)	Uint16	1
6E36h	Slot A channel 1: value associated with the minimum analogue input	Signed 32-bit	2
6E38h	Slot A channel 1: value associated with the maximum analogue input	Signed 32-bit	2
6E3Ah	Label, slot A channel 1	F1	16
6E4Ah	Unit, slot A channel 1	F1	4
6E4Eh	Slot A channel 2: minimum analogue input (mA)	Uint16	1
6E4Fh	Slot A channel 2: maximum analogue input (mA)	Uint16	1
6E50h	Slot A channel 2: value associated with the minimum analogue input	Signed 32-bit	2
6E52h	Slot A channel 2: value associated with the maximum analogue input	Signed 32-bit	2
6E54h	Label, slot A channel 2	F1	16
6E64h	Unit, slot A channel 2	F1	4
6E68h	Slot B channel 1: minimum analogue input (mA)	Uint16	1
6E69h	Slot B channel 1: maximum analogue input (mA)	Uint16	1
6E6Ah	Slot B channel 1: value associated with the minimum analogue input	Signed 32-bit	2
6E6Ch	Slot B channel 1: value associated with the maximum analogue input	Signed 32-bit	2
6E6Eh	Label, slot B channel 1	F1	16
6E7Eh	Unit, slot B channel 1	F1	4
6E82h	Slot B channel 2: minimum analogue input (mA)	Uint16	1
6E83h	Slot B channel 2: maximum analogue input (mA)	Uint16	1
6E84h	Slot B channel 2: value associated with the minimum analogue input	Signed 32-bit	2
6E86h	Slot B channel 2: value associated with the maximum analogue input	Signed 32-bit	2
6E88h	Label, slot B channel 2	F1	16
6E98h	Unit, slot B channel 2	F1	4
6E9Ch	Slot C channel 1: minimum analogue input (mA)	Uint16	1
6E9Dh	Slot C channel 1: maximum analogue input (mA)	Uint16	1
6E9Eh	Slot C channel 1: value associated with the minimum analogue input	Signed 32-bit	2
6EA0h	Slot C channel 1: value associated with the maximum analogue input	Signed 32-bit	2
6EA2h	Label, slot C channel 1	F1	16
6EB2h	Unit, slot C channel 1	F1	4
6EB6h	Slot C channel 2: minimum analogue input (mA)	Uint16	1
6EB7h	Slot C channel 2: maximum analogue input (mA)	Uint16	1
6EB8h	Slot C channel 2: value associated with the minimum analogue input	Signed 32-bit	2
6EBAh	Slot C channel 2: value associated with the maximum analogue input	Signed 32-bit	2
6EBCh	Label, slot C channel 2	F1	16
6ECCh	Unit, slot C channel 2	F1	4

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
6ED0h	Slot D channel 1: minimum analogue input (mA)	Uint16	1
6ED1h	Slot D channel 1: maximum analogue input (mA)	Uint16	1
6ED2h	Slot D channel 1: value associated with the minimum analogue input	Signed 32-bit	2
6ED4h	Slot D channel 1: value associated with the maximum analogue input	Signed 32-bit	2
6ED6h	Label, slot D channel 1	F1	16
6EE6h	Unit, slot D channel 1	F1	4
6EEAh	Slot D channel 2: minimum analogue input (mA)	Uint16	1
6EEBh	Slot D channel 2: maximum analogue input (mA)	Uint16	1
6EECh	Slot D channel 2: value associated with the minimum analogue input	Signed 32-bit	2
6EEeh	Slot D channel 2: value associated with the maximum analogue input	Signed 32-bit	2
6EF0h	Label, slot D channel 2	F1	16
6F00h	Unit, slot D channel 2	F1	4

6.33 ANALOGUE INPUTS

0D68h	Value, slot A channel 1	Signed 32-bit	2
0D6Ah	Value, slot A channel 2	Signed 32-bit	2
0D6Ch	Value, slot B channel 1	Signed 32-bit	2
0D6Eh	Value, slot B channel 2	Signed 32-bit	2
0D70h	Value, slot C channel 1	Signed 32-bit	2
0D72h	Value, slot C channel 2	Signed 32-bit	2
0D74h	Value, slot D channel 1	Signed 32-bit	2
0D76h	Value, slot D channel 2	Signed 32-bit	2

6.34 CONFIGURATION, DIPS / OUTAGES / OVERVOLTAGE / OVERCURRENT (FOR ENERIUM 300 ONLY)

6DFAh	Activation of configuration of dips and outages V1	Unsigned	1
6DFBh	Activation of configuration of dips and outages V2	Unsigned	1
6DFCh	Activation of configuration of dips and outages V3	Unsigned	1
6DFDh	Activation of configuration of dips and outages U12	Unsigned	1
6DFEh	Activation of configuration of dips and outages U23	Unsigned	1
6DFFh	Activation of configuration of dips and outages U31	Unsigned	1
6E00h	Activation of configuration of dips and outages I1	Unsigned	1
6E01h	Activation of configuration of dips and outages I2	Unsigned	1
6E02h	Activation of configuration of dips and outages I3	Unsigned	1
6E03h	Voltage hysteresis in %	Unsigned	1
6E04h	Voltage outage threshold in % primary PT	Unsigned	1
6E05h	Voltage dip threshold in % primary PT	Unsigned	1
6E06h	Overvoltage threshold in % primary PT	Unsigned	1
6E07h	Current hysteresis in %	Unsigned	1
6E08h	RESERVED	Unsigned	1
6E09h	RESERVED	Unsigned	1
6E0Ah	Overcurrent threshold in % primary CT	Unsigned	1
6E0Ch	Threshold between very short outage and short outage in milliseconds	Unsigned	2
6E0Eh	Threshold between a short outage and long outage in milliseconds	Unsigned	2
6E10h	number of transitions for the detection of outages	Unsigned	1
6E11h	Reserved	-	1

6.35 DIPS / OUTAGES / OVERVOLTAGE / OVERCURRENT (FOR ENERIUM 300 ONLY)

8000h	Index of the last event	Unsigned	2
	Event 1		
8002h	Event start date (seconds)	Unsigned	2
8004h	Extension of the event start date (milliseconds)	Unsigned	1
8005h	Quantity	F67	1

