WM30-WM40

COMMUNICATION PROTOCOL

Internal version
rev. 2.2.1

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Index

1 COMMUNICATION PROTOCOL

1.1 Introduction

For a complete description of the MODBUS protocol refer to "Modbus_Application_Protocol_V1_1a.pdf" and "Modbus_Messaging_Implementation_Guide_V1_0a.pdf" documents that can be download from the www.modbus.org web site.

1.2 MODBUS functions

These functions are available on WM30:

1. Reading of n "Holding Registers" (code 03h)
2. Reading of n "Input Register" (code 04h)
3. Writing of one "Holding Registers" (code 06h)
4. Writing of multiple register (code 10h)
5. Diagnostic (code 08h with sub-function code 00h)
6. Reading of "record file" (code 14h with sub-code 06h)
7. Reading of n "Special Registers" (code 42h)
8. Broadcast mode (writing instruction on address 00h)

IMPORTANT:

1. In this document the "Modbus address" field is indicated in two mode:
   a. "**Modicon address**" : it is the "6 digit Modicom" representation with Modbus function code 04 (Read Input Registers) . It is possible to read the same values with function code 03 (Read Holding Register) substituting the first digit with number "4".
2. "**Physical address**": it is the "word address" value included in the communication frame.
3. The functions 03h and 04h have exactly the same effect.
4. The communication parameters must be set in according to the configuration of the instrument (refer to WM30 instruction manual)

1.2.1 Function 03h (Read holding registers)

This function code is used to read the contents of a contiguous block of holding registers (word). The Request frame specifies the starting register address and the number of registers to be read. It is possible to read maximum 125 register (word) with a single request.
The register data in the response message are packed as two bytes per register (word), with the binary contents right justified within each byte. For each register, the first byte contains the high order bits (MSB) and the second contains the low order bits (LSB).

Request frame

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	
Function code	1 byte	03h	
Starting Address	2 bytes	0000h to FFFFh	Byte order: MSB, LSB
Quantity of Registers (**N** word)	2 bytes	1 to 7Dh (1 to 125)	Byte order: MSB, LSB
CRC	2 bytes		

Response frame (correct action)

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	
Function code	1 byte	03h	
Byte count	1 byte	**N** word * 2	
Register value	**N***2 bytes		Byte order: MSB, LSB
CRC	2 bytes		

Response frame (incorrect action)

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	Possible exception : 01h: illegal function 02h: illegal data address 03h: illegal data value 04h: slave device failure
Function code	1 byte	83h	
Exception code	1 byte	01h, 02h, 03h, 04h	
CRC	2 bytes		

1.2.2 Function 04h (Read input registers)

This function code is used to read the contents of a contiguous block of input registers (word). The Request frame specifies the starting register address and the number of registers to be read. It is possible to read maximum 125 register (word) with a single request.
The register data in the response message are packed as two bytes per register (word), with the binary contents right justified within each byte. For each register, the first byte contains the high order bits (MSB) and the second contains the low order bits (LSB).

Request frame

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	
Function code	1 byte	04h	
Starting Address	2 bytes	0000h to FFFFh	Byte order: MSB, LSB
Quantity of Registers (**N** word)	2 bytes	1 to 7Dh (1 to 125)	Byte order: MSB, LSB
CRC	2 bytes		

Response frame (correct action)

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	
Function code	1 byte	04h	
Byte count	1 byte	**N** word * 2	
Register value	**N***2 bytes		Byte order: MSB, LSB
CRC	2 bytes		

Response frame (incorrect action)

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	Possible exception : 01h: illegal function 02h: illegal data address 03h: illegal data value 04h: slave device failure
Function code	1 byte	84h	
Exception code	1 byte	01h, 02h, 03h, 04h	
CRC	2 bytes		

1.2.3 Function 06h (Write single holding register)

This function code is used to write a single holding register. The Request frame specifies the address of the register (word) to be written and its contents.
The correct response is an echo of the request, returned after the register contents have been written.

Request frame

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	
Function code	1 byte	06h	
Starting Address	2 bytes	0000h to FFFFh	Byte order: MSB, LSB
Register value	2 bytes	0000h to FFFFh	Byte order: MSB, LSB
CRC	2 bytes		

Response frame (correct action)

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	
Function code	1 byte	06h	
Starting Address	2 bytes	0000h to FFFFh	
Register value	2 bytes	0000h to FFFFh	Byte order: MSB, LSB
CRC	2 bytes		

Response frame (incorrect action)

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	Possible exception :
Function code	1 byte	86h	01h: illegal function

Exception code	1 byte	01h, 02h, 03h, 04h	02h: illegal data address 03h: illegal data value 04h: slave device failure
CRC	2 bytes		

1.2.4 Function 10h (Write multiple register)

This function code is used to write a block of contiguous registers (maximum 120). The requested values to be written are specified in the request data field. Data is packed as two bytes per register.
The correct response returns the function code, starting address, and the quantity of written registers.

Request frame

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	
Function code	1 byte	10h	
Starting Address	2 bytes	0000h to FFFFh	Byte order: MSB, LSB
Quantity of Registers (**N** word)	2 bytes	0001h to 0078h	Byte order: MSB, LSB
Byte count	1 byte	**N** word * 2	
Register value	**N** * 2 bytes	value	Byte order: MSB, LSB
CRC	2 bytes		

Response frame (correct action)

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	
Function code	1 byte	10h	
Starting Address	2 bytes	0000h to FFFFh	Byte order: MSB, LSB
Quantity of Registers (**N** word)	2 bytes	0001h to 0078h	Byte order: MSB, LSB
CRC	2 bytes		

Response frame (incorrect action)

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	Possible exception : 01h: illegal function 02h: illegal data address 03h: illegal data value 04h: slave device failure
Function code	1 byte	90h	
Exception code	1 byte	01h, 02h, 03h, 04h	
CRC	2 bytes		

1.2.5 Function 08h (Diagnostic with sub-function code 00h)

MODBUS function code 08h provides a series of tests to check the communication system between a client (Master) device and a server (Slave), or to check various internal error conditions within a server.
VMU supports only 0000h sub-function code (Return Query Data). With this sub-function the data passed in the request data field is to be returned (looped back) in the response. The entire response message should be identical to the request.

Request frame

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	
Function code	1 byte	08h	
Sub-function	2 bytes	0000h	
Data (**N** word)	2 bytes	**N** word * 2	Byte order: MSB, LSB
CRC	2 bytes		

Response frame (correct action)

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	
Function code	1 byte	08h	
Sub-function	2 bytes	0000h	
Data (**N** word)	2 bytes	**N** word * 2	Byte order: MSB, LSB
CRC	2 bytes		

Response frame (incorrect action)

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	Possible exception : 01h: illegal function 02h: illegal data address 03h: illegal data value 04h: slave device failure
Function code	1 byte	88h	
Exception code	1 byte	01h, 02h, 03h, 04h	
CRC	2 bytes		

1.2.6 Function 14h with sub-function 06h (Reading of record file)

This function code is used to perform a record file read. All Request Data Lengths are provided in terms of number of bytes and all Record Lengths are provided in terms of registers.
A file is set of records. Each file contains 10000 records, addressed from 0 to 9999.
The function can read multiple groups of references. The groups can be separated (non-contiguous), but the references within each group must be sequential. Each group is defined in a separate 'sub-request' field that contains 7 bytes:
The reference type: 1 byte (must be specified as 6)
The file number: 2 bytes
The starting record number within the file: 2 bytes
The length of the record to be read: 2 bytes.
The quantity of registers to be read, combined with all other fields in the expected response, must not exceed the allowable length of the MODBUS PDU: 253 bytes.
The normal response is a series of 'sub-responses', one for each 'sub-request'. The byte count field is the total combined count of bytes in all 'sub-responses'. In addition, each 'sub-response'contains a field that shows its own byte count.

Request frame

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	
Function code	1 byte	14h	
Byte count	1 byte	07h to F5h bytes	
1°Sub-function code	1 byte	06h	
1°Sub-function file number	2 bytes	0h to FFFFh	Byte order: MSB, LSB
1°Sub-function record number	2 bytes	0h to 270Fh	Byte order: MSB, LSB
1°Sub-function number of word (**N**)	2 bytes	**N**	Byte order: MSB, LSB
2°Sub-function code	1 byte	06h	
2°Sub-function file number	2 bytes	0h to FFFFh	Byte order: MSB, LSB
2°Sub-function record number	2 bytes	0h to 270Fh	Byte order: MSB, LSB
2°Sub-function number of word (**N**1)	2 bytes	**N**1	Byte order: MSB, LSB
….			
CRC	2 bytes		

Response frame (correct action)

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	
Function code	1 byte	14h	
Resp. Data length	1 byte	0x07 to 0xF5	
1°Sub-func. response data length	1 byte	07h to 0F5h	
1°Sub-function code	1 byte	06h	
1°Sub-func. Data (**N** word)	2 bytes	**N** word * 2	Byte order: MSB, LSB
2°Sub-func. response data length	1 byte	07h to 0F5h	
2°Sub-function code	1 byte	06h	
2°Sub-func. Data (**N**1 word)	2 bytes	**N**1 word * 2	Byte order: MSB, LSB
….			
CRC	2 bytes		

Response frame (incorrect action)

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	Possible exception : 01h: illegal function 02h: illegal data address 03h: illegal data value 04h: slave device failure
Function code	1 byte	88h	
Exception code	1 byte	01h, 02h, 03h, 04h	
CRC	2 bytes		

1.2.7 Function 42h (Read special registers)

This function code is used to read the contents of a contiguous block of holding registers (word). The Request frame specifies the starting register address and the number of registers to be read. It is possible to read maximum 125 register (word) with a single request.
The register data in the response message are packed as two bytes per register (word), with the binary contents right justified within each byte. For each register, the first byte contains the high order bits (MSB) and the second contains the low order bits (LSB).

Request frame

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	
Function code	1 byte	42h	

Starting Address	2 bytes	0000h to FFFFh	Byte order: MSB, LSB
Quantity of Registers (**N** word)	2 bytes	1 to 7Dh (1 to 125)	Byte order: MSB, LSB
CRC	2 bytes		

Response frame (correct action)

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	
Function code	1 byte	42h	
Byte count	1 byte	**N** word * 2	
Register value	**N***2 bytes		Byte order: MSB, LSB
CRC	2 bytes		

Response frame (incorrect action)

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 255)	Possible exception : 01h: illegal function 02h: illegal data address 03h: illegal data value 04h: slave device failure
Function code	1 byte	83h	
Exception code	1 byte	01h, 02h, 03h, 04h	
CRC	2 bytes		

1.2.8 Broadcast mode

In broadcast mode the master can send a request (command) to all the slaves. No response is returned to broadcast requests sent by the master. It is possible to send the broadcast message only with function code 06h and 10h and using address 00h.

1.3 Application notes

1.3.1 General consideration

1. To avoid errors due to the signal reflections or line coupling, it is necessary to terminate the input of the last instrument on the network, and also the reception of the Host. The termination on both the instrument and the host is necessary even in case of point-to-point connection, within short distances.
2. The GND connection is optional if a shielded cable is used.
3. For connections longer than 1000m, a line amplifier is necessary.
4. If an instrument does not answer within the “max answering time”, it is necessary to repeat the query. If the instrument does not answer after 2 or 3 consecutive queries, it must be considered as not connected, faulty or with wrong address. The same consideration is valid in case of CRC errors or incomplete frames.

1.3.2 MODBUS timing

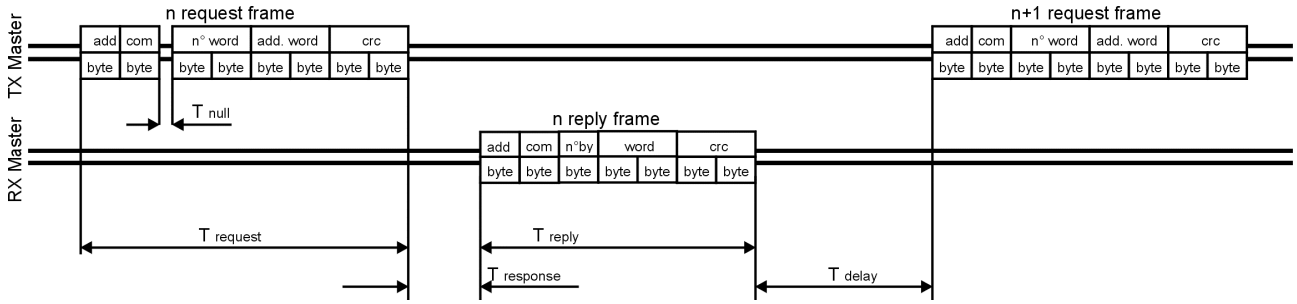


Fig. 1 : 4-wire timing diagram

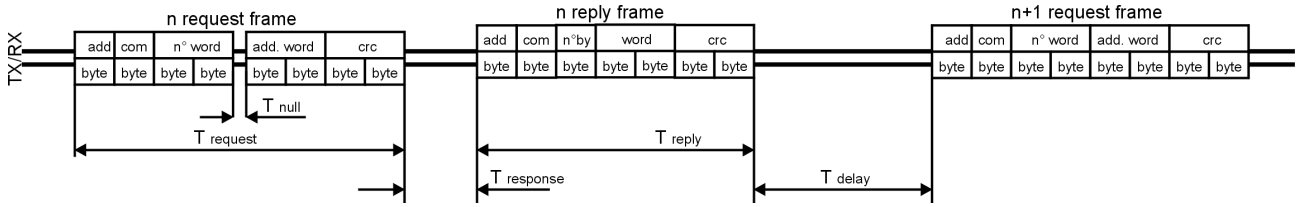


Fig. 2 : 2-wire timing diagram

Timing characteristics of reading function:	msec
T response: Max answering time	1000 ms
T response: Typical answering time @9600 bps	23 ms
T response: Typical answering time @115200 bps	<4 ms
T delay: Minimum time for a new query	9600 baud-rate: 3,5char 19200 baud-rate: 3,5 char 38400 baud-rate: 1,75 ms 115200 baud-rate: 1,75 ms
T null: Max interruption time on the request frame	9600 baud-rate: 2,5char 19200 baud-rate: 2,5 char 38400 baud-rate: 1,75 ms 115200 baud-rate: 1,75 ms

Where: n char = n*10/baud rate

2 TABLES

2.1 Data format representation in Carlo Gavazzi instruments

The variables are represented by integers or floating numbers, with 2's complement notation in case of "signed" format, using the following:

Format	IEC data type	Description	Bits	Range
INT16	INT	Integer	16	-32768 .. 32767
UINT16	UINT	Unsigned integer	16	0 .. 65535
INT32	DINT	Double integer	32	-2^{31} .. 2^{31}
UINT32	UDINT	Unsigned double int	32	0 .. 2^{32}-1
UINT64	ULINT	Unsigned long integer	64	0 .. 2^{64}-1
IEEE754 SP		Single-precision floating-point	32	$-(1+[1-2^{-23}])x2^{127}$ .. 2^{128}

The IEEE754 representation of a 32-bit floating-point number as an integer is defined as follows:

32-bit floating-point

Bits		
31	30 … 23	22 … 0
Sign	Exponent	Mantissa

$$(-1)^{sign} * 2^{(Exponent-127)} * 1.Mantissa$$

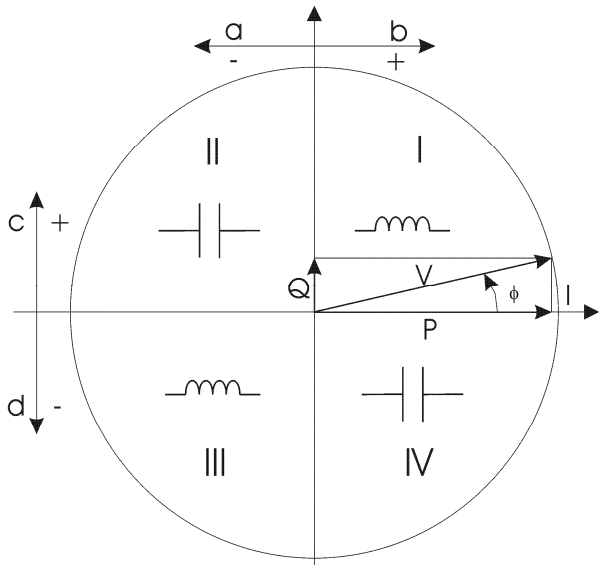
The byte order in the MODBUS (and ANSI) frame is:

1st byte = Bits 15 … 8 of the 32-bit floating-point number in standard IEEE-754
2nd byte = Bits 7 … 0 of the 32-bit floating-point number in standard IEEE-754
3rd byte = Bits 31 … 24 of the 32-bit floating-point number in standard IEEE-754
4th byte = Bits 23 … 16 of the 32-bit floating-point number in standard IEEE-754

The integers are represented in UINT16 (16 bit) or UINT64 (64 bit) format without sign (the byte order inside the single word is MSB->LSB while the word order is LSW->MSW).

