WM20

COMMUNICATION PROTOCOL

Version 3, Rev. 0

December, 2016

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 WM20:

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 ways:
   a. "**Modicom address**" : it is the "6 digit Modicom" representation with the Modbus function code 04 (Read Input Registers). It is possible to read the same values with the 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 according to the configuration of the instrument (refer to the WM20 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 registers (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 247)	
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 247)	
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 247)	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 registers (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 247)	
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 247)	
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 247)	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 content.
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 247)	
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 247)	
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 247)	Possible exception : 01h: illegal function
Function code	1 byte	86h	

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 247)	
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 247)	
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 247)	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		

For “Profibus Profile Variable” is mandatory that all variables of this type are under the correct range otherwise the device will return a “Response frame (incorrect action)”.

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

The 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. WM20 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 247)	
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 247)	
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 247)	Possible exception: 01h: illegal function 02h: illegal data address
Function code	1 byte	88h	
Exception code	1 byte	01h, 02h, 03h, 04h	

CRC	2 bytes		03h: illegal data value 04h: slave device failure

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 the 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 the 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 247)	
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 247)	
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 247)	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 247)	
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 247)	
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 247)	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 the all slaves. No response is returned to broadcast requests sent by the master. It is possible to send the broadcast message only with the function code 06h and 10h and using the 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 1000 m, 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

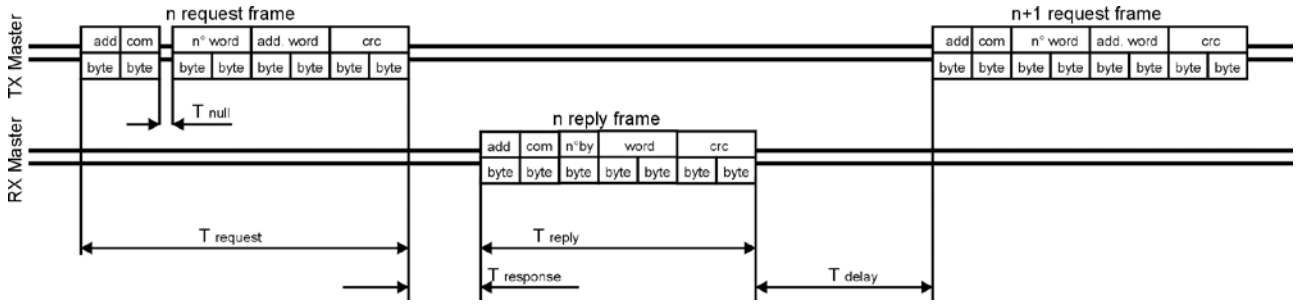


Fig. 1 : 4-wire timing diagram

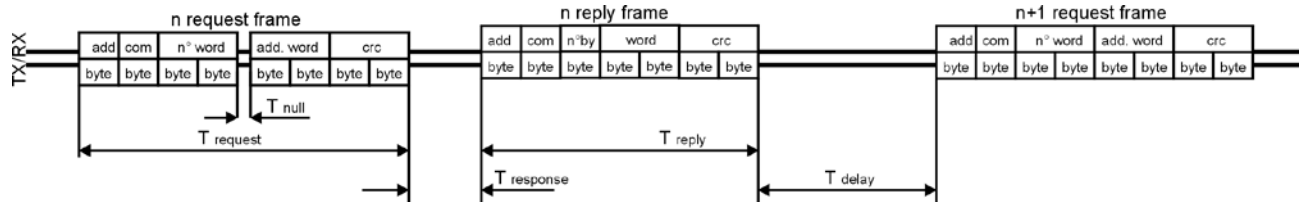


Fig. 2 : 2-wire timing diagram

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: 3,5 char 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: 2,5 char 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