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
8006h	Event duration in milliseconds	Unsigned	2
8008h	Extremum (in the quantity unit)	Unsigned	2
800Ah	Event type	F69	2
800Ch	Associated waveform identifier	Unsigned	2
800Eh	Event 2 at 1023	Event	1020
Event 1024			
AFF6h	Event start date (seconds)	Unsigned	2
AFF8h	Extension of the event start date (milliseconds)	Unsigned	1
AFF9h	Quantity	F67	1
AFFAh	Event duration in milliseconds	Unsigned	2
AFFCh	Extremum (in the quantity unit)	Unsigned	2
AFFEh	Event type	F69	2
B000h	Associated waveform identifier	Unsigned	2

6.36 DIPS / OUTAGES / OVERVOLTAGE / OVERCURRENT UNDERWAY (FOR ENERIUM 300 ONLY)

Event V1			
B002h	Event start date (seconds)	Unsigned	2
B004h	Extension of the event start date (milliseconds)	Unsigned	1
B005h	Quantity	F67	1
B006h	Event duration in milliseconds	Unsigned	2
B008h	Extremum (in the quantity unit)	Unsigned	2
B00Ah	Event type	F69	2
B00Ch	Associated waveform identifier	Unsigned	2
Event V2			
B00Eh	Event start date (seconds)	Unsigned	2
B010h	Extension of the event start date (milliseconds)	Unsigned	1
B011h	Quantity	F67	1
B012h	Event duration in milliseconds	Unsigned	2
B014h	Extremum (in the quantity unit)	Unsigned	2
B016h	Event type	F69	2
B018h	Associated waveform identifier	Unsigned	2
Event V3			
B01Ah	Event start date (seconds)	Unsigned	2
B01Ch	Extension of the event start date (milliseconds)	Unsigned	1
B01Dh	Quantity	F67	1
B01Eh	Event duration in milliseconds	Unsigned	2
B020h	Extremum (in the quantity unit)	Unsigned	2
B022h	Event type	F69	2
B024h	Associated waveform identifier	Unsigned	2
Event U12			
B026h	Event start date (seconds)	Unsigned	2
B028h	Extension of the event start date (milliseconds)	Unsigned	1
B029h	Quantity	F67	1
B02Ah	Event duration in milliseconds	Unsigned	2
B02Ch	Extremum (in the quantity unit)	Unsigned	2
B02Eh	Event type	F69	2
B030h	Associated waveform identifier	Unsigned	2
Event U23			
B032h	Event start date (seconds)	Unsigned	2
B034h	Extension of the event start date (milliseconds)	Unsigned	1
B035h	Quantity	F67	1
B036h	Event duration in milliseconds	Unsigned	2
B038h	Extremum (in the quantity unit)	Unsigned	2
B03Ah	Event type	F69	2
B03Ch	Associated waveform identifier	Unsigned	2
Event U31			
B03Eh	Event start date (seconds)	Unsigned	2
B040h	Extension of the event start date (milliseconds)	Unsigned	1
B041h	Quantity	F67	1

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
B042h	Event duration in milliseconds	Unsigned	2
B044h	Extremum (in the quantity unit)	Unsigned	2
B046h	Event type	F69	2
B048h	Associated waveform identifier	Unsigned	2
Event I1			
B04Ah	Event start date (seconds)	Unsigned	2
B04Ch	Extension of the event start date (milliseconds)	Unsigned	1
B04Dh	Quantity	F67	1
B04Eh	Event duration in milliseconds	Unsigned	2
B050h	Extremum (in the quantity unit)	Unsigned	2
B052h	Event type	F69	2
B054h	Associated waveform identifier	Unsigned	2
Event I2			
B056h	Event start date (seconds)	Unsigned	2
B058h	Extension of the event start date (milliseconds)	Unsigned	1
B059h	Quantity	F67	1
B05Ah	Event duration in milliseconds	Unsigned	2
B05Ch	Extremum (in the quantity unit)	Unsigned	2
B05Eh	Event type	F69	2
B060h	Associated waveform identifier	Unsigned	2
Event I3			
B062h	Event start date (seconds)	Unsigned	2
B064h	Extension of the event start date (milliseconds)	Unsigned	1
B065h	Quantity	F67	1
B066h	Event duration in milliseconds	Unsigned	2
B068h	Extremum (in the quantity unit)	Unsigned	2
B06Ah	Event type	F69	2
B06Ch	Associated waveform identifier	Unsigned	2

6.37 CONFIGURATION OF EN50160 STATISTICS TABLE (FOR ENERIUM 300 ONLY)

6D46h	Threshold 1, frequency compliance	Signed 1/10 (%)	1
6D47h	Threshold 2, frequency compliance	Signed 1/10 (%)	1
6D48h	Threshold 1, voltage compliance	Signed 1/10 (%)	1
6D49h	Threshold 2, voltage compliance	Signed 1/10 (%)	1
6D4Ah	Threshold, U Unbalance compliance	Signed 1/10 (%)	1
6D4Bh	Threshold, THD compliance	Signed 1/10 (%)	1
6D4Ch	Threshold, rank 2 harmonics compliance	Signed 1/10 (%)	1
6D4Dh	Threshold, rank 3 harmonics compliance	Signed 1/10 (%)	1
6D4Eh	Threshold, rank 4 harmonics compliance	Signed 1/10 (%)	1
6D4Fh	Threshold, rank 5 harmonics compliance	Signed 1/10 (%)	1
6D50h	Threshold, rank 6 harmonics compliance	Signed 1/10 (%)	1
6D51h	Threshold, rank 7 harmonics compliance	Signed 1/10 (%)	1
6D52h	Threshold, rank 8 harmonics compliance	Signed 1/10 (%)	1
6D53h	Threshold, rank 9 harmonics compliance	Signed 1/10 (%)	1
6D54h	Threshold, rank 10 harmonics compliance	Signed 1/10 (%)	1
6D55h	Threshold, rank 11 harmonics compliance	Signed 1/10 (%)	1
6D56h	Threshold, rank 12 harmonics compliance	Signed 1/10 (%)	1
6D57h	Threshold, rank 13 harmonics compliance	Signed 1/10 (%)	1
6D58h	Threshold, rank 14 harmonics compliance	Signed 1/10 (%)	1
6D59h	Threshold, rank 15 harmonics compliance	Signed 1/10 (%)	1
6D5Ah	Threshold, rank 16 harmonics compliance	Signed 1/10 (%)	1
6D5Bh	Threshold, rank 17 harmonics compliance	Signed 1/10 (%)	1
6D5Ch	Threshold, rank 18 harmonics compliance	Signed 1/10 (%)	1
6D5Dh	Threshold, rank 19 harmonics compliance	Signed 1/10 (%)	1
6D5Eh	Threshold, rank 20 harmonics compliance	Signed 1/10 (%)	1
6D5Fh	Threshold, rank 21 harmonics compliance	Signed 1/10 (%)	1
6D60h	Threshold, rank 22 harmonics compliance	Signed 1/10 (%)	1
6D61h	Threshold, rank 23 harmonics compliance	Signed 1/10 (%)	1