2.1.1 Geometric representation

According to the signs of the power factor , the active power P and the reactive power Q, it is possible to obtain a geometric representation of the power vector, as indicated in the drawing below, according to EN 62053:



a = Exported active power
b = Imported active power
c = Imported reactive power
d = Exported reactive power

NOTE 1: Power Factor sign is according to Active Power (W)

Fig. 3 : Geometric Representation

2.1.2 Maximum and minimum electrical values

The max and min electric values for each variable are indicated in the following.

AV5: 400/690VLL AC, 5(6)A **(*)**
VLN : 160 V to 480VLN
VLL : 277 V to 830VLL
AV6: 100/208VLL AC, 5(6)A **(**)**
VLN : 40 V to 144VLN
VLL : 70 V to 250VLL
AV4: 400/690VLL AC, 1(2)A **(**)**
VLN : 160 V to 480VLN
VLL : 277 V to 830VLL
AV7: 100/208VLL AC, 1(2)A **(**)**
VLN : 40 V to 144VLN
VLL : 70 V to 250VLL

2.2 Firmware version

MODBUS: read only mode with functions code 03 and 04 **Table 2.2-1**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
300012	0000h	1	Base's Firmware Version	UINT 16	MSB: ASCII code for model (A = AV5, B = AV6, C = AV4, D = AV7) LSB: numeric number for Revision	X0
300012	0000h	1	Base's Firmware Version	UINT 16	MSB: ASCII code for model (A = AV5, B = AV6, C = AV4, D = AV7) LSB: numeric number for Revision	Y0
	0001h	1	Communication module Firmware Version (only in case MCETH or MCBACIP modules)	UINT 16	MSB: ASCII code for model LSB: numeric number for Revision	X0, Y0
	0002h	1	Analogue Output Module Firmware Version (position 1 - only in case MOA2 or MOV2 modules)	UINT 16	MSB: ASCII code for model (A= MOA2, B= MOV2) LSB: numeric number for Revision	X0, Y0
	0003h	1	Advanced six channel digital inputs + four channel outputs module firmware version (only in case MFI6R4 or MFI6O6)	UINT 16	MSB: ASCII code for model (A= MFI6R4, B= MFI6O6) LSB: numeric number for Revision	Y0
	0004h	1	Process Module (only in case MATP or MATPN)	UINT 16	MSB: ASCII code for model (A= MATP, B= MATPN) LSB: numeric number for Revision	Y0
	0005h	1	Analogue Output Module Firmware Version (position 2 - only in case MOA2 or MOV2 modules)	UINT 16	MSB: ASCII code for model (A= MOA2, B= MOV2) LSB: numeric number for Revision	Y0

NOTE 1: In the following document firmware letter "X" indicates all version: "A", "B", "C", e "D" only for WM30. The number indicates the firmware revision
NOTE 2: In the following document firmware letter "Y" indicates all version: "A", "B", "C", e "D" only for WM40. The number indicates the firmware revision

2.3 Carlo Gavazzi Controls identification code

MODBUS: read only mode with functions code 03 and 04 **Table 2.3-1**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
300012	000Bh	1	Carlo Gavazzi Controls identification code	UINT 16	Value = 0x0041 (65d)	X0
300012	000Bh	1	Carlo Gavazzi Controls identification code	UINT 16	Value = 0x0042 (66d)	Y0

2.4 Serial Number

MODBUS: read only mode with functions code 03 and 04 **Table 2.4-1**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	0020h	1	Letter 1 (from SX) Letter 2 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	X2, Y0
	0021h	1	Letter 3 (from SX) Letter 4 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	X2, Y0
	0022h	1	Letter 5 (from SX) Letter 6 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	X2, Y0
	0023h	1	Letter 7 (from SX) Letter 8 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	X2, Y0
	0024h	1	Letter 9 (from SX) Letter 10 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	X2, Y0
	0025h	1	Letter 11 (from SX) Letter 12 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	X2, Y0
	0026h	1	Letter 13 (from SX)	UINT 16	MSB: ASCII code	X2, Y0

2.5 Instantaneous variables

MODBUS: read only mode with functions code 03 and 04 **Table 2.5-1**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	0050h	2	V L1-N	32 bit IEEE 754		X0, Y0
	0052h	2	V L2-N	32 bit IEEE 754		X0, Y0
	0054h	2	V L3-N	32 bit IEEE 754		X0, Y0
	0056h	2	V L-N $\sum$	32 bit IEEE 754		X0, Y0
	0058h	2	V L1-L2	32 bit IEEE 754		X0, Y0
	005Ah	2	V L2-L3	32 bit IEEE 754		X0, Y0
	005Ch	2	V L3-L1	32 bit IEEE 754		X0, Y0
	005Eh	2	V L-L $\sum$	32 bit IEEE 754		X0, Y0

	0060h	2	A L1	32 bit IEEE 754		X0, Y0
	0062h	2	A L2	32 bit IEEE 754		X0, Y0
	0064h	2	A L3	32 bit IEEE 754		X0, Y0
	0066h	2	A N	32 bit IEEE 754	Calculate by base	X0 , Y0
					Measured by optional module	Y0
	0068h	2	W L1	32 bit IEEE 754		X0, Y0
	006Ah	2	W L2	32 bit IEEE 754		X0, Y0
	006Ch	2	W L3	32 bit IEEE 754		X0, Y0
	006Eh	2	W ∑	32 bit IEEE 754		X0, Y0
	0070h	2	VA L1	32 bit IEEE 754		X0, Y0
	0072h	2	VA L2	32 bit IEEE 754		X0, Y0
	0074h	2	VA L3	32 bit IEEE 754		X0, Y0
	0076h	2	VA ∑	32 bit IEEE 754		X0, Y0
	0078h	2	VAR L1	32 bit IEEE 754		X0, Y0
	007Ah	2	VAR L2	32 bit IEEE 754		X0, Y0
	007Ch	2	VAR L3	32 bit IEEE 754		X0, Y0
	007Eh	2	VAR ∑	32 bit IEEE 754		X0, Y0
	0080h	2	PF L1	32 bit IEEE 754	Negative values correspond to lead(C), positive value correspond to lag(L)	X0, Y0
	0082h	2	PF L2	32 bit IEEE 754		
	0084h	2	PF L3	32 bit IEEE 754		
	0086h	2	PF ∑	32 bit IEEE 754		
	0088h	2	Hz	32 bit IEEE 754		X0, Y0
	008Ah	2	Asymmetry L-N %	32 bit IEEE 754		X0, Y0
	008Ch	2	Asymmetry L-L %	32 bit IEEE 754		X0, Y0
	008Eh	2	Phase sequence	32 bit IEEE 754	Value –1 correspond to L1-L2-L3 sequence, value +1 correspond to L1-L3-L2 sequence	X0, Y0
	0090h	2	K-Factor L1	32 bit IEEE 754		Y0
	0092h	2	K-Factor L2	32 bit IEEE 754		Y0
	0094h	2	K-Factor L3	32 bit IEEE 754		Y0
	0096h	2	Temperature	32 bit IEEE 754	Only by optional module	Y0
	0098h	2	Analogue Input	32 bit IEEE 754	Only by optional module	Y0
	00A0h	2	THD tot VL1-N	32 bit IEEE 754		X0, Y0
	00A2h	2	THD tot VL2-N	32 bit IEEE 754		X0, Y0
	00A4h	2	THD tot VL3-N	32 bit IEEE 754		X0, Y0
	00A6h	2	THD tot VL12	32 bit IEEE 754		X0, Y0
	00A8h	2	THD tot VL23	32 bit IEEE 754		X0, Y0
	00AAh	2	THD tot VL31	32 bit IEEE 754		X0, Y0
	00ACh	2	THD tot AL1	32 bit IEEE 754		X0, Y0
	00AEh	2	THD tot AL2	32 bit IEEE 754		X0, Y0
	00B0h	2	THD tot AL3	32 bit IEEE 754		X0, Y0
	00B2h	2	THD odd VL1-N	32 bit IEEE 754		Y0
	00B4h	2	THD odd VL2-N	32 bit IEEE 754		Y0
	00B6h	2	THD odd VL3-N	32 bit IEEE 754		Y0
	00B8h	2	THD odd VL12	32 bit IEEE 754		Y0
	00BAh	2	THD odd VL23	32 bit IEEE 754		Y0
	00BCh	2	THD odd VL31	32 bit IEEE 754		Y0
	00BEh	2	THD odd AL1	32 bit IEEE 754		Y0
	00C0h	2	THD odd AL2	32 bit IEEE 754		Y0
	00C2h	2	THD odd AL3	32 bit IEEE 754		Y0
	00C4h	2	THD even VL1-N	32 bit IEEE 754		Y0
	00C6h	2	THD even VL2-N	32 bit IEEE 754		Y0
	00C8h	2	THD even VL3-N	32 bit IEEE 754		Y0
	00CAh	2	THD even VL12	32 bit IEEE 754		Y0
	00CCh	2	THD even VL23	32 bit IEEE 754		Y0
	00CEh	2	THD even VL31	32 bit IEEE 754		Y0
	00D0h	2	THD even AL1	32 bit IEEE 754		Y0
	00D2h	2	THD even AL2	32 bit IEEE 754		Y0
	00D4h	2	THD even AL3	32 bit IEEE 754		Y0
	00D6h	2	TDD tot AL1	32 bit IEEE 754		Y0
	00D8h	2	TDD tot AL2	32 bit IEEE 754		Y0
	00DAh	2	TDD tot AL3	32 bit IEEE 754		Y0

2.5.1 Additional Info for Instantaneous variables

MODBUS: read only mode with functions code 42 (like 03 / 04) **Table 2.5-2**

Modicom address	Physical address	Length (words)	Data Format	Notes	Firmware compatibility
The same of instantaneous vars.	The same of instantaneous vars.	1	Bit15 – Bit8: RESERVED		X0, Y0
			Bit7 - Bit4: Eng. Unit type		
			Bit3 - Bit2: Phase type		
			Bit1 - Bit0: Precision type		

Enum Description **Table 2.5-3**

Value	Eng. Unit type	Phase type	Precision type	Notes	Firmware compatibility
0	UnDim: Undimensional (not measure unit)	Zero: no phase application	digit0: 0 digit after the decimal point		X0, Y0
1	V: Volt	Single: Parameter application only 1 Phase	digit1: 1 digit after the decimal point		X0, Y0
2	A: Ampere	Double: Parameter application only 2 Phase	digit2: 2 digit after the decimal point		X0, Y0
3	W: Watt	Total: Parameter application at global system	digit3: 3 digit after the decimal point		X0, Y0
4	VA: Volt Ampere				X0, Y0
5	VAR: Volt Ampere Reactive				X0, Y0
6	PF: Power Factor				X0, Y0
7	HZ: Hertz				X0, Y0
8	C: Celsius				X0, Y0
9	F: Fahrenheit				X0, Y0
10	THDpercV: V Thd %				X0, Y0
11	Perc: %				X0, Y0
12	Wh: Watt hour				X0, Y0
13	VARh: War hour				X0, Y0
14	m3: meter^3				X0, Y0
15	THDpercA: A THD %				X0, Y0

2.6 Maximum variables

MODBUS: read only mode with functions code 03 and 04 — **Table 2.6-1**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	0150h	2	Max V L1-N	32 bit IEEE 754		X0, Y0
	0152h	2	Max V L2-N	32 bit IEEE 754		X0, Y0
	0154h	2	Max V L3-N	32 bit IEEE 754		X0, Y0
	0156h	2	Max V L-N ∑	32 bit IEEE 754		X0, Y0
	0158h	2	Max V L1-L2	32 bit IEEE 754		X0, Y0
	015Ah	2	Max V L2-L3	32 bit IEEE 754		X0, Y0
	015Ch	2	Max V L3-L1	32 bit IEEE 754		X0, Y0
	015Eh	2	Max V L-L ∑	32 bit IEEE 754		X0, Y0
	0160h	2	Max A L1	32 bit IEEE 754		X0, Y0
	0162h	2	Max A L2	32 bit IEEE 754		X0, Y0
	0164h	2	Max A L3	32 bit IEEE 754		X0, Y0
	0166h	2	Max A N	32 bit IEEE 754		X0, Y0
	0168h	2	Max W L1	32 bit IEEE 754		X0, Y0
	016Ah	2	Max W L2	32 bit IEEE 754		X0, Y0
	016Ch	2	Max W L3	32 bit IEEE 754		X0, Y0
	016Eh	2	Max W ∑	32 bit IEEE 754		X0, Y0
	0170h	2	Max VA L1	32 bit IEEE 754		X0, Y0
	0172h	2	Max VA L2	32 bit IEEE 754		X0, Y0
	0174h	2	Max VA L3	32 bit IEEE 754		X0, Y0
	0176h	2	Max VA ∑	32 bit IEEE 754		X0, Y0
	0178h	2	Max VAR L1	32 bit IEEE 754	Negative values correspond to lead(C), positive value correspond to lag(L)	X0, Y0
	017Ah	2	Max VAR L2	32 bit IEEE 754		
	017Ch	2	Max VAR L3	32 bit IEEE 754		
	017Eh	2	Max VAR ∑	32 bit IEEE 754		
	0180h	2	Max PF L1	32 bit IEEE 754		X0, Y0
	0182h	2	Max PF L2	32 bit IEEE 754		X0, Y0
	0184h	2	Max PF L3	32 bit IEEE 754		X0, Y0
	0186h	2	Max PF ∑	32 bit IEEE 754		X0, Y0
	0188h	2	Max Hz	32 bit IEEE 754		X0, Y0
	018Ah	2	Max Asymmetry L-N %	32 bit IEEE 754		X0, Y0
	018Ch	2	Max Asymmetry L-L %	32 bit IEEE 754		X0, Y0
	018Eh	*2*	*RESERVED*			
	0190h	2	Max K-Factor L1	32 bit IEEE 754		Y0
	0192h	2	Max K-Factor L2	32 bit IEEE 754		Y0
	0194h	2	Max K-Factor L3	32 bit IEEE 754		Y0
	0196h	2	Max Temperature	32 bit IEEE 754	Only by optional module	Y0
	0198h	2	Max Analogue Input	32 bit IEEE 754	Only by optional module	Y0
	01A0h	2	Max THD tot VL1-N	32 bit IEEE 754		X0, Y0
	01A2h	2	Max THD tot VL2-N	32 bit IEEE 754		X0, Y0
	01A4h	2	Max THD tot VL3-N	32 bit IEEE 754		X0, Y0
	01A6h	2	Max THD tot VL12	32 bit IEEE 754		X0, Y0
	01A8h	2	Max THD tot VL23	32 bit IEEE 754		X0, Y0
	01AAh	2	Max THD tot VL31	32 bit IEEE 754		X0, Y0
	01ACh	2	Max THD tot AL1	32 bit IEEE 754		X0, Y0
	01AEh	2	Max THD tot AL2	32 bit IEEE 754		X0, Y0
	01B0h	2	Max THD tot AL3	32 bit IEEE 754		X0, Y0
	01B2h	2	Max THD odd VL1-N	32 bit IEEE 754		Y0
	01B4h	2	Max THD odd VL2-N	32 bit IEEE 754		Y0
	01B6h	2	Max THD odd VL3-N	32 bit IEEE 754		Y0
	01B8h	2	Max THD odd VL12	32 bit IEEE 754		Y0
	01BAh	2	Max THD odd VL23	32 bit IEEE 754		Y0
	01BCh	2	Max THD odd VL31	32 bit IEEE 754		Y0
	01BEh	2	Max THD odd AL1	32 bit IEEE 754		Y0
	01C0h	2	Max THD odd AL2	32 bit IEEE 754		Y0
	01C2h	2	Max THD odd AL3	32 bit IEEE 754		Y0
	01C4h	2	Max THD even VL1-N	32 bit IEEE 754		Y0
	01C6h	2	Max THD even VL2-N	32 bit IEEE 754		Y0
	01C8h	2	Max THD even VL3-N	32 bit IEEE 754		Y0
	01CAh	2	Max THD even VL12	32 bit IEEE 754		Y0
	01CCh	2	Max THD even VL23	32 bit IEEE 754		Y0
	01CEh	2	Max THD even VL31	32 bit IEEE 754		Y0
	01D0h	2	Max THD even AL1	32 bit IEEE 754		Y0
	01D2h	2	Max THD even AL2	32 bit IEEE 754		Y0
	01D4h	2	Max THD even AL3	32 bit IEEE 754		Y0
	01D6h	2	Max TDD tot AL1	32 bit IEEE 754		Y0
	01D8h	2	Max TDD tot AL2	32 bit IEEE 754		Y0
	01DAh	2	Max TDD tot AL3	32 bit IEEE 754		Y0