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

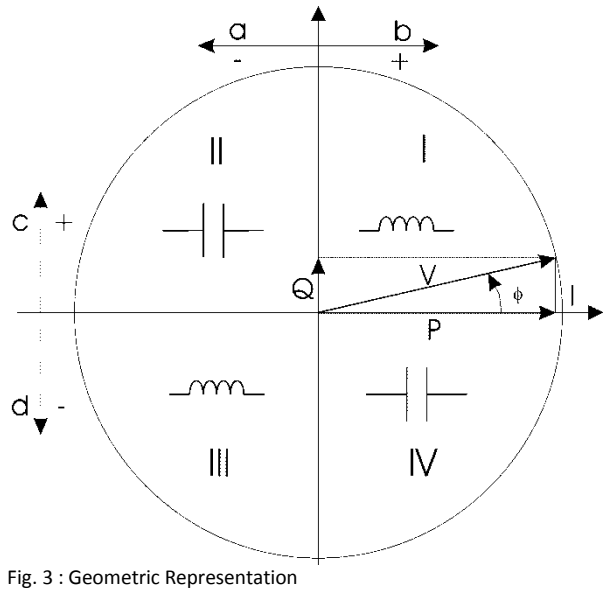
The byte order in the MODBUS (and ANSI) frame is:

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

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 table:

AV4: 400/690VLL AC, 1(2)A
VLN : 160 V to 480VLN
VLL : 277 V to 830VLL

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

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
300001	0000h	1	Base firmware version	UINT 16	MSB: ASCII code for model (A = AV5, B = AV6, C = AV4, D = AV7) LSB: numeric number for revision	Z0
300002	0001h	1	Communication module firmware version (only in case MCETH or MCBACIP or M C BAC MS or MC EI modules)	UINT 16	MSB: ASCII code for model LSB: numeric number for revision	Z0
300007	0006h	1	Communication module firmware version (only in case MCPB and MCPBM)	UINT 16	MSB: ASCII code for model LSB: numeric number for revision	Z0

NOTE 1. In the following document the firmware letter "Z" indicates all versions: "A", "B", "C", e "D" only for WM20. 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 = 0x0062 (98d)	Z0

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
300033	0020h	1	Letter 1 (from SX) Letter 2 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	Z0
300034	0021h	1	Letter 3 (from SX) Letter 4 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	Z0
300035	0022h	1	Letter 5 (from SX) Letter 6 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	Z0
300036	0023h	1	Letter 7 (from SX) Letter 8 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	Z0
300037	0024h	1	Letter 9 (from SX) Letter 10 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	Z0
300038	0025h	1	Letter 11 (from SX) Letter 12 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	Z0
300039	0026h	1	Letter 13 (from SX)	UINT 16	MSB: ASCII code	Z0

Note : in WM20 all the letters that make up serial number are upper case even if display shows lower case

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
300081	0050h	2	V L1-N	32 bit IEEE 754		Z0
300083	0052h	2	V L2-N	32 bit IEEE 754		Z0
300085	0054h	2	V L3-N	32 bit IEEE 754		Z0
300087	0056h	2	V L-N ∑	32 bit IEEE 754		Z0
300089	0058h	2	V L1-L2	32 bit IEEE 754		Z0
300091	005Ah	2	V L2-L3	32 bit IEEE 754		Z0
300093	005Ch	2	V L3-L1	32 bit IEEE 754		Z0
300095	005Eh	2	V L-L ∑	32 bit IEEE 754		Z0
300097	0060h	2	A L1	32 bit IEEE 754		Z0
300099	0062h	2	A L2	32 bit IEEE 754		Z0
300101	0064h	2	A L3	32 bit IEEE 754		Z0
300103	0066h	2	A N	32 bit IEEE 754	Calculated by instrument base	Z0
300105	0068h	2	W L1	32 bit IEEE 754		Z0
300107	006Ah	2	W L2	32 bit IEEE 754		Z0
300109	006Ch	2	W L3	32 bit IEEE 754		Z0
300111	006Eh	2	W ∑	32 bit IEEE 754		Z0
300113	0070h	2	VA L1	32 bit IEEE 754		Z0
300115	0072h	2	VA L2	32 bit IEEE 754		Z0
300117	0074h	2	VA L3	32 bit IEEE 754		Z0
300119	0076h	2	VA ∑	32 bit IEEE 754		Z0