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
6D62h	Threshold, rank 24 harmonics compliance	Signed 1/10 (%)	1
6D63h	Threshold, rank 25 harmonics compliance	Signed 1/10 (%)	1
6D64h	Threshold 1, high frequency	Signed 1/10 (%)	1
6D65h	Threshold 1, low frequency	Signed 1/10 (%)	1
6D66h	Threshold 2, high frequency	Signed 1/10 (%)	1
6D67h	Threshold 2, low frequency	Signed 1/10 (%)	1
6D68h	Threshold 1, high voltage	Signed 1/10 (%)	1
6D69h	Threshold 1, low voltage	Signed 1/10 (%)	1
6D6Ah	Threshold 2, high voltage	Signed 1/10 (%)	1
6D6Bh	Threshold 2, low voltage	Signed 1/10 (%)	1
6D6Ch	Threshold, U unbalance	Signed 1/10 (%)	1
6D6Dh	THD threshold	Signed 1/10 (%)	1
6D6Eh	Threshold, rank 2 harmonics	Signed 1/10 (%)	1
6D6Fh	Threshold, rank 3 harmonics	Signed 1/10 (%)	1
6D70h	Threshold, rank 4 harmonics	Signed 1/10 (%)	1
6D71h	Threshold, rank 5 harmonics	Signed 1/10 (%)	1
6D72h	Threshold, rank 6 harmonics	Signed 1/10 (%)	1
6D73h	Threshold, rank 7 harmonics	Signed 1/10 (%)	1
6D74h	Threshold, rank 8 harmonics	Signed 1/10 (%)	1
6D75h	Threshold, rank 9 harmonics	Signed 1/10 (%)	1
6D76h	Threshold, rank 10 harmonics	Signed 1/10 (%)	1
6D77h	Threshold, rank 11 harmonics	Signed 1/10 (%)	1
6D78h	Threshold, rank 12 harmonics	Signed 1/10 (%)	1
6D79h	Threshold, rank 13 harmonics	Signed 1/10 (%)	1
6D7Ah	Threshold, rank 14 harmonics	Signed 1/10 (%)	1
6D7Bh	Threshold, rank 15 harmonics	Signed 1/10 (%)	1
6D7Ch	Threshold, rank 16 harmonics	Signed 1/10 (%)	1
6D7Dh	Threshold, rank 17 harmonics	Signed 1/10 (%)	1
6D7Eh	Threshold, rank 18 harmonics	Signed 1/10 (%)	1
6D7Fh	Threshold, rank 19 harmonics	Signed 1/10 (%)	1
6D80h	Threshold, rank 20 harmonics	Signed 1/10 (%)	1
6D81h	Threshold, rank 21 harmonics	Signed 1/10 (%)	1
6D82h	Threshold, rank 22 harmonics	Signed 1/10 (%)	1
6D83h	Threshold, rank 23 harmonics	Signed 1/10 (%)	1
6D84h	Threshold, rank 24 harmonics	Signed 1/10 (%)	1
6D85h	Threshold, rank 25 harmonics	Signed 1/10 (%)	1

6.38 EN50160 STATISTICS TABLE (FOR ENERIUM 300 ONLY)

B130h	Current week start date	Unsigned	2
B132h	Number of aggregation cycles for the current week	Unsigned	1
B133h	Number of 10s cycles calculated for the current week	Unsigned	1
B134h	Rate 1, frequency, current week	Unsigned 1/10000 (%)	2
B136h	Rate 2, frequency, current week	Unsigned 1/10000 (%)	2
B138h	Rate 1, V1, current week	Unsigned 1/100 (%)	1
B139h	Rate 2, V1, current week	Unsigned 1/100 (%)	1
B13Ah	Rate 1, V2, current week	Unsigned 1/100 (%)	1
B13Bh	Rate 2, V2, current week	Unsigned 1/100 (%)	1
B13Ch	Rate 1, V3, current week	Unsigned 1/100 (%)	1
B13Dh	Rate 2, V3, current week	Unsigned 1/100 (%)	1
B13Eh	Rate 1, U12, current week	Unsigned 1/100 (%)	1
B13Fh	Rate 2, U12, current week	Unsigned 1/100 (%)	1
B140h	Rate 1, U23, current week	Unsigned 1/100 (%)	1
B141h	Rate 2, U23, current week	Unsigned 1/100 (%)	1
B142h	Rate 1, U31, current week	Unsigned 1/100 (%)	1
B143h	Rate 2, U31, current week	Unsigned 1/100 (%)	1
B144h	U unbalance rate for current week	Unsigned 1/100 (%)	1
B145h	V1 THD rate for current week	Unsigned 1/100 (%)	1
B146h	V2 THD rate for current week	Unsigned 1/100 (%)	1
B147h	V3 THD rate for current week	Unsigned 1/100 (%)	1