2.7 Minimum variables

MODBUS: read only mode with functions code 03 and 04 — **Table 2.7-1**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	0250h	2	Min V L1-N	32 bit IEEE 754		Y0
	0252h	2	Min V L2-N	32 bit IEEE 754		Y0
	0254h	2	Min V L3-N	32 bit IEEE 754		Y0
	0256h	2	Min V L-N ∑	32 bit IEEE 754		Y0
	0258h	2	Min V L1-L2	32 bit IEEE 754		Y0
	025Ah	2	Min V L2-L3	32 bit IEEE 754		Y0
	025Ch	2	Min V L3-L1	32 bit IEEE 754		Y0
	025Eh	2	Min V L-L ∑	32 bit IEEE 754		Y0
	0260h	2	Min A L1	32 bit IEEE 754		Y0
	0262h	2	Min A L2	32 bit IEEE 754		Y0
	0264h	2	Min A L3	32 bit IEEE 754		Y0
	0266h	2	Min A N	32 bit IEEE 754		Y0
	0268h	2	Min W L1	32 bit IEEE 754		Y0
	026Ah	2	Min W L2	32 bit IEEE 754		Y0
	026Ch	2	Min W L3	32 bit IEEE 754		Y0
	026Eh	2	Min W ∑	32 bit IEEE 754		Y0
	0270h	2	Min VA L1	32 bit IEEE 754		Y0
	0272h	2	Min VA L2	32 bit IEEE 754		Y0
	0274h	2	Min VA L3	32 bit IEEE 754		Y0
	0276h	2	Min VA ∑	32 bit IEEE 754		Y0
	0278h	2	Min VAR L1	32 bit IEEE 754	Negative values correspond to lead(C), positive value correspond to lag(L)	Y0
	027Ah	2	Min VAR L2	32 bit IEEE 754		
	027Ch	2	Min VAR L3	32 bit IEEE 754		
	027Eh	2	Min VAR ∑	32 bit IEEE 754		
	0280h	2	Min PF L1	32 bit IEEE 754		Y0
	0282h	2	Min PF L2	32 bit IEEE 754		Y0
	0284h	2	Min PF L3	32 bit IEEE 754		Y0
	0286h	2	Min PF ∑	32 bit IEEE 754		Y0
	0288h	2	Min Hz	32 bit IEEE 754		Y0
	028Ah	2	Min Asymmetry L-N %	32 bit IEEE 754		Y0
	028Ch	2	Min Asymmetry L-L %	32 bit IEEE 754		Y0
	028Eh	*2*	*RESERVED*			Y0
	0290h	2	Min K-Factor L1	32 bit IEEE 754		Y0
	0292h	2	Min K-Factor L2	32 bit IEEE 754		Y0
	0294h	2	Min K-Factor L3	32 bit IEEE 754		Y0
	0296h	2	Min Temperature	32 bit IEEE 754	Only by optional module	Y0
	0298h	2	Min Analogue Input	32 bit IEEE 754	Only by optional module	Y0
	02A0h	2	Min THD tot VL1-N	32 bit IEEE 754		Y0
	02A2h	2	Min THD tot VL2-N	32 bit IEEE 754		Y0
	02A4h	2	Min THD tot VL3-N	32 bit IEEE 754		Y0
	02A6h	2	Min THD tot VL12	32 bit IEEE 754		Y0
	02A8h	2	Min THD tot VL23	32 bit IEEE 754		Y0
	02AAh	2	Min THD tot VL31	32 bit IEEE 754		Y0
	02ACh	2	Min THD tot AL1	32 bit IEEE 754		Y0
	02AEh	2	Min THD tot AL2	32 bit IEEE 754		Y0
	02B0h	2	Min THD tot AL3	32 bit IEEE 754		Y0
	02B2h	2	Min THD odd VL1-N	32 bit IEEE 754		Y0
	02B4h	2	Min THD odd VL2-N	32 bit IEEE 754		Y0
	02B6h	2	Min THD odd VL3-N	32 bit IEEE 754		Y0
	02B8h	2	Min THD odd VL12	32 bit IEEE 754		Y0
	02BAh	2	Min THD odd VL23	32 bit IEEE 754		Y0
	02BCh	2	Min THD odd VL31	32 bit IEEE 754		Y0
	02BEh	2	Min THD odd AL1	32 bit IEEE 754		Y0
	02C0h	2	Min THD odd AL2	32 bit IEEE 754		Y0
	02C2h	2	Min THD odd AL3	32 bit IEEE 754		Y0
	02C4h	2	Min THD even VL1-N	32 bit IEEE 754		Y0
	02C6h	2	Min THD even VL2-N	32 bit IEEE 754		Y0
	02C8h	2	Min THD even VL3-N	32 bit IEEE 754		Y0
	02CAh	2	Min THD even VL12	32 bit IEEE 754		Y0
	02CCh	2	Min THD even VL23	32 bit IEEE 754		Y0
	02CEh	2	Min THD even VL31	32 bit IEEE 754		Y0
	02D0h	2	Min THD even AL1	32 bit IEEE 754		Y0
	02D2h	2	Min THD even AL2	32 bit IEEE 754		Y0
	02D4h	2	Min THD even AL3	32 bit IEEE 754		Y0
	02D6h	2	Min TDD tot AL1	32 bit IEEE 754		Y0
	02D8h	2	Min TDD tot AL2	32 bit IEEE 754		Y0
	02DAh	2	Min TDD tot AL3	32 bit IEEE 754		Y0

2.8 DMD variables

MODBUS: read only mode with functions code 03 and 04 **Table 2.8-1**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	0350h	2	DMD V L1-N	32 bit IEEE 754		X0
	0352h	2	DMD V L2-N	32 bit IEEE 754		X0
	0354h	2	DMD V L3-N	32 bit IEEE 754		X0
	0356h	2	DMD V L-N ∑	32 bit IEEE 754		X0
	0358h	2	DMD V L1-L2	32 bit IEEE 754		X0
	035Ah	2	DMD V L2-L3	32 bit IEEE 754		X0
	035Ch	2	DMD V L3-L1	32 bit IEEE 754		X0
	035Eh	2	DMD V L-L ∑	32 bit IEEE 754		X0
	0360h	2	DMD A L1	32 bit IEEE 754		X0
	0362h	2	DMD A L2	32 bit IEEE 754		X0
	0364h	2	DMD A L3	32 bit IEEE 754		X0
	0366h	2	DMD A N	32 bit IEEE 754		X0
	0368h	2	DMD W L1	32 bit IEEE 754		X0
	036Ah	2	DMD W L2	32 bit IEEE 754		X0
	036Ch	2	DMD W L3	32 bit IEEE 754		X0
	036Eh	2	DMD W ∑	32 bit IEEE 754		X0
	0370h	2	DMD VA L1	32 bit IEEE 754		X0
	0372h	2	DMD VA L2	32 bit IEEE 754		X0
	0374h	2	DMD VA L3	32 bit IEEE 754		X0
	0376h	2	DMD VA ∑	32 bit IEEE 754		X0
	0378h	2	DMD VAR L1	32 bit IEEE 754	Negative values correspond to lead(C), positive value correspond to lag(L)	X0
	037Ah	2	DMD VAR L2	32 bit IEEE 754		
	037Ch	2	DMD VAR L3	32 bit IEEE 754		
	037Eh	2	DMD VAR ∑	32 bit IEEE 754		
	0380h	2	DMD PF L1	32 bit IEEE 754		X0
	0382h	2	DMD PF L2	32 bit IEEE 754		X0
	0384h	2	DMD PF L3	32 bit IEEE 754		X0
	0386h	2	DMD PF ∑	32 bit IEEE 754		X0
	0388h	2	DMD Hz	32 bit IEEE 754		X0
	038Ah	2	DMD Asymmetry L-N %	32 bit IEEE 754		X0
	038Ch	2	DMD Asymmetry L-L %	32 bit IEEE 754		X0
	038Eh	*2*	*RESERVED*			
	0390h	2	DMD K-Factor L1	32 bit IEEE 754		Y0
	0392h	2	DMD K-Factor L2	32 bit IEEE 754		Y0
	0394h	2	DMD K-Factor L3	32 bit IEEE 754		Y0
	0396h	2	DMD Temperature	32 bit IEEE 754	Only by optional module	Y0
	0398h	2	DMD Analogue Input	32 bit IEEE 754	Only by optional module	Y0
	03A0h	2	DMD THD tot VL1-N	32 bit IEEE 754		Y0
	03A2h	2	DMD THD tot VL2-N	32 bit IEEE 754		Y0
	03A4h	2	DMD THD tot VL3-N	32 bit IEEE 754		Y0
	03A6h	2	DMD THD tot VL12	32 bit IEEE 754		Y0
	03A8h	2	DMD THD tot VL23	32 bit IEEE 754		Y0
	03AAh	2	DMD THD tot VL31	32 bit IEEE 754		Y0
	03ACh	2	DMD THD tot AL1	32 bit IEEE 754		Y0
	03AEh	2	DMD THD tot AL2	32 bit IEEE 754		Y0
	03B0h	2	DMD THD tot AL3	32 bit IEEE 754		Y0
	03B2h	2	DMD THD odd VL1-N	32 bit IEEE 754		Y0
	03B4h	2	DMD THD odd VL2-N	32 bit IEEE 754		Y0
	03B6h	2	DMD THD odd VL3-N	32 bit IEEE 754		Y0
	03B8h	2	DMD THD odd VL12	32 bit IEEE 754		Y0
	03BAh	2	DMD THD odd VL23	32 bit IEEE 754		Y0
	03BCh	2	DMD THD odd VL31	32 bit IEEE 754		Y0
	03BEh	2	DMD THD odd AL1	32 bit IEEE 754		Y0
	03C0h	2	DMD THD odd AL2	32 bit IEEE 754		Y0
	03C2h	2	DMD THD odd AL3	32 bit IEEE 754		Y0
	03C4h	2	DMD THD even VL1-N	32 bit IEEE 754		Y0
	03C6h	2	DMD THD even VL2-N	32 bit IEEE 754		Y0
	03C8h	2	DMD THD even VL3-N	32 bit IEEE 754		Y0
	03CAh	2	DMD THD even VL12	32 bit IEEE 754		Y0
	03CCh	2	DMD THD even VL23	32 bit IEEE 754		Y0
	03CEh	2	DMD THD even VL31	32 bit IEEE 754		Y0
	03D0h	2	DMD THD even AL1	32 bit IEEE 754		Y0
	03D2h	2	DMD THD even AL2	32 bit IEEE 754		Y0
	03D4h	2	DMD THD even AL3	32 bit IEEE 754		Y0
	03D6h	2	DMD TDD tot AL1	32 bit IEEE 754		Y0
	03D8h	2	DMD TDD tot AL2	32 bit IEEE 754		Y0
	03DAh	2	DMD TDD tot AL3	32 bit IEEE 754		Y0

2.9 Maximum DMD variables

MODBUS: read only mode, with functions code 03 and 04 — Table 2.9-1

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	0450h	2	DMD Max V L1-N	32 bit IEEE 754		Y0
	0452h	2	DMD Max V L2-N	32 bit IEEE 754		Y0
	0454h	2	DMD Max V L3-N	32 bit IEEE 754		Y0
	0456h	2	DMD Max V L-N ∑	32 bit IEEE 754		Y0
	0458h	2	DMD Max V L1-L2	32 bit IEEE 754		Y0
	045Ah	2	DMD Max V L2-L3	32 bit IEEE 754		Y0
	045Ch	2	DMD Max V L3-L1	32 bit IEEE 754		Y0
	045Eh	2	DMD Max V L-L ∑	32 bit IEEE 754		Y0
	0460h	2	DMD Max A L1	32 bit IEEE 754		Y0
	0462h	2	DMD Max A L2	32 bit IEEE 754		Y0
	0464h	2	DMD Max A L3	32 bit IEEE 754		Y0
	0466h	2	DMD Max A N	32 bit IEEE 754		Y0
	0468h	2	DMD Max W L1	32 bit IEEE 754		Y0
	046Ah	2	DMD Max W L2	32 bit IEEE 754		Y0
	046Ch	2	DMD Max W L3	32 bit IEEE 754		Y0
	046Eh	2	DMD Max W ∑	32 bit IEEE 754		Y0
	0470h	2	DMD Max VA L1	32 bit IEEE 754		Y0
	0472h	2	DMD Max VA L2	32 bit IEEE 754		Y0
	0474h	2	DMD Max VA L3	32 bit IEEE 754		Y0
	0476h	2	DMD Max VA ∑	32 bit IEEE 754		Y0
	0478h	2	DMD Max VAR L1	32 bit IEEE 754	Negative values correspond to lead(C), positive value correspond to lag(L)	Y0
	047Ah	2	DMD Max VAR L2	32 bit IEEE 754		
	047Ch	2	DMD Max VAR L3	32 bit IEEE 754		
	047Eh	2	DMD Max VAR ∑	32 bit IEEE 754		
	0480h	2	DMD Max PF L1	32 bit IEEE 754		Y0
	0482h	2	DMD Max PF L2	32 bit IEEE 754		Y0
	0484h	2	DMD Max PF L3	32 bit IEEE 754		Y0
	0486h	2	DMD Max PF ∑	32 bit IEEE 754		Y0
	0488h	2	DMD Max Hz	32 bit IEEE 754		Y0
	048Ah	2	DMD Max Asymmetry L-N %	32 bit IEEE 754		Y0
	048Ch	2	DMD Max Asymmetry L-L %	32 bit IEEE 754		Y0
	048Eh	*2*	*RESERVED*			Y0
	0490h	2	DMD Max K-Factor L1	32 bit IEEE 754		Y0
	0492h	2	DMD Max K-Factor L2	32 bit IEEE 754		Y0
	0494h	2	DMD Max K-Factor L3	32 bit IEEE 754		Y0
	0496h	2	DMD Max Temperature	32 bit IEEE 754	Only by optional module	Y0
	0498h	2	DMD Max Analogue Input	32 bit IEEE 754	Only by optional module	Y0
	04A0h	2	DMD MAX THD tot VL1-N	32 bit IEEE 754		Y0
	04A2h	2	DMD MAX THD tot VL2-N	32 bit IEEE 754		Y0
	04A4h	2	DMD MAX THD tot VL3-N	32 bit IEEE 754		Y0
	04A6h	2	DMD MAX THD tot VL12	32 bit IEEE 754		Y0
	04A8h	2	DMD MAX THD tot VL23	32 bit IEEE 754		Y0
	04AAh	2	DMD MAX THD tot VL31	32 bit IEEE 754		Y0
	04ACh	2	DMD MAX THD tot AL1	32 bit IEEE 754		Y0
	04AEh	2	DMD MAX THD tot AL2	32 bit IEEE 754		Y0
	04B0h	2	DMD MAX THD tot AL3	32 bit IEEE 754		Y0
	04B2h	2	DMD MAX THD odd VL1-N	32 bit IEEE 754		Y0
	04B4h	2	DMD MAX THD odd VL2-N	32 bit IEEE 754		Y0
	04B6h	2	DMD MAX THD odd VL3-N	32 bit IEEE 754		Y0
	04B8h	2	DMD MAX THD odd VL12	32 bit IEEE 754		Y0
	04BAh	2	DMD MAX THD odd VL23	32 bit IEEE 754		Y0
	04BCh	2	DMD MAX THD odd VL31	32 bit IEEE 754		Y0
	04BEh	2	DMD MAX THD odd AL1	32 bit IEEE 754		Y0
	04C0h	2	DMD MAX THD odd AL2	32 bit IEEE 754		Y0
	04C2h	2	DMD MAX THD odd AL3	32 bit IEEE 754		Y0
	04C4h	2	DMD MAX THD even VL1-N	32 bit IEEE 754		Y0
	04C6h	2	DMD MAX THD even VL2-N	32 bit IEEE 754		Y0
	04C8h	2	DMD MAX THD even VL3-N	32 bit IEEE 754		Y0
	04CAh	2	DMD MAX THD even VL12	32 bit IEEE 754		Y0
	04CCh	2	DMD MAX THD even VL23	32 bit IEEE 754		Y0
	04CEh	2	DMD MAX THD even VL31	32 bit IEEE 754		Y0
	04D0h	2	DMD MAX THD even AL1	32 bit IEEE 754		Y0
	04D2h	2	DMD MAX THD even AL2	32 bit IEEE 754		Y0
	04D4h	2	DMD MAX THD even AL3	32 bit IEEE 754		Y0
	04D6h	2	DMD MAX TDD tot AL1	32 bit IEEE 754		Y0
	04D8h	2	DMD MAX TDD tot AL2	32 bit IEEE 754		Y0
	04DAh	2	DMD MAX TDD tot AL3	32 bit IEEE 754		Y0