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
B148h	U12 THD rate for current week	Unsigned 1/100 (%)	1
B149h	U23 THD rate for current week	Unsigned 1/100 (%)	1
B14Ah	U31 THD rate for current week	Unsigned 1/100 (%)	1
B14Bh	V1 harmonics 2 rate for current week	Unsigned 1/100 (%)	1
B14Ch	V1 harmonics 3 rate for current week	Unsigned 1/100 (%)	1
B14Dh	V1 harmonics 4 rate for current week	Unsigned 1/100 (%)	1
B14Eh	V1 harmonics 5 rate for current week	Unsigned 1/100 (%)	1
B14Fh	V1 harmonics 6 rate for current week	Unsigned 1/100 (%)	1
B150h	V1 harmonics 7 rate for current week	Unsigned 1/100 (%)	1
B151h	V1 harmonics 8 rate for current week	Unsigned 1/100 (%)	1
B152h	V1 harmonics 9 rate for current week	Unsigned 1/100 (%)	1
B153h	V1 harmonics 10 rate for current week	Unsigned 1/100 (%)	1
B154h	V1 harmonics 11 rate for current week	Unsigned 1/100 (%)	1
B155h	V1 harmonics 12 rate for current week	Unsigned 1/100 (%)	1
B156h	V1 harmonics 13 rate for current week	Unsigned 1/100 (%)	1
B157h	V1 harmonics 14 rate for current week	Unsigned 1/100 (%)	1
B158h	V1 harmonics 15 rate for current week	Unsigned 1/100 (%)	1
B159h	V1 harmonics 16 rate for current week	Unsigned 1/100 (%)	1
B15Ah	V1 harmonics 17 rate for current week	Unsigned 1/100 (%)	1
B15Bh	V1 harmonics 18 rate for current week	Unsigned 1/100 (%)	1
B15Ch	V1 harmonics 19 rate for current week	Unsigned 1/100 (%)	1
B15Dh	V1 harmonics 20 rate for current week	Unsigned 1/100 (%)	1
B15Eh	V1 harmonics 21 rate for current week	Unsigned 1/100 (%)	1
B15Fh	V1 harmonics 22 rate for current week	Unsigned 1/100 (%)	1
B160h	V1 harmonics 23 rate for current week	Unsigned 1/100 (%)	1
B161h	V1 harmonics 24 rate for current week	Unsigned 1/100 (%)	1
B162h	V1 harmonics 25 rate for current week	Unsigned 1/100 (%)	1
B163h	V2 harmonics 2 rate for current week	Unsigned 1/100 (%)	1
B164h	V2 harmonics 3 rate for current week	Unsigned 1/100 (%)	1
B165h	V2 harmonics 4 rate for current week	Unsigned 1/100 (%)	1
B166h	V2 harmonics 5 rate for current week	Unsigned 1/100 (%)	1
B167h	V2 harmonics 6 rate for current week	Unsigned 1/100 (%)	1
B168h	V2 harmonics 7 rate for current week	Unsigned 1/100 (%)	1
B169h	V2 harmonics 8 rate for current week	Unsigned 1/100 (%)	1
B16Ah	V2 harmonics 9 rate for current week	Unsigned 1/100 (%)	1
B16Bh	V2 harmonics 10 rate for current week	Unsigned 1/100 (%)	1
B16Ch	V2 harmonics 11 rate for current week	Unsigned 1/100 (%)	1
B16Dh	V2 harmonics 12 rate for current week	Unsigned 1/100 (%)	1
B16Eh	V2 harmonics 13 rate for current week	Unsigned 1/100 (%)	1
B16Fh	V2 harmonics 14 rate for current week	Unsigned 1/100 (%)	1
B170h	V2 harmonics 15 rate for current week	Unsigned 1/100 (%)	1
B171h	V2 harmonics 16 rate for current week	Unsigned 1/100 (%)	1
B172h	V2 harmonics 17 rate for current week	Unsigned 1/100 (%)	1
B173h	V2 harmonics 18 rate for current week	Unsigned 1/100 (%)	1
B174h	V2 harmonics 19 rate for current week	Unsigned 1/100 (%)	1
B175h	V2 harmonics 20 rate for current week	Unsigned 1/100 (%)	1
B176h	V2 harmonics 21 rate for current week	Unsigned 1/100 (%)	1
B177h	V2 harmonics 22 rate for current week	Unsigned 1/100 (%)	1
B178h	V2 harmonics 23 rate for current week	Unsigned 1/100 (%)	1
B179h	V2 harmonics 24 rate for current week	Unsigned 1/100 (%)	1
B17Ah	V2 harmonics 25 rate for current week	Unsigned 1/100 (%)	1
B17Bh	V3 harmonics 2 rate for current week	Unsigned 1/100 (%)	1
B17Ch	V3 harmonics 3 rate for current week	Unsigned 1/100 (%)	1
B17Dh	V3 harmonics 4 rate for current week	Unsigned 1/100 (%)	1
B17Eh	V3 harmonics 5 rate for current week	Unsigned 1/100 (%)	1
B17Fh	V3 harmonics 6 rate for current week	Unsigned 1/100 (%)	1
B180h	V3 harmonics 7 rate for current week	Unsigned 1/100 (%)	1
B181h	V3 harmonics 8 rate for current week	Unsigned 1/100 (%)	1
B182h	V3 harmonics 9 rate for current week	Unsigned 1/100 (%)	1
B183h	V3 harmonics 10 rate for current week	Unsigned 1/100 (%)	1
B184h	V3 harmonics 11 rate for current week	Unsigned 1/100 (%)	1
B185h	V3 harmonics 12 rate for current week	Unsigned 1/100 (%)	1

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
B186h	V3 harmonics 13 rate for current week	Unsigned 1/100 (%)	1
B187h	V3 harmonics 14 rate for current week	Unsigned 1/100 (%)	1
B188h	V3 harmonics 15 rate for current week	Unsigned 1/100 (%)	1
B189h	V3 harmonics 16 rate for current week	Unsigned 1/100 (%)	1
B18Ah	V3 harmonics 17 rate for current week	Unsigned 1/100 (%)	1
B18Bh	V3 harmonics 18 rate for current week	Unsigned 1/100 (%)	1
B18Ch	V3 harmonics 19 rate for current week	Unsigned 1/100 (%)	1
B18Dh	V3 harmonics 20 rate for current week	Unsigned 1/100 (%)	1
B18Eh	V3 harmonics 21 rate for current week	Unsigned 1/100 (%)	1
B18Fh	V3 harmonics 22 rate for current week	Unsigned 1/100 (%)	1
B190h	V3 harmonics 23 rate for current week	Unsigned 1/100 (%)	1
B191h	V3 harmonics 24 rate for current week	Unsigned 1/100 (%)	1
B192h	V3 harmonics 25 rate for current week	Unsigned 1/100 (%)	1
B193h	U12 harmonics 2 rate for current week	Unsigned 1/100 (%)	1
B194h	U12 harmonics 3 rate for current week	Unsigned 1/100 (%)	1
B195h	U12 harmonics 4 rate for current week	Unsigned 1/100 (%)	1
B196h	U12 harmonics 5 rate for current week	Unsigned 1/100 (%)	1
B197h	U12 harmonics 6 rate for current week	Unsigned 1/100 (%)	1
B198h	U12 harmonics 7 rate for current week	Unsigned 1/100 (%)	1
B199h	U12 harmonics 8 rate for current week	Unsigned 1/100 (%)	1
B19Ah	U12 harmonics 9 rate for current week	Unsigned 1/100 (%)	1
B19Bh	U12 harmonics 10 rate for current week	Unsigned 1/100 (%)	1
B19Ch	U12 harmonics 11 rate for current week	Unsigned 1/100 (%)	1
B19Dh	U12 harmonics 12 rate for current week	Unsigned 1/100 (%)	1
B19Eh	U12 harmonics 13 rate for current week	Unsigned 1/100 (%)	1
B19Fh	U12 harmonics 14 rate for current week	Unsigned 1/100 (%)	1
B1A0h	U12 harmonics 15 rate for current week	Unsigned 1/100 (%)	1
B1A1h	U12 harmonics 16 rate for current week	Unsigned 1/100 (%)	1
B1A2h	U12 harmonics 17 rate for current week	Unsigned 1/100 (%)	1
B1A3h	U12 harmonics 18 rate for current week	Unsigned 1/100 (%)	1
B1A4h	U12 harmonics 19 rate for current week	Unsigned 1/100 (%)	1
B1A5h	U12 harmonics 20 rate for current week	Unsigned 1/100 (%)	1
B1A6h	U12 harmonics 21 rate for current week	Unsigned 1/100 (%)	1
B1A7h	U12 harmonics 22 rate for current week	Unsigned 1/100 (%)	1
B1A8h	U12 harmonics 23 rate for current week	Unsigned 1/100 (%)	1
B1A9h	U12 harmonics 24 rate for current week	Unsigned 1/100 (%)	1
B1AAh	U12 harmonics 25 rate for current week	Unsigned 1/100 (%)	1
B1ABh	U23 harmonics 2 rate for current week	Unsigned 1/100 (%)	1
B1ACH	U23 harmonics 3 rate for current week	Unsigned 1/100 (%)	1
B1ADh	U23 harmonics 4 rate for current week	Unsigned 1/100 (%)	1
B1AEh	U23 harmonics 5 rate for current week	Unsigned 1/100 (%)	1
B1AFh	U23 harmonics 6 rate for current week	Unsigned 1/100 (%)	1
B1B0h	U23 harmonics 7 rate for current week	Unsigned 1/100 (%)	1
B1B1h	U23 harmonics 8 rate for current week	Unsigned 1/100 (%)	1
B1B2h	U23 harmonics 9 rate for current week	Unsigned 1/100 (%)	1
B1B3h	U23 harmonics 10 rate for current week	Unsigned 1/100 (%)	1
B1B4h	U23 harmonics 11 rate for current week	Unsigned 1/100 (%)	1
B1B5h	U23 harmonics 12 rate for current week	Unsigned 1/100 (%)	1
B1B6h	U23 harmonics 13 rate for current week	Unsigned 1/100 (%)	1
B1B7h	U23 harmonics 14 rate for current week	Unsigned 1/100 (%)	1
B1B8h	U23 harmonics 15 rate for current week	Unsigned 1/100 (%)	1
B1B9h	U23 harmonics 16 rate for current week	Unsigned 1/100 (%)	1
B1BAh	U23 harmonics 17 rate for current week	Unsigned 1/100 (%)	1
B1BBh	U23 harmonics 18 rate for current week	Unsigned 1/100 (%)	1
B1BCh	U23 harmonics 19 rate for current week	Unsigned 1/100 (%)	1
B1BDh	U23 harmonics 20 rate for current week	Unsigned 1/100 (%)	1
B1BEh	U23 harmonics 21 rate for current week	Unsigned 1/100 (%)	1
B1BFh	U23 harmonics 22 rate for current week	Unsigned 1/100 (%)	1
B1C0h	U23 harmonics 23 rate for current week	Unsigned 1/100 (%)	1
B1C1h	U23 harmonics 24 rate for current week	Unsigned 1/100 (%)	1
B1C2h	U23 harmonics 25 rate for current week	Unsigned 1/100 (%)	1
B1C3h	U31 harmonics 2 rate for current week	Unsigned 1/100 (%)	1