2.10 Total and partial (tariff) energy meters

MODBUS: read only mode with functions code 03 and 04 **Table 2.10-1**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
301281	0500h	4	Total KWh+	UINT 64	Values in Wh or varh	X0, Y0
301285	0504h	4	Total Kvarh+	UINT 64		
301289	0508h	4	Total KWh-	UINT 64		
301293	050Ch	4	Total Kvarh-	UINT 64		
301297	0510h	4	Partial KWh+	UINT 64		
301301	0514h	4	Partial Kvarh+	UINT 64		
301305	0518h	4	Partial KWh-	UINT 64		
301309	051Ch	4	Partial Kvarh-	UINT 64		
	0520h	4	Hours counter	UINT 64	Number Hours is divide for 100 Number Minute is rest of divide for 100	X0, Y0
301313	0524h	4	Tariff 1 KWh+	UINT 64	Values in Wh or varh. Only by optional module.	Y0
301317	0528h	4	Tariff 1 Kvarh+	UINT 64		
301321	052Ch	4	Tariff 1 KWh-	UINT 64		
301325	0530h	4	Tariff 1 Kvarh-	UINT 64		
301329	0534h	4	Tariff 2 KWh+	UINT 64		
301333	0538h	4	Tariff 2 Kvarh+	UINT 64		
301337	053Ch	4	Tariff 2 KWh-	UINT 64		
301341	0540h	4	Tariff 2 Kvarh-	UINT 64		
301345	0544h	4	Tariff 3 KWh+	UINT 64		
301349	0548h	4	Tariff 3 Kvarh+	UINT 64		
301353	054Ch	4	Tariff 3 KWh-	UINT 64		
301357	0550h	4	Tariff 3 Kvarh-	UINT 64		
301361	0554h	4	Tariff 4 KWh+	UINT 64		
301365	0558h	4	Tariff 4 Kvarh+	UINT 64		
301369	055Ch	4	Tariff 4 KWh-	UINT 64		
301373	0560h	4	Tariff 4 Kvarh-	UINT 64		
301377	0564h	4	Tariff 5 KWh+	UINT 64		
301381	0568h	4	Tariff 5 Kvarh+	UINT 64		
301385	056Ch	4	Tariff 5 KWh-	UINT 64		
301389	0570h	4	Tariff 5 Kvarh-	UINT 64		
301393	0574h	4	Tariff 6 KWh+	UINT 64		
301397	0578h	4	Tariff 6 Kvarh+	UINT 64		
301401	057Ch	4	Tariff 6 KWh-	UINT 64		
301405	0580h	4	Tariff 6 Kvarh-	UINT 64		
301409	0584h	4	C-1	UINT 64	Only by optional module.	
301413	0588h	4	C-2	UINT 64		
301417	058Ch	4	C-3	UINT 64		
	05F0h	1	Real Time tariff	UINT 16		

2.11 Harmonic Analysis

MODBUS: read only mode, with functions code 03 and 04 **Table 2.11-1**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	0600h	71	V L1-N	Custom Harmonic data structure	Refer to Table 2.11-2	Y0
	0650h	71	V L2-N	Custom Harmonic data structure		
	06A0h	71	V L3-N	Custom Harmonic data structure		
	06F0h	71	V L1-L2	Custom Harmonic data structure		
	0740h	71	V L2-L3	Custom Harmonic data structure		
	0790h	71	V L3-L1	Custom Harmonic data structure		
	07E0h	71	A L1	Custom Harmonic data structure		
	0830h	71	A L2	Custom Harmonic data structure		
	0880h	71	A L3	Custom Harmonic data structure		

Custom Harmonic data structure **Table 2.11-2**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
Block address +0	Block address +0	1	Number of sample	UINT 16		Y0
Block address +1	Block address +1	2	Frequency	32 bit IEEE 754		Y0
Block address +3	Block address +3	2	RMS value	32 bit IEEE 754		Y0
Block address +5	Block address +5	1	Re (FFT(0))	UINT 16		
Block address +6	Block address +6	1	Re (FFT(1))	UINT 16		Y0
...	...	...	...	...	...	Y0
Block address +3	Block address +37	1	Re (FFT(32))	UINT 16		Y0
Block address +38	Block address +38	1	Im (FFT(0))	UINT 16		Y0
Block address +39	Block address +39	1	Im (FFT(1))	UINT 16		Y0
...	...	...	...	...	...	Y0
Block address +71	Block address +71	1	Im (FFT(32))	UINT 16		Y0

2.11.1 Harmonic phase angles

MODBUS: read only mode with functions code 03 and 04 **Table 2.11-3**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	0900h	1	1° harmonic Ph. Angle VL1-N→AL1 [°]	UINT 16		Y0
	0901h	1	2° harmonic Ph. Angle VL1-N→AL1 [°]	UINT 16		Y0
	...	...	...			Y0

	091Eh	1	30° harmonic Ph. Angle VL1-N→AL1 [°]	UINT 16		Y0
	091Fh	1	31° harmonic Ph. Angle VL1-N→AL1 [°]	UINT 16		Y0
	0920h	1	1° harmonic Ph. Angle VL2-N→AL2 [°]	UINT 16		Y0
	0921h	1	2° harmonic Ph. Angle VL2-N→AL2 [°]	UINT 16		Y0
	...	...	...			Y0
	093Eh	1	30° harmonic Ph. Angle VL2-N→AL2 [°]	UINT 16		Y0
	093Fh	1	31° harmonic Ph. Angle VL2-N→AL2 [°]	UINT 16		Y0
	0940h	1	1° harmonic Ph. Angle VL3-N→AL3 [°]	UINT 16		Y0
	0941h	1	2° harmonic Ph. Angle VL3-N→AL3 [°]	UINT 16		Y0
	...	...	...			Y0
	095Eh	1	30° harmonic Ph. Angle VL3-N→AL3 [°]	UINT 16		Y0
	095Fh	1	31° harmonic Ph. Angle VL3-N→AL3 [°]	UINT 16		Y0

2.12 Modules Programming Parameter

2.12.1 Modules Map

Table 2.12-1

Module Ref.	Description	Recognize system	Module Name	Firmware compatibility
1	WM30 base provided with display, power supply, measuring inputs and optical front communication port		**WM30 AV5**	
2			**WM30 AV6**	
3			**WM30 AV4**	
4			**WM30 AV7**	
1b	WM40 base provided with display, power supply, measuring inputs and optical front communication port		**WM40 AV5**	
2b			**WM40 AV6**	
3b			**WM40 AV4**	
4b			**WM40 AV7**	
5	RS485 / RS232 port	Manual by keyboard or modbus	**M C 485 232**	X0, Y0
6	RS485 / RS232 port with Memory for Data stamping	Automatic	**M C 485 232 M**	Y0
7	Ethernet/Modbus protocol	Automatic	**M C ETH**	X1, Y0
8	Ethernet/ Bacnet protocol	Automatic	**M C BAC IP**	X0, Y0
7b	Ethernet/Modbus protocol with Memory for data stamping	Automatic	**M C ETH M**	Y0
8b	Ethernet/ Bacnet protocol with Memory for data stamping	Automatic	**M C BAC IP M**	Y0
10a	Analogue output (20mADC)	Automatic	**M O A2**	X1, Y0
10a	Analogue output (10VDC)	Automatic	**M O V2**	X1, Y0
11	Relay output	Manual	**M O R2**	X0, Y0
12	Opto-Mos output	Manual	**M O O2**	X0, Y0
13	Digital inputs and Opto-Mos outputs	Automatic	**M F I6 R4**	Y0
14	Digital inputs and Relay outputs	Automatic	**M F I6 O6**	Y0
16	Temperature + Process signal measurements (°C/°F)	Automatic	**M A T P**	Y0
17	Direct neutral current measurement + Temperature + Process signal measurements (°C/°F)	Automatic	**M A T P N**	Y0

2.12.2 Base (Module Ref. 1, 2, 3 and 4)

MODBUS: read and write mode

Table 2.12-2

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	1000h	1	PASSWORD	UINT 16	Minimum valid value: 0d Maximum valid value: 9999d	X0, Y0
	1001h	1	Measuring system configuration	UINT 16	Value =0: 1P (1-phase 2-wire) Value =1: 2P (2-phase 3-wire) Value=2: 3P (3-phase 3-wire) Value=3: 3P2 (3-phase 2-wire) one current and 1-phase (L1) to neutral voltage measurement) Value=4: 3P1 (3-phase 4-wire one current and 3-phase to neutral voltage measurements) Value=5: 3PN (default =3PN)	X0, Y0
	1002h	1	Application system configuration	UINT 16	Value=0: A Value=1: B Value=2: C Value=3: D Solar Value=4: E Industrial Value=5: F Advanced industrial Value=6: G Advanced industrial for power generation (default =6)	X0, Y0
	1003h	1	Backlight colour	UINT 16	Selecting the colour of the Backlight: 0 = Back_Off 1 = Back_White	X0
	1003h	1	Backlight colour	UINT 16	Selecting the colour of the Backlight: 0 = Back_Off (No timer) 1 = Back_White (Timer)	Y0

					2 = Back_Blue (Timer) 3 = Backlight always OFF, when an alarm occurs it flashes from white to blue (No timer) 4 = Backlight always white, when an alarm occurs it flashes from white to blue (Timer) 5 = Backlight always blue, when an alarm occurs it flashes from blue to white (Timer) Note: Main colour: 1s, second colour: 1s. The alarm warning works as an OR logic. The alarm has always priority on backlight timer.	
	1004h	1	Backlight mode	UINT 16	The backlight time is programmable from 0 (always on) to 255 minutes	X0, Y0
	1005h	1	Type of Home Page	UINT 16	0 = line "2-3-4-5" with freely programmable system variables 1 = Normal Page	X0, Y0

	1006h	1	Pag. Home Line 1	UINT 16	If (Type 0 and System not 1P):
					0=AN; 1= W∑; 2=VAR∑; 3=VA∑; 4=PF∑; 5=frequency; other values = AN
					
					If (Type 0 and System = 1P):
					0=V1; 1=A1; 2=W1; 3=VAR1; 4=VA1; 5=PF1; 6=frequency; other values = V1
					
					If (type 1 and System not 1P):
					One's of normal pages from 1 to 11 (
					0 = empty; 1 = VLN; 2 = VLL; 3 = A;
					4 = Hz/ASY; 5 = VA; 6 = VAR; 7 = W;
					8 = PF; 9 = THD_VLN; 10 = THD_VLL
					11 = THD_A
					
					If (type 1 and System = 1P):
					0, 1, 2, 3, 4 =page with V1, A1, Hz
					5, 6, 7, 8 = page with VA, VAR1, W1, PF1
					9, 10, 11 = pages with THD_V1, THD A1
						X0

	1006h	1	Pag. Home Line 1	UINT 16	If (Type 0 and System not 1P):
					0=AN; 1= W∑; 2=VAR∑; 3=VA∑; 4=PF∑; 5=frequency; other values = AN
					
					If (Type 0 and System = 1P):
					0=V1; 1=A1; 2=W1; 3=VAR1; 4=VA1; 5=PF1; 6=frequency; other values = V1
					
					If (type 1 and System not 1P):
					One's of normal pages from 1 to 11 (
					0 = empty; 1 = VLN; 2 = VLL; 3 = A;
					4 = Hz/ASY; 5 = VA; 6 = VAR; 7 = W;
					8 = PF; 9 = THD_VLN; 10 = THD_VLL
					11 = THD_A; 12 = THD_VLN_EVEN; 13 = THD_VLL_EVEN; 14 = THD_A_EVEN; 15 = THD_VLN_ODD; 16 = THD_VLL_ODD; 17 = THD_A_ODD; 18 = K_FACTOR; 19 = TDD_A; 20 = EXT
					
					If (type 1 and System = 1P):
					0, 1, 2, 3, 4 =page with V1, A1, Hz
					5, 6, 7, 8 = page with VA1, VAR1, W1, PF1
					9, 10, 11 = pages with THD_V1, THD A1
					12, 13, 14 = pages with THD_V1 EVEN, THD A1 EVEN
					15, 16, 17 = pages with THD_V1 ODD, THD A1 ODD
					18 = pages with K-Factor 1
					19 = pages with TDD_A1
					20 = pages with EXT
						Y0

	1007h	1	Pag. Home Line 2	UINT 16	If (Type 0 and System not 1P):
					0=AN; 1= W∑; 2=VAR∑; 3=VA∑; 4=PF∑; 5=frequency; other values = AN
					
					If (Type 0 and System = 1P):
					0=V1; 1=A1; 2=W1; 3=VAR1; 4=VA1; 5=PF1;
						X0, Y0

	1008h	1	Pag. Home Line 3	UINT 16	If (Type 0 and System not 1P): 0=VL-L∑; 1=AN; 2= W∑; 3=VAR∑; 4=VA∑; 5=PF∑; 6=frequency	X0, Y0

					If (Type 0 and System = 1P): 0=V1; 1=A1; 2=W1; 3=VAR1; 4=VA1; 5=PF1; 6=frequency;	

	1009h	1	Pag. Home Line 4	UINT 16	If (Type 0 and System not 1P):
					0=VL-N∑; 1=AN; 2= W∑; 3=VAR∑; 4=VA∑; 5=PF∑; 6=frequency
					
					If (Type 0 and System = 1P):
					0=V1; 1=A1; 2=W1; 3=VAR1; 4=VA1; 5=PF1; 6=frequency
						X0, Y0

	100Ah	1	Data DMD Type	UINT 16	Selecting the working of the integration time calculation Value=0: Fixed; Value=1: Slide only for W∑ and VA∑;	X0, Y0
	100Bh	1	Data DMD Time interval	UINT 16	Value=0: 1min; Value=1: 5min; Value=2: 10min; Value=3: 15min; Value=4: 30min; Value=5: 60min;	X0
	100Bh	1	Data DMD Time interval	UINT 16	Value=0: 1min; Value=1: 5min; Value=2: 10min; Value=3: 15min; Value=4: 20min; Value=5: 30min; Value=6: 60min;	X2, Y0
					Value=7: 30s	Y0
	100Ch	1	Data DMD Sync	UINT 16	Selecting the synchronisation of the time start calculation based on different signal source. Value=0: OFF; Value=1: clock;	X0, Y0
					Value=2: contact	Y0
	100Dh	1	LCD Bargraph variable	UINT 16	Value=0 Disable Value=1 W∑ Value=2 VA∑	X0
	100Dh	1	LCD Bargraph variable	UINT 16	Value=0 W∑ Value=1 VA∑ Value=2 Disable	X2, Y0
	100Eh	1	Optical port Address	UINT 16	Value=1	Y0
	100Fh	1	(**) Optical port baud rate selection	UINT 16	Value=0: 9600 Value=1: 19200 Value=2: 38400 Value=3: 115200	Y0
	1010h	1	(**) Optical port parity selection	UINT 16	Value=0: No parity Value=1: Odd parity Value=2: Even parity	Y0
	1011h	1	Optical port Bit Stop	UINT 16		Y0
	1012h	1	Factor K / K Factor selected	UINT 16	Value=0: Factor K (The European approach) Value=1: K-Factor (The North American approach)	Y0
	1018h	2	CT - Current transformer ratio	32 bit IEEE 754	1.0 to 9999.0	X0, Y0
	101Ah	2	VT(PT) - Voltage transformer ratio	32 bit IEEE 754	1.0 to 9999.0	X0, Y0
	101Ch	2	Nominal installed power	32 bit IEEE 754	Value min = 1000 (1K) Value max = 9999000000 (9999M)	X0, Y0
	101Eh	2	Filter span parameter	32 bit IEEE 754	Value min = 0.0 Value max = 100.0 (disable = 0.0)	X0, Y0
	1020h	2	Filter coefficient	32 bit IEEE 754	Value min = 1.0 Value max = 256.0	X0, Y0
	1022h	2	Low V reference for bargraph	32 bit IEEE 754		Y0
	1024h	2	High V reference for bargraph	32 bit IEEE 754		Y0
	1026h	2	Low A reference for bargraph	32 bit IEEE 754		Y0
	1028h	2	High A reference for bargraph	32 bit IEEE 754		Y0
	102Ah	2	Low PF reference for bargraph	32 bit IEEE 754		Y0
	102Ch	2	High PF reference for bargraph	32 bit IEEE 754		Y0
	102Eh	2	Eddy current Loss (e) for K-Factor	32 bit IEEE 754	Min = 0.0	Y0
	1030h	2	Exponential constant (q) for K-Factor	32 bit IEEE 754	Min = 0.0	Y0
	1032h	2	Maximum demand load current (IL) for TDD	32 bit IEEE 754	Min = 0.001	Y0
	1050h	16	Virtual Alarm AL1 (Led 1)	Custom Base	Refer to	X0

	1060h	16	Virtual Alarm AL2 (Led 2)	Alarm data structure	Table 2.12-3	X0
	1070h	16	Virtual Alarm AL3 (Led 3)			X0
	1080h	16	Virtual Alarm AL4 (Led 4)			X0
	1500h	16	Virtual Alarm AL1 (Led 1)	Custom Advanced Alarm data structure	Refer to	Y0
	1510h	16	Virtual Alarm AL2 (Led 1)			Y0
	1520h	16	Virtual Alarm AL3 (Led 1)			Y0
	1530h	16	Virtual Alarm AL4 (Led 1)			Y0
	1540h	16	Virtual Alarm AL5 (Led 2)			Y0
	1550h	16	Virtual Alarm AL6 (Led 2)			Y0
	1560h	16	Virtual Alarm AL7 (Led 2)			Y0
	1570h	16	Virtual Alarm AL8 (Led 2)			Y0
	1580h	16	Virtual Alarm AL9 (Led 3)			Y0
	1590h	16	Virtual Alarm AL10 (Led 3)			Y0
	15A0h	16	Virtual Alarm AL11 (Led 3)			Y0
	15B0h	16	Virtual Alarm AL12 (Led 3)			Y0
	15C0h	16	Virtual Alarm AL13 (Led 4)			Y0
	15D0h	16	Virtual Alarm AL14 (Led 4)			Y0
	15E0h	16	Virtual Alarm AL15 (Led 4)			Y0
	15F0h	16	Virtual Alarm AL16 (Led 4)			Y0

(*) The maximum power being measured cannot exceed 210 MW. If the currents and/or voltages being measured exceed their maximum limits the display shows the error message "EEEE". For MID complaint applications the maximum power being measured is 25 MW.
(**) Values are update only when the command "update optical communication setting" is sent or switch off and on the instrument

Base Virtual Alarm configuration parameters **Table 2.12-3**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
Block address +0	Block address +0	1	Alarm **N** enable selection	UINT 16	Value=1: alarm N is enabled Value=0: alarm N is disabled All other values are considered as value=0	X0
Block address +1	Block address +1	1	Type of variable linked to Alarm **N**	UINT 16	Refer to 0 Code Variables List	X0
Block address +2	Block address +2	1	ON delay of alarm **N** (sec)	UINT 16	Value min = 0 Value max = 3600 If the value is outside the limits the instrument considers the value equal to 0	X0
Block address +3	Block address +3	2	Set 1 of Alarm **N**	32 bit IEEE 754	Value min = -9999M Value max = 9999M If the value is outside the limits the instrument considers value equal to 0.000	X0
Block address +5	Block address +5	2	Set 2 of Alarm **N**	32 bit IEEE 754	Value min = -9999M Value max = 9999M If the value is outside the limits the instrument considers value equal to 0.000	X0
Block address +7	Block address +7	9	*Reserved*			

Advanced Base Virtual Alarm configuration parameters **Table 2.12-4**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
Block address +0	Block address +0	1	Alarm **N** enable selection	UINT 16	Value=1: alarm N is enabled Value=0: alarm N is disabled All other values are considered as value=0	Y0
Block address +1	Block address +1	1	Type of variable linked to Alarm **N**	UINT 16	Refer to 0 Code Variables List	Y0
Block address +2	Block address +2	1	Type of alarm	UINT 16	Value=0: UP control Value=1: DOWN control Value=2: IN control Value=3: OUT control	Y0
Block address +3	Block address +3	1	Latch	UINT 16	Value=0: OFF; Value=1: ON;	Y0
Block address +4	Block address +4	1	Alarm start control condition	UINT 16	Value=0: The alarm control starts with power on Value=1: The alarm control starts with no alarm condition	Y0
Block address +5	Block address +5	1	ON delay of alarm **N** (sec)	UINT 16	Value min = 0 Value max = 3600 If the value is outside the limits the instrument considers the value equal to 0	Y0
Block address +6	Block address +6	1	Physical output linked to	UINT 16	Value = 0 Virtual 1..8 one'sof physical output	Y0

Block address +7	Block address +7	1	Physical output Logic	UINT 16	Value=0: OR; Value=1: AND;	Y0
Block address +8	Block address +8	2	Set 1 of Alarm **N**	32 bit IEEE 754	Value min = -9999M Value max = 9999M If the value is outside the limits the instrument considers value equal to 0.000	Y0
Block address +10	Block address +10	2	Set 2 of Alarm **N**	32 bit IEEE 754	Value min = -9999M Value max = 9999M If the value is outside the limits the instrument considers value equal to 0.000	Y0
Block address +12	Block address +12	4	*Reserved*			Y0

2.12.3 RS485 – RS232 (Module Ref. 5 and Module Ref. 6)

MODBUS: Read and write mode **Table 2.12-5**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	1100h	1	Data Base system setup (only for **M C 485 232 M – Module ref. 6**)	UINT 16	Bit 0: DB DMD/MAX/MIN Enable Value=0: NO; Value=1: YES; Bit 1: EVENT Enable Value=0: NO; Value=1: YES; Bit 2: LOAD PROFILING Enable Value=0: NO; Value=1: YES; Family events enable: Value=0: NO; Value=1: YES Bit 6: Alarm Bit 7: Digital Input Bit 8: Digital Output Bit 9: Max Bit 10: Min Bit 11: DMD Max Bit 12: Reset Counters Bit 13: Reset Min/Max/DMD/MaxDMD Bit 14: Reset DB DB DMD has the same integration time of NormalDMD	Y0
	1101h	1	Load Profiling Time interval (only for **M C 485 232 M – Module ref. 6**)	UINT 16	Value=0: 1min; Value=1: 5min; Value=2: 10min; Value=3: 15min; Value=4: 20min; Value=5: 30min; Value=6: 60min;	Y0
	1102h	1	Load Profiling variable (only for **M C 485 232 M – Module ref. 6**)	UINT 16	Value=0: Wdmd; Value=1: VAdmd;	Y0
	1103h	1	Clock Time format	UINT 16	0=24h/12h ; 1=AM-PM	X0, Y0
	1104h	1	Clock Daylight-saving:	UINT 16	Value=0: NO; Value=1: YES;	X0, Y0
	1104h	1	Clock Daylight-saving / Sync watch with input	UINT 16	Daylight Bit1: Value=0: NO; Value=1: YES; Sync Bit2: Value=0: NO; Value=1: YES;	Y0
	1105h	1	(*) Clock Calendar: Year	UINT 16	2009 ... 2099	X0, Y0
	1106h	1	(*) Clock Calendar: Month	UINT 16	1 ... 12	X0, Y0
	1107h	1	(*) Clock Calendar: Day	UINT 16	1 ... 31	X0, Y0
	1108h	1	(*) Clock Time: hour	UINT 16	0 ... 23	X0, Y0
	1109h	1	(*) Clock Time: minutes	UINT 16	0 ... 59	X0, Y0
	110Ah	1	(*) Clock Time: seconds	UINT 16	0 ... 59	X0, Y0
	110Bh	1	Daylight Saving Month to increase hour (+1H)	UINT 16	1 ... 12 month	X0, Y0
	110Ch	1	Daylight Saving Number of Sunday to increase hour (+1H)	UINT 16	0 ... 4 (if 0 is last Sunday on month)	X0, Y0
	110Dh	1	Daylight Saving Hour to increase hour (+1H)	UINT 16	0 ... 23 (only in 24h format)	X0, Y0
	110Eh	1	Daylight Saving Month to decrease hour (-1H)	UINT 16	1 ... 12 month	X0, Y0

	110Fh	1	Daylight Saving Number of Sunday to decrease hour (-1H)	UINT 16	0 ... 4 (if 0 is last Sunday on month)	X0, Y0
	1110h	1	Daylight Saving Hour to decrease hour (-1H)	UINT 16	0 ... 23 (only in 24h format)	X0, Y0
	1111h	1	DMD Variable 1	INT 16	Refer to Code Variables List If value = 0xFF is disable. It's possible modify this area only after send command 3057h which stop and reset DB DMD System. For unlock this area and restart the DB DMD system have to send command 3058h Please Attention !!!	Y0
	1112h	1	DMD Variable 2	INT 16		Y0
	1113h	1	DMD Variable 3	INT 16		Y0
	1114h	1	DMD Variable 4	INT 16		Y0
	1115h	1	DMD Variable 5	INT 16		Y0
	1116h	1	DMD Variable 6	INT 16		Y0
	1117h	1	DMD Variable 7	INT 16		Y0
	1118h	1	DMD Variable 8	INT 16		Y0
	1119h	1	DMD Variable 9	INT 16		Y0
	111Ah	1	DMD Variable 10	INT 16		Y0
	111Bh	1	DMD Variable 11	INT 16		Y0
	111Ch	1	DMD Variable 12	INT 16		Y0
	111Dh	1	DMD Variable 13	INT 16		Y0
	111Eh	1	DMD Variable 14	INT 16		Y0
	111Fh	1	DMD Variable 15	INT 16		Y0
	1120h	1	DMD Variable 16	INT 16		Y0
	1121h	1	DMD Variable 17	INT 16		Y0
	1122h	1	DMD Variable 18	INT 16		Y0
	1123h	1	DMD Variable 19	INT 16		Y0
	1124h	1	DMD Variable 20	INT 16		Y0
	1125h	1	Type calculate enable:	INT 16	Value=0: NO; Value=1: YES; Bit 0: DMD Bit 1: MAX Bit 2: MIN It's possible modify this area only after send command 3057h which stop and reset DB DMD System. For unlock this area and restart the DB DMD system have to send command 3058h Please Attention !!!	Y0
	1126h	1	Nbr of Variables enable	INT 16	Read only !	Y0
	1130h	1	(**) RS485 instrument address selection	UINT 16	Value min = 1 Value max = 247 If the value is outside the limits the instrument considers the value equal to 1	X0
	1131h	1	(**) RS485 baud rate selection	UINT 16	Value=0: 9600 Value=1: 19200 Value=2: 38400 Value=3: 115200 All other values are considered as value=0	X0
	1132h	1	(**) RS485 parity selection	UINT 16	Value=0: No parity Value=1: Odd parity Value=2: Even parity All other values are considered as value=0	X0
	1033h	1	(**) RS485 Bit Stop	UINT 16		Y0

(*) Values are update only when the command "update clock" is sent.
(**) Values are update only when the command "update serial communication setting" is sent or switch off and on the instrument

2.12.4 Ethernet / Bacnet (Module Ref. 7 and Module Ref. 8)

MODBUS: Read and write mode **Table 2.12-6**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	1100h	1	Data Base system setup (only for **MC ETH M or MC BAC M - Module ref. 8**)	UINT 16	Bit15...Bit0: Bit 0: DB DMD/MAX/MIN Enable Value=0: NO; Value=1: YES; Bit 1: EVENT Enable Value=0: NO; Value=1: YES; Bit 2: LOAD PROFILING Enable Value=0: NO; Value=1: YES;	Y0

					Family events enable: Value=0: NO; Value=1: YES Bit 6: Alarm Bit 7: Digital Input Bit 8: Digital Output Bit 9: Max Bit 10: Min Bit 11: DMD Max Bit 12: Reset Counters Bit 13: Reset Min/Max/DMD/MaxDMD Bit 14: Reset DB DB DMD has the same integration time of NormalDMD	
	1101h	1	Load Profiling Time interval (only for **MC ETH M or MC BAC M - Module ref. 8**)	UINT 16	Value=0: 1min; Value=1: 5min; Value=2: 10min; Value=3: 15min; Value=4: 20min; Value=5: 30min; Value=6: 60min;	Y0
	1102h	1	Load Profiling variable (only for **MC ETH M or MC BAC M - Module ref. 8**)	UINT 16	Value=0: Wdmd; Value=1: VAdmd;	Y0
	1103h	1	Clock Time format	UINT 16	0=24h/12h ; 1=AM-PM	X0, Y0
	1104h	1	Clock Daylight-saving:	UINT 16	Value=0: NO; Value=1: YES;	X0, Y0
	1104h	1	Clock Daylight-saving / Sync watch with input	UINT 16	Daylight Bit1: Value=0: NO; Value=1: YES; Sync Bit2: Value=0: NO; Value=1: YES;	Y0
	1105h	1	(*) Clock Calendar: Year	UINT 16	2009 ... 2099	X0, Y0
	1106h	1	(*) Clock Calendar: Month	UINT 16	1 ... 12	X0, Y0
	1107h	1	(*) Clock Calendar: Day	UINT 16	1 ... 31	X0, Y0
	1108h	1	(*) Clock Time: hour	UINT 16	0 ... 23	X0, Y0
	1109h	1	(*) Clock Time: minutes	UINT 16	0 ... 59	X0, Y0
	110Ah	1	(*) Clock Time: seconds	UINT 16	0 ... 59	X0, Y0
	110Bh	1	Daylight Saving Month to increase hour (+1H)	UINT 16	1 ... 12 month	X0, Y0
	110Ch	1	Daylight Saving Number of Sunday to increase hour (+1H)	UINT 16	0 ... 4 (if 0 is last Sunday on month)	X0, Y0
	110Dh	1	Daylight Saving Hour to increase hour (+1H)	UINT 16	0 ... 23 (only in 24h format)	X0, Y0
	110Eh	1	Daylight Saving Month to decrease hour (-1H)	UINT 16	1 ... 12 month	X0, Y0
	110Fh	1	Daylight Saving Number of Sunday to decrease hour (-1H)	UINT 16	0 ... 4 (if 0 is last Sunday on month)	X0, Y0
	1110h	1	Daylight Saving Hour to decrease hour (-1H)	UINT 16	0 ... 23 (only in 24h format)	X0, Y0
	1111h	1	DMD Variable 1	INT 16	Refer to Code Variables List If value = 0xFF is disabile. It's possible modify this area only after send command 3057h which stop and reset DB DMD System. For unlock this area and restart the DB DMD system have to send command 3058h Please Attention !!!	Y0
	1112h	1	DMD Variable 2	INT 16		Y0
	1113h	1	DMD Variable 3	INT 16		Y0
	1114h	1	DMD Variable 4	INT 16		Y0
	1115h	1	DMD Variable 5	INT 16		Y0
	1116h	1	DMD Variable 6	INT 16		Y0
	1117h	1	DMD Variable 7	INT 16		Y0
	1118h	1	DMD Variable 8	INT 16		Y0
	1119h	1	DMD Variable 9	INT 16		Y0
	111Ah	1	DMD Variable 10	INT 16		Y0
	111Bh	1	DMD Variable 11	INT 16		Y0
	111Ch	1	DMD Variable 12	INT 16		Y0
	111Dh	1	DMD Variable 13	INT 16		Y0
	111Eh	1	DMD Variable 14	INT 16		Y0
	111Fh	1	DMD Variable 15	INT 16		Y0
	1120h	1	DMD Variable 16	INT 16		Y0
	1121h	1	DMD Variable 17	INT 16		Y0
	1122h	1	DMD Variable 18	INT 16		Y0
	1123h	1	DMD Variable 19	INT 16		Y0
	1124h	1	DMD Variable 20	INT 16		Y0
	1125h	1	Type calculate enable:	INT 16	Value=0: NO; Value=1: YES; Bit 0: DMD Bit 1: MAX Bit 2: MIN It's possible modify this area only after send command 3057h which	Y0

					stop and reset DB DMD System. For unlock this area and restart the DB DMD system have to send command 3058h Please Attention !!!	
	1126h	1	Nbr of Variables enable	INT 16	Read only !	Y0
	1150h	1	IP Address (**A**.B.C.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255	X0, Y0
	1151h	1	IP Address (A.**B**.C.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255	X0, Y0
	1152h	1	IP Address (A.B.**C**.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255	X0, Y0
	1153h	1	IP Address (A.B.C.**D**)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255	X0, Y0
	1154h	1	Subnet mask (**A**.B.C.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255	X0, Y0
	1155h	1	Subnet mask (A.**B**.C.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255	X0, Y0
	1156h	1	Subnet mask (A.B.**C**.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255	X0, Y0
	1157h	1	Subnet mask (A.B.C.**D**)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255	X0, Y0
	1158h	1	Default Gateway (**A**.B.C.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255	X0, Y0
	1159h	1	Default Gateway (A.**B**.C.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255	X0, Y0
	115Ah	1	Default Gateway (A.B.**C**.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255	X0, Y0
	115Bh	1	Default Gateway (A.B.C.**D**)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255	X0, Y0
	115Ch	1	Modbus TCP/IP port	UINT 16	Value min = 1 Value max = 9999 (default = 502)	X0, Y0
	115Dh	1	Bacnet Port	UINT 16	Value min = 1 Value max = 65535 (default = 0xBAC0)	X0, Y0
	115Eh	1	Bacnet Device Object Instance Number (LSB) (Bacnet ID)	UINT 16	Value min = 0 Value max = 9999	X0, Y0
	115Fh	1	Bacnet Device Object Instance Number (LSB)	UINT 16	Value min = 0 Value max = 65535	X0, Y0
	1160h	1	Update Ethernet	UINT 16	Value min = 0 Value max = 1 (when configuration is changed)	X0, Y0

(*) Values are update only when the command "update clock" is sent.
(**)Note: To activate the new configuration of the ethernet interface it is necessary to send the "updating of ethernet configuration" command (refer to 2.18.25) or switch off and on the instrument.