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
B1C4h	U31 harmonics 3 rate for current week	Unsigned 1/100 (%)	1
B1C5h	U31 harmonics 4 rate for current week	Unsigned 1/100 (%)	1
B1C6h	U31 harmonics 5 rate for current week	Unsigned 1/100 (%)	1
B1C7h	U31 harmonics 6 rate for current week	Unsigned 1/100 (%)	1
B1C8h	U31 harmonics 7 rate for current week	Unsigned 1/100 (%)	1
B1C9h	U31 harmonics 8 rate for current week	Unsigned 1/100 (%)	1
B1CAh	U31 harmonics 9 rate for current week	Unsigned 1/100 (%)	1
B1CBh	U31 harmonics 10 rate for current week	Unsigned 1/100 (%)	1
B1CCh	U31 harmonics 11 rate for current week	Unsigned 1/100 (%)	1
B1CDh	U31 harmonics 12 rate for current week	Unsigned 1/100 (%)	1
B1CEh	U31 harmonics 13 rate for current week	Unsigned 1/100 (%)	1
B1CFh	U31 harmonics 14 rate for current week	Unsigned 1/100 (%)	1
B1D0h	U31 harmonics 15 rate for current week	Unsigned 1/100 (%)	1
B1D1h	U31 harmonics 16 rate for current week	Unsigned 1/100 (%)	1
B1D2h	U31 harmonics 17 rate for current week	Unsigned 1/100 (%)	1
B1D3h	U31 harmonics 18 rate for current week	Unsigned 1/100 (%)	1
B1D4h	U31 harmonics 19 rate for current week	Unsigned 1/100 (%)	1
B1D5h	U31 harmonics 20 rate for current week	Unsigned 1/100 (%)	1
B1D6h	U31 harmonics 21 rate for current week	Unsigned 1/100 (%)	1
B1D7h	U31 harmonics 22 rate for current week	Unsigned 1/100 (%)	1
B1D8h	U31 harmonics 23 rate for current week	Unsigned 1/100 (%)	1
B1D9h	U31 harmonics 24 rate for current week	Unsigned 1/100 (%)	1
B1DAh	U31 harmonics 25 rate for current week	Unsigned 1/100 (%)	1
B1DBh	Value of aggregation period for the current week	F33	1
B1DCh	Type of wiring used for the Stats for the current week	F74	1
B1DEh	Start date of week minus 1	Unsigned	2
B1E0h	Number of aggregation cycles for the week minus 1	Unsigned	1
B1E1h	Number of 10s cycles calculated for the week minus 1	Unsigned	1
B1E2h	Rate 1, frequency, week minus 1	Unsigned 1/10000 (%)	2
B1E4h	Rate 2, frequency, week minus 1	Unsigned 1/10000 (%)	2
B1E6h	Rate 1, V1, week minus 1	Unsigned 1/100 (%)	1
B1E7h	Rate 2, V1, week minus 1	Unsigned 1/100 (%)	1
B1E8h	Rate 1, V2, week minus 1	Unsigned 1/100 (%)	1
B1E9h	Rate 2, V2, week minus 1	Unsigned 1/100 (%)	1
B1EAh	Rate 1, V3, week minus 1	Unsigned 1/100 (%)	1
B1EBh	Rate 2, V3, week minus 1	Unsigned 1/100 (%)	1
B1ECh	Rate 1, U12, week minus 1	Unsigned 1/100 (%)	1
B1EDh	Rate 2, U12, week minus 1	Unsigned 1/100 (%)	1
B1EEh	Rate 1, U23, week minus 1	Unsigned 1/100 (%)	1
B1EFh	Rate 2, U23, week minus 1	Unsigned 1/100 (%)	1
B1F0h	Rate 1, U31, week minus 1	Unsigned 1/100 (%)	1
B1F1h	Rate 2, U31, week minus 1	Unsigned 1/100 (%)	1
B1F2h	U unbalance rate for week minus 1	Unsigned 1/100 (%)	1
B1F3h	V1 THD rate for week minus 1	Unsigned 1/100 (%)	1
B1F4h	V2 THD rate for week minus 1	Unsigned 1/100 (%)	1
B1F5h	V3 THD rate for week minus 1	Unsigned 1/100 (%)	1
B1F6h	U12 THD rate for week minus 1	Unsigned 1/100 (%)	1
B1F7h	U23 THD rate for week minus 1	Unsigned 1/100 (%)	1
B1F8h	U31 THD rate for week minus 1	Unsigned 1/100 (%)	1
B1F9h	V1 harmonics 2 rate for week minus 1	Unsigned 1/100 (%)	1
B1FAh	V1 harmonics 3 rate for week minus 1	Unsigned 1/100 (%)	1
B1FBh	V1 harmonics 4 rate for week minus 1	Unsigned 1/100 (%)	1
B1FCh	V1 harmonics 5 rate for week minus 1	Unsigned 1/100 (%)	1
B1FDh	V1 harmonics 6 rate for week minus 1	Unsigned 1/100 (%)	1
B1FEh	V1 harmonics 7 rate for week minus 1	Unsigned 1/100 (%)	1
B1FFh	V1 harmonics 8 rate for week minus 1	Unsigned 1/100 (%)	1
B200h	V1 harmonics 9 rate for week minus 1	Unsigned 1/100 (%)	1
B201h	V1 harmonics 10 rate for week minus 1	Unsigned 1/100 (%)	1
B202h	V1 harmonics 11 rate for week minus 1	Unsigned 1/100 (%)	1
B203h	V1 harmonics 12 rate for week minus 1	Unsigned 1/100 (%)	1
B204h	V1 harmonics 13 rate for week minus 1	Unsigned 1/100 (%)	1
B205h	V1 harmonics 14 rate for week minus 1	Unsigned 1/100 (%)	1

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
B206h	V1 harmonics 15 rate for week minus 1	Unsigned 1/100 (%)	1
B207h	V1 harmonics 16 rate for week minus 1	Unsigned 1/100 (%)	1
B208h	V1 harmonics 17 rate for week minus 1	Unsigned 1/100 (%)	1
B209h	V1 harmonics 18 rate for week minus 1	Unsigned 1/100 (%)	1
B20Ah	V1 harmonics 19 rate for week minus 1	Unsigned 1/100 (%)	1
B20Bh	V1 harmonics 20 rate for week minus 1	Unsigned 1/100 (%)	1
B20Ch	V1 harmonics 21 rate for week minus 1	Unsigned 1/100 (%)	1
B20Dh	V1 harmonics 22 rate for week minus 1	Unsigned 1/100 (%)	1
B20Eh	V1 harmonics 23 rate for week minus 1	Unsigned 1/100 (%)	1
B20Fh	V1 harmonics 24 rate for week minus 1	Unsigned 1/100 (%)	1
B210h	V1 harmonics 25 rate for week minus 1	Unsigned 1/100 (%)	1
B211h	V2 harmonics 2 rate for week minus 1	Unsigned 1/100 (%)	1
B212h	V2 harmonics 3 rate for week minus 1	Unsigned 1/100 (%)	1
B213h	V2 harmonics 4 rate for week minus 1	Unsigned 1/100 (%)	1
B214h	V2 harmonics 5 rate for week minus 1	Unsigned 1/100 (%)	1
B215h	V2 harmonics 6 rate for week minus 1	Unsigned 1/100 (%)	1
B216h	V2 harmonics 7 rate for week minus 1	Unsigned 1/100 (%)	1
B217h	V2 harmonics 8 rate for week minus 1	Unsigned 1/100 (%)	1
B218h	V2 harmonics 9 rate for week minus 1	Unsigned 1/100 (%)	1
B219h	V2 harmonics 10 rate for week minus 1	Unsigned 1/100 (%)	1
B21Ah	V2 harmonics 11 rate for week minus 1	Unsigned 1/100 (%)	1
B21Bh	V2 harmonics 12 rate for week minus 1	Unsigned 1/100 (%)	1
B21Ch	V2 harmonics 13 rate for week minus 1	Unsigned 1/100 (%)	1
B21Dh	V2 harmonics 14 rate for week minus 1	Unsigned 1/100 (%)	1
B21Eh	V2 harmonics 15 rate for week minus 1	Unsigned 1/100 (%)	1
B21Fh	V2 harmonics 16 rate for week minus 1	Unsigned 1/100 (%)	1
B220h	V2 harmonics 17 rate for week minus 1	Unsigned 1/100 (%)	1
B221h	V2 harmonics 18 rate for week minus 1	Unsigned 1/100 (%)	1
B222h	V2 harmonics 19 rate for week minus 1	Unsigned 1/100 (%)	1
B223h	V2 harmonics 20 rate for week minus 1	Unsigned 1/100 (%)	1
B224h	V2 harmonics 21 rate for week minus 1	Unsigned 1/100 (%)	1
B225h	V2 harmonics 22 rate for week minus 1	Unsigned 1/100 (%)	1
B226h	V2 harmonics 23 rate for week minus 1	Unsigned 1/100 (%)	1
B227h	V2 harmonics 24 rate for week minus 1	Unsigned 1/100 (%)	1
B228h	V2 harmonics 25 rate for week minus 1	Unsigned 1/100 (%)	1
B229h	V3 harmonics 2 rate for week minus 1	Unsigned 1/100 (%)	1
B22Ah	V3 harmonics 3 rate for week minus 1	Unsigned 1/100 (%)	1
B22Bh	V3 harmonics 4 rate for week minus 1	Unsigned 1/100 (%)	1
B22Ch	V3 harmonics 5 rate for week minus 1	Unsigned 1/100 (%)	1
B22Dh	V3 harmonics 6 rate for week minus 1	Unsigned 1/100 (%)	1
B22Eh	V3 harmonics 7 rate for week minus 1	Unsigned 1/100 (%)	1
B22Fh	V3 harmonics 8 rate for week minus 1	Unsigned 1/100 (%)	1
B230h	V3 harmonics 9 rate for week minus 1	Unsigned 1/100 (%)	1
B231h	V3 harmonics 10 rate for week minus 1	Unsigned 1/100 (%)	1
B232h	V3 harmonics 11 rate for week minus 1	Unsigned 1/100 (%)	1
B233h	V3 harmonics 12 rate for week minus 1	Unsigned 1/100 (%)	1
B234h	V3 harmonics 13 rate for week minus 1	Unsigned 1/100 (%)	1
B235h	V3 harmonics 14 rate for week minus 1	Unsigned 1/100 (%)	1
B236h	V3 harmonics 15 rate for week minus 1	Unsigned 1/100 (%)	1
B237h	V3 harmonics 16 rate for week minus 1	Unsigned 1/100 (%)	1
B238h	V3 harmonics 17 rate for week minus 1	Unsigned 1/100 (%)	1
B239h	V3 harmonics 18 rate for week minus 1	Unsigned 1/100 (%)	1
B23Ah	V3 harmonics 19 rate for week minus 1	Unsigned 1/100 (%)	1
B23Bh	V3 harmonics 20 rate for week minus 1	Unsigned 1/100 (%)	1
B23Ch	V3 harmonics 21 rate for week minus 1	Unsigned 1/100 (%)	1
B23Dh	V3 harmonics 22 rate for week minus 1	Unsigned 1/100 (%)	1
B23Eh	V3 harmonics 23 rate for week minus 1	Unsigned 1/100 (%)	1
B23Fh	V3 harmonics 24 rate for week minus 1	Unsigned 1/100 (%)	1
B240h	V3 harmonics 25 rate for week minus 1	Unsigned 1/100 (%)	1
B241h	U12 harmonics 2 rate for week minus 1	Unsigned 1/100 (%)	1
B242h	U12 harmonics 3 rate for week minus 1	Unsigned 1/100 (%)	1
B243h	U12 harmonics 4 rate for week minus 1	Unsigned 1/100 (%)	1

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
B244h	U12 harmonics 5 rate for week minus 1	Unsigned 1/100 (%)	1
B245h	U12 harmonics 6 rate for week minus 1	Unsigned 1/100 (%)	1
B246h	U12 harmonics 7 rate for week minus 1	Unsigned 1/100 (%)	1
B247h	U12 harmonics 8 rate for week minus 1	Unsigned 1/100 (%)	1
B248h	U12 harmonics 9 rate for week minus 1	Unsigned 1/100 (%)	1
B249h	U12 harmonics 10 rate for week minus 1	Unsigned 1/100 (%)	1
B24Ah	U12 harmonics 11 rate for week minus 1	Unsigned 1/100 (%)	1
B24Bh	U12 harmonics 12 rate for week minus 1	Unsigned 1/100 (%)	1
B24Ch	U12 harmonics 13 rate for week minus 1	Unsigned 1/100 (%)	1
B24Dh	U12 harmonics 14 rate for week minus 1	Unsigned 1/100 (%)	1
B24Eh	U12 harmonics 15 rate for week minus 1	Unsigned 1/100 (%)	1
B24Fh	U12 harmonics 16 rate for week minus 1	Unsigned 1/100 (%)	1
B250h	U12 harmonics 17 rate for week minus 1	Unsigned 1/100 (%)	1
B251h	U12 harmonics 18 rate for week minus 1	Unsigned 1/100 (%)	1
B252h	U12 harmonics 19 rate for week minus 1	Unsigned 1/100 (%)	1
B253h	U12 harmonics 20 rate for week minus 1	Unsigned 1/100 (%)	1
B254h	U12 harmonics 21 rate for week minus 1	Unsigned 1/100 (%)	1
B255h	U12 harmonics 22 rate for week minus 1	Unsigned 1/100 (%)	1
B256h	U12 harmonics 23 rate for week minus 1	Unsigned 1/100 (%)	1
B257h	U12 harmonics 24 rate for week minus 1	Unsigned 1/100 (%)	1
B258h	U12 harmonics 25 rate for week minus 1	Unsigned 1/100 (%)	1
B259h	U23 harmonics 2 rate for week minus 1	Unsigned 1/100 (%)	1
B25Ah	U23 harmonics 3 rate for week minus 1	Unsigned 1/100 (%)	1
B25Bh	U23 harmonics 4 rate for week minus 1	Unsigned 1/100 (%)	1
B25Ch	U23 harmonics 5 rate for week minus 1	Unsigned 1/100 (%)	1
B25Dh	U23 harmonics 6 rate for week minus 1	Unsigned 1/100 (%)	1
B25Eh	U23 harmonics 7 rate for week minus 1	Unsigned 1/100 (%)	1
B25Fh	U23 harmonics 8 rate for week minus 1	Unsigned 1/100 (%)	1
B260h	U23 harmonics 9 rate for week minus 1	Unsigned 1/100 (%)	1
B261h	U23 harmonics 10 rate for week minus 1	Unsigned 1/100 (%)	1
B262h	U23 harmonics 11 rate for week minus 1	Unsigned 1/100 (%)	1
B263h	U23 harmonics 12 rate for week minus 1	Unsigned 1/100 (%)	1
B264h	U23 harmonics 13 rate for week minus 1	Unsigned 1/100 (%)	1
B265h	U23 harmonics 14 rate for week minus 1	Unsigned 1/100 (%)	1
B266h	U23 harmonics 15 rate for week minus 1	Unsigned 1/100 (%)	1
B267h	U23 harmonics 16 rate for week minus 1	Unsigned 1/100 (%)	1
B268h	U23 harmonics 17 rate for week minus 1	Unsigned 1/100 (%)	1
B269h	U23 harmonics 18 rate for week minus 1	Unsigned 1/100 (%)	1
B26Ah	U23 harmonics 19 rate for week minus 1	Unsigned 1/100 (%)	1
B26Bh	U23 harmonics 20 rate for week minus 1	Unsigned 1/100 (%)	1
B26Ch	U23 harmonics 21 rate for week minus 1	Unsigned 1/100 (%)	1
B26Dh	U23 harmonics 22 rate for week minus 1	Unsigned 1/100 (%)	1
B26Eh	U23 harmonics 23 rate for week minus 1	Unsigned 1/100 (%)	1
B26Fh	U23 harmonics 24 rate for week minus 1	Unsigned 1/100 (%)	1
B270h	U23 harmonics 25 rate for week minus 1	Unsigned 1/100 (%)	1
B271h	U31 harmonics 2 rate for week minus 1	Unsigned 1/100 (%)	1
B272h	U31 harmonics 3 rate for week minus 1	Unsigned 1/100 (%)	1
B273h	U31 harmonics 4 rate for week minus 1	Unsigned 1/100 (%)	1
B274h	U31 harmonics 5 rate for week minus 1	Unsigned 1/100 (%)	1
B275h	U31 harmonics 6 rate for week minus 1	Unsigned 1/100 (%)	1
B276h	U31 harmonics 7 rate for week minus 1	Unsigned 1/100 (%)	1
B277h	U31 harmonics 8 rate for week minus 1	Unsigned 1/100 (%)	1
B278h	U31 harmonics 9 rate for week minus 1	Unsigned 1/100 (%)	1
B279h	U31 harmonics 10 rate for week minus 1	Unsigned 1/100 (%)	1
B27Ah	U31 harmonics 11 rate for week minus 1	Unsigned 1/100 (%)	1
B27Bh	U31 harmonics 12 rate for week minus 1	Unsigned 1/100 (%)	1
B27Ch	U31 harmonics 13 rate for week minus 1	Unsigned 1/100 (%)	1
B27Dh	U31 harmonics 14 rate for week minus 1	Unsigned 1/100 (%)	1
B27Eh	U31 harmonics 15 rate for week minus 1	Unsigned 1/100 (%)	1
B27Fh	U31 harmonics 16 rate for week minus 1	Unsigned 1/100 (%)	1
B280h	U31 harmonics 17 rate for week minus 1	Unsigned 1/100 (%)	1
B281h	U31 harmonics 18 rate for week minus 1	Unsigned 1/100 (%)	1