2.12.5 Analogue output (Module Ref. 9 and Module Ref. 10)

MODBUS: Read and write mode **Table 2.12-7**

Modicom	Physical	Length	VARIABLE	Data	Notes	Firmware

address	address	(words)	ENG. UNIT	Format		compatibility
	1200h	16	Analogue output A0 configuration parameters	Custom Ouput data structure	Refer to Table 2.12-8	X0, Y0
	1210h	16	Analogue output A1 configuration parameters	Custom Ouput data structure		X0, Y0
	1220h	16	Analogue output A2 configuration parameters	Custom Ouput data structure		Y0
	1230h	16	Analogue output A3 configuration parameters	Custom Ouput data structure		Y0

Analogue output configuration parameters **Table 2.12-8**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
Block address +0	Block address +0	1	Type of variable that is linked to **N** analogue output	UINT 16	Refer to 0 Code Variables List	X0, Y0
Block address +1	Block address +1	2	Minimum electric value for **N** analogue output	32 bit IEEE 754	Value min = -9999M Value max = 9999M (Value min = 0.0 for X1 and X0)	X2, Y0
Block address +3	Block address +3	2	Maximum electric value for **N** analogue output	32 bit IEEE 754		
Block address +5	Block address +5	2	Minimum output value for **N** analogue output	32 bit IEEE 754	Value min = 0.0 Value max = 100.0	X0, Y0
Block address +7	Block address +7	2	Maximum output value for **N** analogue output	32 bit IEEE 754		
Block address +9	Block address +9	7	*Reserved*			X0, Y0

2.12.6 Relay / Opto-Mos output (Module Ref. 11 and Module Ref. 12)

MODBUS: Read and write mode **Table 2.12-9**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	1300h	1	Digital output channel 1: Enabling	UINT16	0=Remote; 1=Alarm; 2= Pulse	X0, Y0
	1301h	1	Digital output channel 1: Output status	UINT16	0=NO; 1=NC (only if selected “Alarm” type)	X0, Y0
	1302h	1	Digital output channel 1:Alarm Joined	UINT16	0=AL1; 1=AL2; 2=AL3; 3=AL4 (only if selected “Alarm” type)	X0
	1303h	1	Channel 1 Counter Variable Joined	UINT16	0=Total KWh+; 1=Total Kvarh+; 2=Total KWh-; 3=Total Kvarh-; 4=Partial KWh+; 5= Partial Kvarh+; 6= Partial KWh-; 7= Partial Kvarh-;	X0, Y0
	1304h	2	Digital Output channel 1 Pulse	32 bit IEEE 754	Pulse weight [KWh/pulse] or [KVarh/pulse]. Value min = 0.001 Value max = 9999.9	X0, Y0
	1306h	1	Digital output channel 2: Enabling	UINT16	0=Remote; 1=Alarm; 2= Pulse;	X0, Y0
	1307h	1	Digital output channel 2: Output status	UINT16	0=NO; 1=NC (only if selected “Alarm” type)	X0, Y0
	1308h	1	Digital output channel 2:Alarm Joined	UINT16	0=AL1; 1=AL2; 2=AL3; 3=AL4 (only if selected “Alarm” type)	X0
	1309h	1	Channel 2 Counter Variable Joined	UINT16	0=Total KWh+; 1=Total Kvarh+; 2=Total KWh-; 3=Total Kvarh-; 4=Partial KWh+; 5= Partial Kvarh+; 6= Partial KWh-; 7= Partial Kvarh-;	X0, Y0
	130Ah	2	Digital Output channel 2 Pulse	32 bit IEEE 754	Pulse weight [KWh/pulse] or [KVarh/pulse]. Value min = 0.001 Value max = 9999.0	X0, Y0

2.12.7 Digital Inputs and Outputs (Module Ref. 13 and Module Ref. 14)

MODBUS: Read and write mode **Table 2.12-10**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	1310h	16	Digital output O3 configuration parameters	Custom data structure		Y0
	1320h	16	Digital output O4 configuration parameters	Custom data structure		Y0
	1330h	16	Digital output O5 configuration parameters	Custom data structure		Y0
	1340h	16	Digital output O6 configuration parameters	Custom data structure		Y0
	1350h	16	Digital output O7 configuration parameters	Custom data structure	Only for **M F I6 O6 – module ref 14**	Y0
	1360h	16	Digital output O8 configuration parameters	Custom data structure	Only for **M F I6 O6 – module ref 14**	Y0
	1380h	16	Digital input I1 configuration parameters	Custom data structure		Y0
	1390h	16	Digital input I2 configuration parameters	Custom data structure		Y0
	13A0h	16	Digital input I3 configuration parameters	Custom data structure		Y0
	13B0h	16	Digital input I4 configuration parameters	Custom data structure		Y0
	13C0h	16	Digital input I5 configuration parameters	Custom data structure		Y0
	13D0h	16	Digital input I6 configuration parameters	Custom data structure		Y0

Digital output configuration parameters **Table 2.12-11**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
Block address +0	Block address +0	1	Digital output channel Enabling	UINT16	0=Remote; 1=Alarm; 2= Pulse (Only for **M F I6 O6 – module ref 14)**	Y0
Block address +1	Block address +1	1	Digital output channel Output status	UINT16	0=NO; 1=NC (only if selected "Alarm" type)	Y0
Block address +2	Block address +2	1	Channel Counter Variable Joined	UINT16	0=Total KWh+; 1=Total Kvarh+; 2=Total KWh-; 3=Total Kvarh-; 4=Partial KWh+; 5= Partial Kvarh+; 6= Partial KWh-; 7= Partial Kvarh-;	Y0
Block address +3	Block address +3	2	Digital Output channel Pulse	32 bit IEEE 754	Pulse weight [KWh/pulse] or [KVarh/pulse]. Value min = 0.001 Value max = 9999.0	Y0
Block address +6	Block address +6		*Reserved*			Y0

Digital input configuration parameters **Table 2.12-12**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
Block address +0	Block address +0	1	Digital input channel function	UINT 16	Value=0: Remote input channel status (1); Value=1: Tariff change (2); Value=2: Water, gas and remote heating (3); Value=3: Remote alarm reset (4); Value=4: Trip counter of protection (5); Value=5: Synch (dmd) (6); Value=6: Energy counting (7);	Y0
Block address +1	Block address +1	1	Reserved	UINT 16		Y0
Block address +2	Block address +2	1	Digital input channel totalizer type	UINT 16	Value=0: GAS Value=1: COLD H2O Value=2: HOT H2O Value=3: REMOTE HEAT Only in case of « Water, gas and remote heating (3)»	Y0

Block address +4	Block address +4	2	Digital input pulses	32 bit IEEE 754	Pulse weight: [KWh/pulse] or [KVarh/pulse]. Value min = 0.001 Value max = 9999.0 Only in case of « Water, gas and remote heating » or « Energy counting »	Y0
Block address +6	Block address +6	10	*Reserved*			Y0

Note: every single digital input can be configured according to the table below.

Function	Note	Digital inputs					
		1	2	3	4	5	6
Synch (dmd)	At each status change from OFF(1) to ON(0)	YES					
Tariff change	<table><tr><th>Current Tariff</th><th>Digital CH 1</th><th>Digital CH 2</th><th>Digital CH 3</th></tr><tr><td>Tariff 1</td><td>0</td><td>0</td><td>0</td></tr><tr><td>Tariff 2</td><td>1</td><td>0</td><td>0</td></tr><tr><td>Tariff 3</td><td>0</td><td>1</td><td>0</td></tr><tr><td>Tariff 4</td><td>1</td><td>1</td><td>0</td></tr><tr><td>Tariff 5</td><td>0</td><td>0</td><td>1</td></tr><tr><td>Tariff 6</td><td>1</td><td>0</td><td>1</td></tr><tr><td>*(Default Tariff)*</td><td>X</td><td>1</td><td>1</td></tr></table> In case of incoherent programming the system uses default tariff	YES	YES	YES			
Hot Water	Digital input ch 4 is joined only with C-1 counter				YES	YES	YES
Cold Water	Digital input ch 5 is joined only with C-2 counter				YES	YES	YES
Gas	Digital input ch 6 is joined only with C-3 counter				YES	YES	YES
Remote heating					YES	YES	YES
Remote alarm reset	At each status change from OFF(1) to ON(0)				YES		
Trip counter of protection	Digital input ch 4 is joined only with C-1 counter				YES		
Remote input channel status		YES	YES	YES	YES	YES	YES
kWh counting (-)				YES			
kWh counting (+)					YES		
kvarh counting (+)						YES	

MODBUS: Read and write mode **Table 2.12-13**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	1400h	1	Tariff from watch/input	UINT16	Value=0: disabled Value=1: Tariff selection by clock Value=2: Tariff selection by digital inputs	Y0
	1401h	1	Working days	UINT16	Set 1 if is working day. 0 else Value: Sunday 0 Monday 1 Tuesday 2 Wednesday 3 Thursday 4 Friday 5 Saturday 6	Y0
	1402h	1	Period 1 start	UINT16	The format is mmdd Value < 101 is disabled	Y0
	1403h	1	Period 1 stop	UINT16		Y0
	1404h	1	Period 2 start	UINT16	The format is mmdd Value < 101 is disabled	Y0
	1405h	1	Period 2 stop	UINT16		Y0
	1406h	1	Time Slot 1 for Period 1 start	UINT16	The format is hhmm (24h format)	Y0
	1407h	1	Time Slot 1 for Period 1 stop	UINT16	The format is hhmm (24h format)	Y0
	1408h		Joined Tariff for Time Slot 1 and Period 1	UINT16	Value=0: tariff 1; Value=1: tariff 2; Value=2: tariff 3; Value=3: tariff 4; Value=4: tariff 5; Value=5: tariff 6; Value=6: disabled;	Y0
	1409h	1	Time Slot 1 for Period 2 start	UINT16	The format is hhmm (24h format)	Y0
	140Ah	1	Time Slot 1 for Period 2 stop	UINT16	The format is hhmm (24h format)	Y0
	140Bh		Joined Tariff for Time Slot 1 and Period 2	UINT16	Value=0: tariff 1; Value=1: tariff 2; Value=2: tariff 3; Value=3: tariff 4; Value=4: tariff 5; Value=5: tariff 6; Value=6: disabled;	Y0
	140Ch	1	Time Slot 2 for Period 1 start	UINT16	The format is hhmm (24h format)	Y0
	140Dh	1	Time Slot 2 for Period 1 stop	UINT16	The format is hhmm (24h format)	Y0
	140Eh		Joined Tariff for Time Slot 2 and Period 1	UINT16	Value=0: tariff 1; Value=1: tariff 2; Value=2: tariff 3; Value=3: tariff 4; Value=4: tariff 5; Value=5: tariff 6; Value=6: disabled;	Y0
	140Fh	1	Time Slot 2 for Period 2 start	UINT16	The format is hhmm (24h format)	Y0
	1410h	1	Time Slot 2 for Period 2 stop	UINT16	The format is hhmm (24h format)	Y0

	1411h		Joined Tariff for Time Slot 2 and Period 2	UINT16	Value=0: tariff 1; Value=1: tariff 2; Value=2: tariff 3; Value=3: tariff 4; Value=4: tariff 5; Value=5: tariff 6; Value=6: disabled;	Y0
	1412h	1	Time Slot 3 for Period 1 start	UINT16	The format is hhmm (24h format)	Y0
	1413h	1	Time Slot 3 for Period 1 stop	UINT16	The format is hhmm (24h format)	Y0
	1414h		Joined Tariff for Time Slot 3 and Period 1	UINT16	Value=0: tariff 1; Value=1: tariff 2; Value=2: tariff 3; Value=3: tariff 4; Value=4: tariff 5; Value=5: tariff 6; Value=6: disabled;	Y0
	1415h	1	Time Slot 3 for Period 2 start	UINT16	The format is hhmm (24h format)	Y0
	1416h	1	Time Slot 3 for Period 2 stop	UINT16	The format is hhmm (24h format)	Y0
	1417h		Joined Tariff for Time Slot 3 and Period 2	UINT16	Value=0: tariff 1; Value=1: tariff 2; Value=2: tariff 3; Value=3: tariff 4; Value=4: tariff 5; Value=5: tariff 6; Value=6: disabled;	Y0
	1418h	1	Time Slot 4 for Period 1 start	UINT16	The format is hhmm (24h format)	Y0
	1419h	1	Time Slot 4 for Period 1 stop	UINT16	The format is hhmm (24h format)	Y0
	141Ah		Joined Tariff for Time Slot 4 and Period 1	UINT16	Value=0: tariff 1; Value=1: tariff 2; Value=2: tariff 3; Value=3: tariff 4; Value=4: tariff 5; Value=5: tariff 6; Value=6: disabled;	Y0
	141Bh	1	Time Slot 4 for Period 2 start	UINT16	The format is hhmm (24h format)	Y0
	141Ch	1	Time Slot 4 for Period 2 stop	UINT16	The format is hhmm (24h format)	Y0
	141Dh		Joined Tariff for Time Slot 4 and Period 2	UINT16	Value=0: tariff 1; Value=1: tariff 2; Value=2: tariff 3; Value=3: tariff 4; Value=4: tariff 5; Value=5: tariff 6; Value=6: disabled;	Y0
	141Eh	1	Time Slot 5 for Period 1 start	UINT16	The format is hhmm (24h format)	Y0
	141Fh	1	Time Slot 5 for Period 1 stop	UINT16	The format is hhmm (24h format)	Y0
	1420h		Joined Tariff for Time Slot 5 and Period 1	UINT16	Value=0: tariff 1; Value=1: tariff 2; Value=2: tariff 3; Value=3: tariff 4; Value=4: tariff 5; Value=5: tariff 6; Value=6: disabled;	Y0
	1421h	1	Time Slot 5 for Period 2 start	UINT16	The format is hhmm (24h format)	Y0
	1422h	1	Time Slot 5 for Period 2 stop	UINT16	The format is hhmm (24h format)	Y0
	1423h		Joined Tariff for Time Slot 5 and Period 2	UINT16	Value=0: tariff 1; Value=1: tariff 2; Value=2: tariff 3; Value=3: tariff 4; Value=4: tariff 5; Value=5: tariff 6; Value=6: disabled;	Y0
	1424h	1	Time Slot 6 for Period 1 start	UINT16	The format is hhmm (24h format)	Y0
	1425h	1	Time Slot 6 for Period 1 stop	UINT16	The format is hhmm (24h format)	Y0
	1426h		Joined Tariff for Time Slot 6 and Period 1	UINT16	Value=0: tariff 1; Value=1: tariff 2; Value=2: tariff 3; Value=3: tariff 4; Value=4: tariff 5; Value=5: tariff 6; Value=6: disabled;	Y0
	1427h	1	Time Slot 6 for Period 2 start	UINT16	The format is hhmm (24h format)	Y0
	1428h	1	Time Slot 6 for Period 2 stop	UINT16	The format is hhmm (24h format)	Y0
	1429h		Joined Tariff for Time Slot 6 and Period 2	UINT16	Value=0: tariff 1; Value=1: tariff 2; Value=2: tariff 3; Value=3: tariff 4; Value=4: tariff 5; Value=5: tariff 6; Value=6: disabled;	Y0
	142Ah	1	Joined Tariff for Holiday	UINT16	Value=0: tariff 1; Value=1: tariff 2; Value=2: tariff 3; Value=3: tariff 4; Value=4: tariff 5; Value=5: tariff 6; Value=6: disabled;	Y0
	142Bh	1	Holiday1 start	UINT16	The format is mmdd Value < 101 is disabled	Y0
	142Ch	1	Holiday1 stop	UINT16		Y0
	142Dh	1	Holiday2 start	UINT16		Y0
	142Eh	1	Holiday2 stop	UINT16		Y0
	142Fh	1	Holiday3 start	UINT16		Y0
	1430h	1	Holiday3 stop	UINT16		Y0
	1431h	1	Holiday4 start	UINT16		Y0
	1432h	1	Holiday4 stop	UINT16		Y0
	1433h	1	Holiday5 start	UINT16		Y0
	1434h	1	Holiday5 stop	UINT16		Y0
	1435h	1	Holiday6 start	UINT16		Y0
	1436h	1	Holiday6 stop	UINT16		Y0
	1437h	1	Holiday7 start	UINT16		Y0
	1438h	1	Holiday7 stop	UINT16		Y0
	1439h	1	Holiday8 start	UINT16		Y0
	143Ah	1	Holiday8 stop	UINT16		Y0
	143Bh	1	Holiday9 start	UINT16		Y0
	143Ch	1	Holiday9 stop	UINT16		Y0
	143Dh	1	Holiday10 start	UINT16		Y0

	143Eh	1	Holiday10 stop	UINT16		Y0
	143Fh	1	Default Tariff	UINT16	Value=0: tariff 1; Value=1: tariff 2; Value=2: tariff 3; Value=3: tariff 4; Value=4: tariff 5; Value=5: tariff 6; Value=6: disabled; In case of incoherent programming the system uses this tariff	Y0

2.12.8 Direct neutral current measurement + Temperature + Process signal measurements (°C/°F) (Module Ref. 16 and 17)

MODBUS: Read and write mode **Table 2.12-14**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	1600h	1	Temperature Engineering unit	UINT 16	0=Celsius; 1=Fahrenheit	Y0
	1601h	1	Temperature Probe	UINT 16	0=Pt100 3W; 1=Pt100 2W; 2=Pt1000 3W; 3=Pt1000 2W;	Y0
	1602h	2	Process Signal Electrical Scale Low	32 bit IEEE 754	-20.0...20.0 (mA)	Y0
	1604h	2	Process Signal Electrical Scale High	32 bit IEEE 754	-20.0...20.0 (mA)	Y0
	1606h	2	Process Signal Display Scale Low	32 bit IEEE 754	-9999M...9999M	Y0
	1608h	2	Process Signal Display Scale High	32 bit IEEE 754	-9999M...9999M	Y0
	16A0h	2	Current RATIO	32 bit IEEE 754	1...9999	Y0