Address (hex)	Name of MODBUS quantity	Format or precision	Size (words)
B282h	U31 harmonics 19 rate for week minus 1	Unsigned 1/100 (%)	1
B283h	U31 harmonics 20 rate for week minus 1	Unsigned 1/100 (%)	1
B284h	U31 harmonics 21 rate for week minus 1	Unsigned 1/100 (%)	1
B285h	U31 harmonics 22 rate for week minus 1	Unsigned 1/100 (%)	1
B286h	U31 harmonics 23 rate for week minus 1	Unsigned 1/100 (%)	1
B287h	U31 harmonics 24 rate for week minus 1	Unsigned 1/100 (%)	1
B288h	U31 harmonics 25 rate for week minus 1	Unsigned 1/100 (%)	1
B289h	Value of aggregation period for the week minus 1	F33	1
B28Ah	Type of wiring used for the Stats for the week minus 1	F74	1

6.39 CONFIGURATION OF WAVEFORMS (FOR ENERIUM 300 ONLY)

6FE0h	Quantity No. 1	F75	1
6FE1h	Quantity No. 2	F75	1
6FE2h	Quantity No. 3	F75	1
6FE3h	Quantity No. 4	F75	1
6FE4h	Command Word Activation	F63	1
6FE5h	Sync Input Activation	F63	1
6FE6h	RESERVED (always at 0)		1
6FE7h	RESERVED		1
6FE8h	Dips Activation	F63	1
6FE9h	Very short outage activation	F63	1
6FEAh	Short outage activation	F63	1
6FEBh	Long outage activation	F63	1
6FECb	Very short outage preceded by a dip activation	F63	1
6FEDh	Short outage preceded by a dip activation	F63	1
6FEEh	Long outage preceded by a dip activation	F63	1
6FEFh	RESERVED (always at 0)		1
6FF0h	RESERVED (always at 0)		1
6FF1h	Overvoltage Activation	F63	1
6FF2h	Overcurrent Activation	F63	1

6.40 WAVEFORMS (FOR ENERIUM 300 ONLY)

B28Ch	Last waveform identifier	Unsigned	2
Waveform No. 1			
B28Eh	Waveform identifier	Unsigned	2
B290h	Duration (in milliseconds)	Unsigned	2
B292h	Start date (in seconds)	Unsigned	2
B294h	Extension of the start date (in milliseconds)	Unsigned	1
B295h	Information	F77	1
B296h	Number of points per cycle	Unsigned	1
B297h	Number of cycles	Unsigned	1
B299h	Duration of cycle outage (between cycle No. 146 and No. 147) (in milliseconds)	Unsigned	2
ADDRESS (HEX)	NAME OF THE MODBUS QUANTITY	FORMAT OR PRECISION	SIZE (WORDS)
B29Ah	Number of quantities contained in the waveform	Unsigned	1
B29Bh	Quantity No. 1	F75	1
B29Ch	Quantity No. 2	F75	1
B29Dh	Quantity No. 3	F75	1
B29Eh	Quantity No. 4	F75	1
B29Fh	Type of trigger	F76	1
B2A0h	Dip / outage triggering event	F78	2
Waveform No. 16			
B3BAh	Waveform identifier	Unsigned	2
B3BCh	Duration (in milliseconds)	Unsigned	2
B3BEh	Start date (in seconds)	Unsigned	2

B3C0h	Extension of the start date (in milliseconds)	Unsigned	1
B3C1h	Information	F77	1
B3C2h	Number of points per cycle	Unsigned	1
B3C3h	Number of cycles	Unsigned	1
B3C4h	Duration of cycle outage (between cycle No. 146 and No. 147) (in milliseconds)	Unsigned	2
B3C6h	Number of quantities contained in the waveform	Unsigned	1
B3C7h	Quantity No. 1	F75	1
B3C8h	Quantity No. 2	F75	1
B3C9h	Quantity No. 3	F75	1
B3CAh	Quantity No. 4	F75	1
B3CBh	Type of trigger	F76	1
B3CCh	Dip / outage triggering event	F78	2



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