2.12.9 Table of commands

MODBUS: write only mode **Table 2.12-15**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	3050h	1	Get clock values	UINT 16	Value=1: command is executed; other values: no effect	X0, Y0
	3051h	1	Set clock values	UINT 16	Value=1: set data & time	X0, Y0
					Value=2: set only time (please use this command for sync - Without generate any events)	X2, Y0
	3052h	1	(*) External Serial communication configuration updating / Ethernet communication configuration updating	UINT 16	Value=1: command is executed; other values: no effect	X0, Y0
	3053h	1	(*) Optical Serial communication configuration updating	UINT 16	Value=1: command is executed; other values: no effect	Y0
	3054h	1	Set/reset MOR2	UINT 16	Value=1: enabled module; Value=0: disable module;	X0, Y0
	3055h	1	Set/reset MO02	UINT 16	Value=1: enabled module; Value=0: disable module;	X0, Y0
	3056h	1	Set/reset MC232485	UINT 16	Value=1: enabled module; Value=0: disable module;	X0, Y0
	3057h	1	Stop DB DMD and unlock dmd area. This command also reset all DB DMD indices	UINT 16	Value=1: command is executed; other values: no effect	Y0
	3058h	1	Restart DB DMD and lock dmd area	UINT 16	Value=1: command is executed; other values: no effect	Y0
	3080h	1	Set clock values with hour and minute Without generate any events	UINT 16		X2, Y0
	3100h	1	Reset all Remote outputs (MOR2 / MO02)	UINT 16	Value=1: command is executed; other values: no effect	X0, Y0
	3101h	1	Remote output command on port 1 (MOR2 / MOO2)	UINT 16	Value=0: reset port; Value=1: set port; other values: no effect	X0, Y0
	3102h	1	Remote output command on port 2 (MOR2 / MOO2)	UINT 16	Value=0: reset port; Value=1: set port; other values: no effect	X0, Y0
	3103h	1	Set all Remote outputs (MOR2 / MOO2)	UINT 16	Value=1: command is executed; other values: no effect	X0, Y0
	3104h	1	Reset all Remote outputs (MFI6O6 / MFI6R4)	UINT 16	Value=1: command is executed; other values: no effect	Y0
	3105h	1	Remote output command on port 3 (MFI6O6 / MFI6R4)	UINT 16	Value=0: reset port; Value=1: set port; other values: no effect	Y0

	3106h	1	Remote output command on port 4 (MFI6O6 / MFI6R4)	UINT 16	Value=0: reset port; Value=1: set port; other values: no effect	Y0
	3107h	1	Remote output command on port 5 (MFI6O6 / MFI6R4)	UINT 16	Value=0: reset port; Value=1: set port; other values: no effect	Y0
	3108h	1	Remote output command on port 6 (MFI6O6 / MFI6R4)	UINT 16	Value=0: reset port; Value=1: set port; other values: no effect	Y0
	3109h	1	Remote output command on port 7 (MFI6O6 / MFI6R4)	UINT 16	Value=0: reset port; Value=1: set port; other values: no effect	Y0
	310Ah	1	Remote output command on port 8 (MFI6O6 / MFI6R4)	UINT 16	Value=0: reset port; Value=1: set port; other values: no effect	Y0
	310Bh	1	Set all Remote outputs (MFI6O6 / MFI6R4)	UINT 16	Value=1: command is executed; other values: no effect	Y0
	3150h	1	Reset all latch status	UINT 16	Value=1: command is executed; other values: no effect	Y0
	3200h	1	Reset V L1-N	UINT 16	Bit1 = Max Value (X0, Y0) Bit2 = DMD (X0, Y0) Bit3 = DMD Max Value (Y0) Bit4 = Min Value (Y0) Where bit is set to "1" there is reset	
	3201h	1	Reset V L2-N	UINT 16		
	3202h	1	Reset V L3-N	UINT 16		
	3203h	1	Reset V L-N $\sum$	UINT 16		
	3204h	1	Reset V L1-L2	UINT 16		
	3205h	1	Reset V L2-L3	UINT 16		
	3206h	1	Reset V L3-L1	UINT 16		
	3207h	1	Reset V L-L $\sum$	UINT 16		
	3208h	1	Reset A L1	UINT 16		
	3209h	1	Reset A L2	UINT 16		
	320Ah	1	Reset A L3	UINT 16		
	320Bh	1	Reset A N	UINT 16		
	320Ch	1	Reset W L1	UINT 16		
	320Dh	1	Reset W L2	UINT 16		
	320Eh	1	Reset W L3	UINT 16		
	320Fh	1	Reset W $\sum$	UINT 16		
	3210h	1	Reset VA L1	UINT 16		
	3211h	1	Reset VA L2	UINT 16		
	3212h	1	Reset VA L3	UINT 16		
	3213h	1	Reset VA $\sum$	UINT 16		
	3214h	1	Reset VAR L1	UINT 16		
	3215h	1	Reset VAR L2	UINT 16		
	3216h	1	Reset VAR L3	UINT 16		
	3217h	1	Reset VAR $\sum$	UINT 16		
	3218h	1	Reset PF L1	UINT 16		
	3219h	1	Reset PF L2	UINT 16		
	321Ah	1	Reset PF L3	UINT 16		
	321Bh	1	Reset PF $\sum$	UINT 16		
	321Ch	1	Reset Hz	UINT 16		
	321Dh	1	Reset Asymmetry L-N %	UINT 16		
	321Eh	1	Reset Asymmetry L-L %	UINT 16		
			RESERVED			
	3220h	1	Reset K Factor L1	UINT 16	Bit1 = Max Value (X0, Y0) Bit2 = DMD (X0, Y0) Bit3 = DMD Max Value (Y0) Bit4 = Min Value (Y0) Where bit is set to "1" there is reset	
	3221h	1	Reset K Factor L2	UINT 16		
	3222h	1	Reset K Factor L3	UINT 16		
	3223h	1	Reset Temperature	UINT 16		
	3224h	1	Reset Analogue Input	UINT 16		
	3225h	1	THD tot VL1-N	UINT 16	Bit1 = Max Value (X0, Y0) Bit2 = DMD (X0, Y0) Bit3 = DMD Max Value (Y0) Bit4 = Min Value (Y0) Where bit is set to "1" there is reset	
	3226h	1	THD tot VL2-N	UINT 16		
	3227h	1	THD tot VL3-N	UINT 16		
	3228h	1	THD tot VL12	UINT 16		
	3229h	1	THD tot VL23	UINT 16		
	322Ah	1	THD tot VL31	UINT 16		
	322Bh	1	THD tot AL1	UINT 16		
	322Ch	1	THD tot AL2	UINT 16		
	322Dh	1	THD tot AL3	UINT 16		
	322Eh	1	THD odd VL1-N	UINT 16		
	322Fh	1	THD odd VL2-N	UINT 16		
	3230h	1	THD odd VL3-N	UINT 16		
	3231h	1	THD odd VL12	UINT 16		
	3232h	1	THD odd VL23	UINT 16		
	3233h	1	THD odd VL31	UINT 16		
	3234h	1	THD odd AL1	UINT 16		
	3235h	1	THD odd AL2	UINT 16		
	3236h	1	THD odd AL3	UINT 16		
	3237h	1	THD even VL1-N	UINT 16		

	3238h	1	THD even VL2-N	UINT 16		
	3239h	1	THD even VL3-N	UINT 16		
	323Ah	1	THD even VL12	UINT 16		
	323Bh	1	THD even VL23	UINT 16		
	323Ch	1	THD even VL31	UINT 16		
	323Dh	1	THD even AL1	UINT 16		
	323Eh	1	THD even AL2	UINT 16		
	323Fh	1	THD even AL3	UINT 16		
	3240h	1	TDD AL1	UINT 16		
	3241h	1	TDD AL2	UINT 16		
	3242h	1	TDD AL3	UINT 16		
	3500h	1	Reset Total KWh+	UINT 16	Value=1: command is executed	X0, Y0
	3501h	1	Reset Total Kvarh+	UINT 16	Value=1: command is executed	X0, Y0
	3502h	1	Reset Total KWh-	UINT 16	Value=1: command is executed	X0, Y0
	3503h	1	Reset Total Kvarh-	UINT 16	Value=1: command is executed	X0, Y0
	3504h	1	Reset Partial KWh+	UINT 16	Value=1: command is executed	X0, Y0
	3505h	1	Reset Partial Kvarh+	UINT 16	Value=1: command is executed	X0, Y0
	3506h	1	Reset Partial KWh-	UINT 16	Value=1: command is executed	X0, Y0
	3507h	1	Reset Partial Kvarh-	UINT 16	Value=1: command is executed	X0, Y0
	3508h	1	Reset Run Hours	UINT 16	Value=1: command is executed	X0, Y0
	3509h	1	Reset Tariff 1 KWh+	UINT 16	Value=1: command is executed	Y0
	350Ah	1	Reset Tariff 1 Kvarh+	UINT 16	Value=1: command is executed	Y0
	350Bh	1	Reset Tariff 1 KWh-	UINT 16	Value=1: command is executed	Y0
	350Ch	1	Reset Tariff 1 Kvarh-	UINT 16	Value=1: command is executed	Y0
	350Dh	1	Reset Tariff 2 KWh+	UINT 16	Value=1: command is executed	Y0
	350Eh	1	Reset Tariff 2 Kvarh+	UINT 16	Value=1: command is executed	Y0
	350Fh	1	Reset Tariff 2 KWh-	UINT 16	Value=1: command is executed	Y0
	35A0h	1	Reset Tariff 2 Kvarh-	UINT 16	Value=1: command is executed	Y0
	35A1h	1	Reset Tariff 3 KWh+	UINT 16	Value=1: command is executed	Y0
	35A2h	1	Reset Tariff 3 Kvarh+	UINT 16	Value=1: command is executed	Y0
	35A3h	1	Reset Tariff 3 KWh-	UINT 16	Value=1: command is executed	Y0
	35A4h	1	Reset Tariff 3 Kvarh-	UINT 16	Value=1: command is executed	Y0
	35A5h	1	Reset Tariff 4 KWh+	UINT 16	Value=1: command is executed	Y0
	35A6h	1	Reset Tariff 4 Kvarh+	UINT 16	Value=1: command is executed	Y0
	35A7h	1	Reset Tariff 4 KWh-	UINT 16	Value=1: command is executed	Y0
	35A8h	1	Reset Tariff 4 Kvarh-	UINT 16	Value=1: command is executed	Y0
	35A9h	1	Reset Tariff 5 KWh+	UINT 16	Value=1: command is executed	Y0
	35AAh	1	Reset Tariff 5 Kvarh+	UINT 16	Value=1: command is executed	Y0
	35ABh	1	Reset Tariff 5 KWh-	UINT 16	Value=1: command is executed	Y0
	35ACh	1	Reset Tariff 5 Kvarh-	UINT 16	Value=1: command is executed	Y0
	35ADh	1	Reset Tariff 6 KWh+	UINT 16	Value=1: command is executed	Y0
	35AEh	1	Reset Tariff 6 Kvarh+	UINT 16	Value=1: command is executed	Y0
	35AFh	1	Reset Tariff 6 KWh-	UINT 16	Value=1: command is executed	Y0
	35B1h	1	Reset Tariff 6 Kvarh-	UINT 16	Value=1: command is executed	Y0
	35B2h	1	Reset C1	UINT 16	Value=1: command is executed	Y0
	35B3h	1	Reset C2	UINT 16	Value=1: command is executed	Y0
	35B4h	1	Reset C3	UINT 16	Value=1: command is executed	Y0
	3600h	1	Reset DB - DMD	UINT 16	Value=1: command is executed; other values: no effect	Y0
	3601h	1	Reset DB – Events	UINT 16	Value=1: command is executed; other values: no effect	Y0
	3602h	1	Reset DB - Load Profiling	UINT 16	Value=1: command is executed; other values: no effect	Y0

(*) Wait at least 6 seconds before communicate with the new parameters

2.12.10 Status

MODBUS: Read mode **Table 2.12-16**

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
	4000h	1	Virtual Alarm	UINT 16		X0, Y0
	4001h	1	Output	UINT 16	Port vs LSB Bit (0=OFF; 1 = ON; only if port isn't linked with counter) Port vs LSB Bit: Port1 0 Port2 1	X0, Y0

	4001h	1	Output	UINT 16	Port vs LSB Bit (0=OFF; 1 = ON; only if port isn't linked with counter) Port3 2 Port4 3 Port5 4 Port6 5 Port7 6 Port8 7 Port vs MSB Bit (0=alarm or remote config port; 1 = pulse config port) Port1 8 Port2 9 Port3 10 Port4 11 Port5 12 Port6 13 Port7 14 Port8 15	Y0
	4002h	1	HW Config Modules	UINT 16	Bit: HW_MOR2 0 HW_MOO2 1 HW_MC232485 2 HW_MCETH 3 HW_MCBACIP 4 HW_MOA2 5 HW_MOV2 6	X0
	4002h	1	HW Config Modules	UINT 16	Bit: HW_MOR2 0 HW_MOO2 1 HW_MC232485 2 HW_MCETH 3 HW_MCBACIP 4 HW_MOA2 5 HW_MOV2 6 HW_MFI6R4 7 HW_MFI6O6 8 HW_MATP 9 HW_MATPN 10 HW_MEMORY 11 HW_MOA2 (pos 2) 12 HW_MOV2 (pos 2) 13	Y0
	4003h	1	Input	UINT 16	Bit: Port1 0 Port2 1 Port3 2 Port4 3 Port5 4 Port6 5 (1(OFF)=open, 0(ON)=close)	Y0
	4004h	1	Output setup	UINT 16	Port vs LSB Bit (0=NO; 1=NC;) Port3 2 Port4 3 Port5 4 Port6 5 Port7 6 Port8 7	Y0
	4005h	1	Input preovious state	UINT 16	Bit: Port1 0 Port2 1 Port3 2 Port4 3 Port5 4 Port6 5 (1(OFF)=open, 0(ON)=close)	Y0

2.12.11 Code Variables List

Protocol Code X0	Protocol Code Y0	VARIABLE ENG. UNIT	Notes	Firmware compatibility
0	0	V L1-N		X0, Y0
1	1	V L2-N		X0, Y0
2	2	V L3-N		X0, Y0
3	3	V L-N $\sum$		X0, Y0

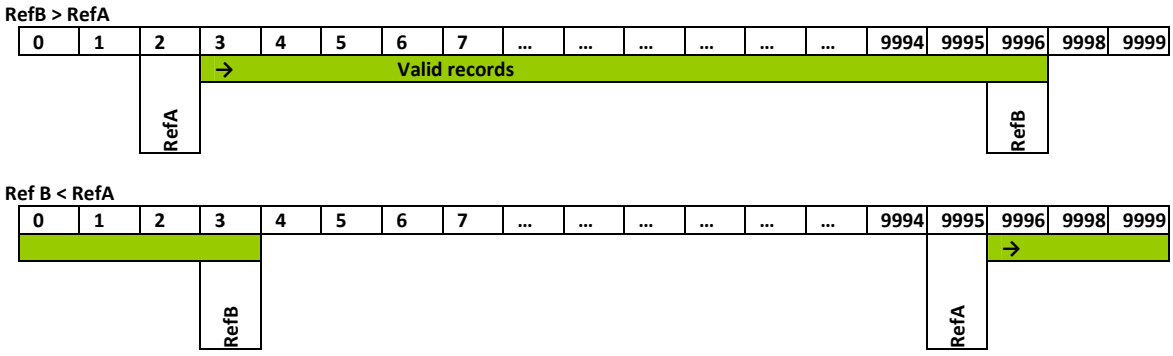
4	4	V L1-L2		X0, Y0
5	5	V L2-L3		X0, Y0
6	6	V L3-L1		X0, Y0
7	7	V L-L ∑		X0, Y0
8	8	A L1		X0, Y0
9	9	A L2		X0, Y0
10	10	A L3		X0, Y0
11	11	A N		X0, Y0
12	12	W L1		X0, Y0
13	13	W L2		X0, Y0
14	14	W L3		X0, Y0
15	15	W ∑		X0, Y0
16	16	VA L1		X0, Y0
17	17	VA L2		X0, Y0
18	18	VA L3		X0, Y0
19	19	VA ∑		X0, Y0
20	20	VAR L1		X0, Y0
21	21	VAR L2		X0, Y0
22	22	VAR L3		X0, Y0
23	23	VAR ∑		X0, Y0
24	24	PF L1		X0, Y0
25	25	PF L2		X0, Y0
26	26	PF L3		X0, Y0
27	27	PF ∑		X0, Y0
28	28	Hz		X0, Y0
29	29	Asymmetry L-N %		X0, Y0
30	30	Asymmetry L-L %		X0, Y0
31	31	Phase sequence		X0, Y0
	32	K-Factor L1		Y0
	33	K-Factor L2		Y0
	34	K-Factor L3		Y0
	35	Temperature		Y0
	36	Analogue Input		Y0
32	37	THD tot VL1-N		X0, Y0
33	38	THD tot VL2-N		X0, Y0
34	39	THD tot VL3-N		X0, Y0
35	40	THD tot VL12		X0, Y0
36	41	THD tot VL23		X0, Y0
37	42	THD tot VL31		X0, Y0
38	43	THD tot AL1		X0, Y0
39	44	THD tot AL2		X0, Y0
40	45	THD tot AL3		X0, Y0
	46	THD odd VL1-N		Y0
	47	THD odd VL2-N		Y0
	48	THD odd VL3-N		Y0
	49	THD odd VL12		Y0
	50	THD odd VL23		Y0
	51	THD odd VL31		Y0
	52	THD odd AL1		Y0
	53	THD odd AL2		Y0
	54	THD odd AL3		Y0
	55	THD even VL1-N		Y0
	56	THD even VL2-N		Y0
	57	THD even VL3-N		Y0
	58	THD even VL12		Y0
	59	THD even VL23		Y0
	60	THD even VL31		Y0
	61	THD even AL1		Y0
	62	THD even AL2		Y0
	63	THD even AL3		Y0
	64	TDD tot AL1		Y0
	65	TDD tot AL2		Y0
	66	TDD tot AL3		Y0

3 Database System

The integers are represented in UINT16 (16 bit) or UINT32(32 bit) or UINT64 (64 bit) format without sign (the byte order inside the single word is MSB->LSB while the word order is LSW->MSW).
The float IEEE754 are represented in UINT32(32 bit) format without sign (the byte order inside the single word is MSB->LSB while the word order is LSW->MSW).

3.1 Table of "Data Event" file

The "Data event" (also known as "DE") is a file with 10000 records (from index 0000 to 9999). The record is organised in 11 words as illustrated in table 2.6.2. The "data event" file is readable whith Modbus function code 14h using file number 0.
The "data event" has a FIFO management system and uses two reference record numbers to identify the first record available (RefA) and the last record stored (RefB). If RefB > RefA, the records valid are from RefA+1 to RefB, if RefA > RefB, the records valid are from RefA+1 to 9999 and from 0 to RefB.



To read the "data event" file it is necessary to execute the following actions:

1) Read the reference of the first record available (RefA) and the reference of the last record stored (RefB) using Modbus function code 04h or 03h.
2) Read the valid records using Modbus function code 14h and sub-function code 06h. The identification file number for the data base is 0.
3) When all records are read, write the reference number RefA with the value of RefB (Modbus function code 06h). This action executes an equivalent reset function.

Table 3.1-1 - "Data event" file: reference record numbers

Modicon address	HEX Physical address	Description	Data Format	Notes	Firmware compatibility
	2000h	"Data event": First record available (RefA)	INT16	0 ... 9999 (it is possible the write and read mode access)	Y0
	2001h	"Data event": Last record stored (RefB)	INT16	0 ... 9999 (it is possible only the read mode access)	Y0

Table 3.1-2 - "Data event" file: record organisation

HEX Physical address	Description	Data Format	Notes	Firmware compatibility
Base+0h	Record index	INT16	0 ... 9999	Y0
Base+1h	Date: Year and Month	INT16	Lsb=Month (1...12); MSB=Year (08...50)	Y0
Base+2h	Date: Day and Hour	INT16	Lsb=Hour (0 ... 23); MSB=Day (01 ... 31)	Y0
Base+3h	Date: Minute and Second	INT16	Lsb=Second (0 ... 59); Msb=Minute (0 ...59)	Y0
From Base+004h to Base+00Ah	Record fields	7 word	See " Data event record field", table 2.7-3	Y0

Table 3.1-3 – "Data event" file: organisation of the record field vs. event type

Event Type	Description	Address	Length (words)	Data Format	Notes	Firmware compatibility
0=Alarm	Type of event	Base+4h	1	UINT16	0=Alarm	Y0
	Type of sub event	Base+5h	1	UINT16	MSB: Value=0: UP control Value=1: DOWN control Value=2: IN control Value=3: OUT control	Y0

					LSB: type of alarm : Value=0: activate Value=1: deactivate	
	Type of variable	Base+6h	1	UINT16	MSB: number of virtual alarm LSB: See Table "Variable code"	Y0
	Alarm link code	Base+7h	1	UINT16	MSB: ones of physical output (0: none, 1-8 port) LSB: physical output logic: Value=0: OR; Value=1: AND;	Y0
	Variable value	Base+8h	2	32 bit IEEE 754	Depend by the type of variable If NAN this event is generated by Reset	Y0
1=Digital input	Type of event	Base+4h	1	UINT16	1=Digital input	Y0
	Number of channel input	Base+5h	1	UINT16	Port1 0 Port2 1 Port3 2 Port4 3 Port5 4 Port6 5	Y0
	New status	Base+6h	1	UINT16	1(OFF)=open, 0(ON)=close	Y0
2=Digital output	Type of event	Base+4h	1	UINT16	2=Digital output	Y0
	Number of channel output	Base+5h	1	UINT16	Port1 0 Port2 1 Port3 2 Port4 3 Port5 4 Port6 5 Port7 6 Port8 7	Y0
	New status	Base+6h		UINT16	0(OFF)=deactivate, 1(ON) =activate	Y0
	Type of output	Base+7h	1	UINT16	0=Remote; 1=Alarm;	Y0
3=Reset	Type of event	Base+4h	1	UINT16	3=Reset	Y0
	Type of Reset	Base+5h	1	UINT16	See "Reset type" on Table 2.7-5	Y0
	Sub type	Base+6h	1	UINT16	Variable code (only is valid)	Y0
4=General	Type of event	Base+4h	1	UINT16	4=General	Y0
	Type of error	Base+5h	1	UINT16	See "General type" on Table 2.7-5	Y0
	New status	Base+6h	1	UINT16	0=activate; 1=deactivate	Y0
5=Max/Min	Type of event	Base+4h	1	UINT16	5=Max/Min	Y0
	Type of sub event	Base+5h	1	UINT16	LSB: type: Value=0: max Value=1:DMD max Value=2: min	Y0
	Type of variable	Base+6h	1	UINT16	LSB: See Table "Variable code"	Y0
	Variable value	Base+7h	2	32 bit IEEE 754	Depend by the type of variable If NAN this event is generated by Reset	Y0

Table 3.1-4 - "Data event" file: General type

Word value	Link
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	Local access to programming mode
11	Power off
12	Power on
13	
14	Parameters were stored
15	

Table 3.1-5 - "Data event" file: Reset type

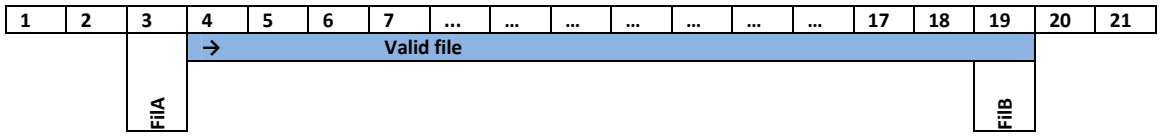
Word value	Link
0	Reset Energy
1	Max Value
2	DMD
3	Min Value
4	DMD Max Value

5	DB Reset – DMD
6	DB Reset – Event
7	DB Reset - Load Profiling
8	
9	
10	
11	
12	
13	
14	
15	

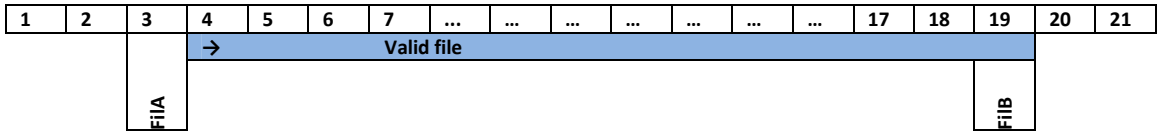
3.2 Table of "Data Load profiling" file

The "Data Load profiling" (also known as "DLP") is composed by **21** files (every file has 10000 records from index 0000 to 9999). The record is organized in different words depending by the number of variables are joined. This is illustrated in table 2.5.2. The "data base" file is readable with Modbus function code 14h using the specific file number from **1** to **21**.
The "Data Load profiling" has a circular management system and uses four reference record numbers to identify the first file available (FilA), the last file available (FilB), the first record available into the file (RefA) and the last record stored (RefB).
If FilA > FilB, the file valid are from FilA +1 to FilB, if FilA > FilB, the records valid are from FilA +1 to **21** and from 0 to FilB.
If RefB > RefA, the records valid are from RefA+1 to RefB, if RefA > RefB, the records valid are from RefA+1 to 9999 and from 0 to RefB.
NOTE: the maximum index for 21TH file is 1600

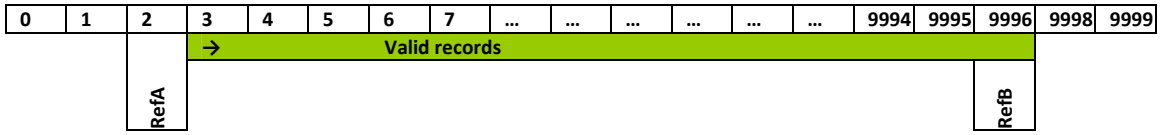
FilB > FilA



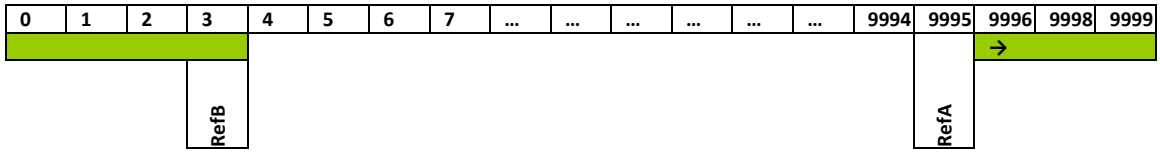
FilB > filA



RefB > RefA



Ref B < RefA



To read the "Data Load profiling" file it is necessary to execute the following actions:

1) Read the reference of the first file available (FilA) and the reference of the last file stored (FilB) using Modbus function code 04h or 03h.
2) Read the reference of the first record available (RefA) and the reference of the last record stored (RefB) using Modbus function code 04h or 03h.
3) Read the valid records using Modbus function code 14h and sub-function code 06h. The identification files number for the data base are from FilA to FilB.
4) When all records are read, write the reference number RefA with the value of RefB (Modbus function code 06h). This action executes an equivalent reset function.

Table 3.2-1 - "Data Load profiling" file: reference record numbers

Modicon address	HEX Physical address	Description	Data Format	Notes	Firmware compatibility
	2002h	First number of file (FilA)	INT16	0 ... n (it is possible the write and read mode access)	Y0
	2003h	Last number of file (FilB)	INT16	0 ... n (it is possible only the read mode access)	Y0
	2004h	"Data Load profiling": First record available (RefA)	INT16	0 ... 9999 (it is possible the write and read mode access)	Y0
	2005h	"Data Load profiling": Last record stored (RefB)	INT16	0 ... 9999 (it is possible only the read mode access)	Y0

Table 3.2-2 - "Data Load profiling" file: record organisation

HEX Physical address	Description	Data	Notes	Firmware

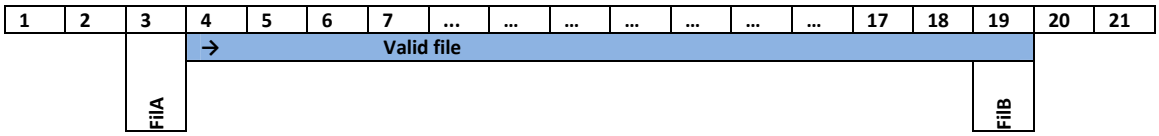
		Format		compatibility
Base+0h	Record index	INT16	0 … 9999	Y0
Base+1h	Date: Year and Month	INT16	Lsb=Month (1…12); MSB=Year (08…50)	Y0
Base+2h	Date: Day and Hour	INT16	Lsb=Hour (0 … 23); MSB=Day (01 … 31)	Y0
Base+3h	Date: Minute and Second	INT16	Lsb=Second (0 … 59); Msb=Minute (0 …59)	Y0
Base+4h	Record fields	INT16	0 = Wtot 1 = Vartot	Y0
Base+5h	Value	32 bit IEEE 754	Value	Y0

3.3 Table of "Data Base" file

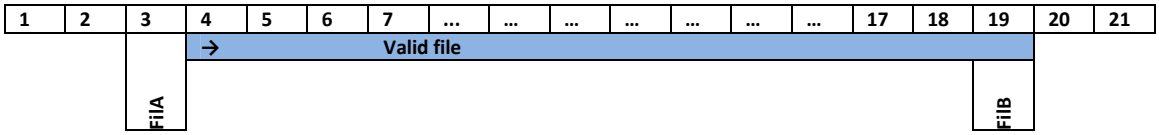
The "Data base" (also known as "DB") is composed by **n** files (every file has 10000 records from index 0000 to 9999). The record is organized in different words depending by the number of variables are joined. This is illustrated in table 2.5.2. The "data base" file is readable with Modbus function code 14h using the specific file number.
The "data base" has a circular management system and uses four reference record numbers to identify the first file available (FilA), the last file available (FilB), the first record available into the file (RefA) and the last record stored (RefB).

If FilA > FilB, the file valid are from FilA +1 to FilB, if FilA > FilB, the records valid are from FilA +1 to **n** and from 0 to FilB.
If RefB > RefA, the records valid are from RefA+1 to RefB, if RefA > RefB, the records valid are from RefA+1 to 9999 and from 0 to RefB.

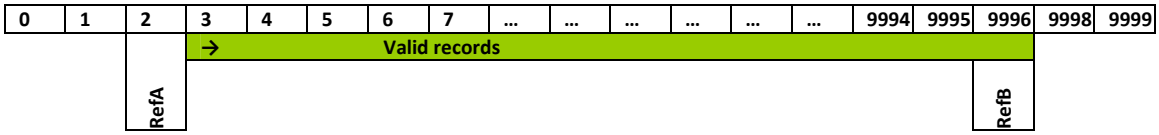
FilB > FilA



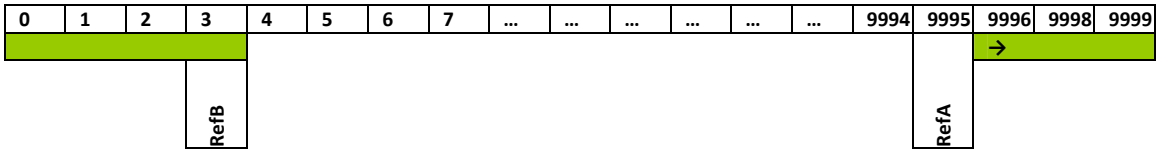
FilB > filA



RefB > RefA



Ref B < RefA



To read the "data base" file it is necessary to execute the following actions:

5) Read the reference of the first file available (FilA) and the reference of the last file stored (FilB) using Modbus function code 04h or 03h.
6) Read the reference of the first record available (RefA) and the reference of the last record stored (RefB) using Modbus function code 04h or 03h.
7) Read the valid records using Modbus function code 14h and sub-function code 06h. The identification files number for the data base are from FilA to FilB.
8) When all records are read, write the reference number RefA with the value of RefB (Modbus function code 06h). This action executes an equivalent reset function.

Table 3.3-1 - "Data base" file: reference record numbers

Modicon address	HEX Physical address	Description	Data Format	Notes	Firmware compatibility
	2006h	First number of file (FilA)	INT16	0 ... n (it is possible the write and read mode access)	Y0
	2007h	Last number of file (FilB)	INT16	0 ... n (it is possible only the read mode access)	Y0
	2008h	"Data Base": First record available (RefA)	INT16	0 ... 9999 (it is possible the write and read mode access)	Y0
	2009h	"Data Base": Last record stored (RefB)	INT16	0 ... 9999 (it is possible only the read mode access)	Y0
	200Ah	Max valid number of file	INT16		Y0
	200Bh	Max valid index of last file	INT16		Y0

Table 3.3-2 - "Data base" file: record organisation

HEX Physical address	Length (words)	Description	Data Format	Notes	Firmware compatibility
Base+0h	1	Record index	INT16	0 ... 9999	Y0
Base+1h	1	Date: Year and Month	INT16	Lsb=Month (1...12); MSB=Year (08...50)	Y0
Base+2h	1	Date: Day and Hour	INT16	Lsb=Hour (0 ... 23); MSB=Day (01 ... 31)	Y0
Base+3h	1	Date: Minute and Second	INT16	Lsb=Second (0 ... 59); Msb=Minute (0 ...59)	Y0
Base+4h	1	Number of variables / Type Enable	INT16	MSB: Type calculate enable: Value=0: NO; Value=1: YES; Bit 0: DMD Bit 1: MAX Bit 2: MIN LSB: Number of variables	Y0
	2 - 6	DMD / Max / Min - Variable 1	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 2	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 3	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 4	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 5	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 6	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 7	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 8	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 9	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 10	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 12	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 12	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 13	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 14	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 15	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 16	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 17	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 18	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 19	32 bit IEEE 754		Y0
	2 - 6	DMD / Max / Min - Variable 20	32 bit IEEE 754		Y0