300121	0078h	2	VAR L1	32 bit IEEE 754		Z0
300123	007Ah	2	VAR L2	32 bit IEEE 754		Z0
300125	007Ch	2	VAR L3	32 bit IEEE 754		Z0
300127	007Eh	2	VAR ∑	32 bit IEEE 754		Z0
300129	0080h	2	PF L1	32 bit IEEE 754	Negative values correspond to lead(C), positive values correspond to lag(L)	Z0
300131	0082h	2	PF L2	32 bit IEEE 754		
300133	0084h	2	PF L3	32 bit IEEE 754		
300135	0086h	2	PF ∑	32 bit IEEE 754		
300137	0088h	2	Hz	32 bit IEEE 754		Z0
300139	008Ah	2	Asymmetry L-N %	32 bit IEEE 754		Z0
300141	008Ch	2	Asymmetry L-L %	32 bit IEEE 754		Z0
300143	008Eh	2	Phase sequence	32 bit IEEE 754	Value +1 corresponds to the L1-L2-L3 sequence, value -1 corresponds to wrong sequence	Z0
300145	0090h	2	A ∑	32 bit IEEE 754		Z0
300161	00A0h	2	THD tot VL1-N	32 bit IEEE 754		Z0
300163	00A2h	2	THD tot VL2-N	32 bit IEEE 754		Z0
300165	00A4h	2	THD tot VL3-N	32 bit IEEE 754		Z0
300167	00A6h	2	THD tot VL12	32 bit IEEE 754		Z0
300169	00A8h	2	THD tot VL23	32 bit IEEE 754		Z0
300171	00AAh	2	THD tot VL31	32 bit IEEE 754		Z0
300173	00ACh	2	THD tot AL1	32 bit IEEE 754		Z0
300175	00AEh	2	THD tot AL2	32 bit IEEE 754		Z0
300177	00B0h	2	THD tot AL3	32 bit IEEE 754		Z0

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
300361	0168h	2	Max W L1	32 bit IEEE 754		Z0
300363	016Ah	2	Max W L2	32 bit IEEE 754		Z0
300365	016Ch	2	Max W L3	32 bit IEEE 754		Z0
300367	016Eh	2	Max W ∑	32 bit IEEE 754		Z0
300369	0170h	2	Max VA L1	32 bit IEEE 754		Z0
300371	0172h	2	Max VA L2	32 bit IEEE 754		Z0
300373	0174h	2	Max VA L3	32 bit IEEE 754		Z0
300375	0176h	2	Max VA ∑	32 bit IEEE 754		Z0
300377	0178h	2	Max VAR L1	32 bit IEEE 754		Z0
300379	017Ah	2	Max VAR L2	32 bit IEEE 754		Z0
300381	017Ch	2	Max VAR L3	32 bit IEEE 754		Z0
300383	017Eh	2	Max VAR ∑	32 bit IEEE 754		Z0
300399	*018Eh*	*2*	*RESERVED*			

2.7 DMD 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
300873	0368h	2	DMD W L1	32 bit IEEE 754		Z0
300875	036Ah	2	DMD W L2	32 bit IEEE 754		Z0
300877	036Ch	2	DMD W L3	32 bit IEEE 754		Z0
300879	036Eh	2	DMD W ∑	32 bit IEEE 754		Z0
300881	0370h	2	DMD VA L1	32 bit IEEE 754		Z0
300883	0372h	2	DMD VA L2	32 bit IEEE 754		Z0
300885	0374h	2	DMD VA L3	32 bit IEEE 754		Z0
300887	0376h	2	DMD VA ∑	32 bit IEEE 754		Z0
300889	0378h	2	DMD VAR L1	32 bit IEEE 754		Z0
300891	037Ah	2	DMD VAR L2	32 bit IEEE 754		Z0
300893	037Ch	2	DMD VAR L3	32 bit IEEE 754		Z0
300895	037Eh	2	DMD VAR ∑	32 bit IEEE 754		Z0
300911	*038Eh*	*2*	*RESERVED*			

2.8 Total and partial (tariff) energy meters

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
301281	0500h	4	Total KWh+	UINT 64	Values in Wh or varh	Z0
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		
301313	0520h	4	Hours counter	UINT 64	Hours value: integer part got from the division of the counter by 100 Minutes value: rest of the previous computation (decimal part)	Z0

2.9 Modules programming parameter

2.9.1 Modules map

Table 2.9-1

Module Ref.	Description	Module acknowledgement	Module Name	Firmware compatibility
1	WM20 base provided with display, power supply, measuring inputs and optical front communication port		**WM20 AV5**	
2			**WM20 AV6**	
3			**WM20 AV4**	
4			**WM20 AV7**	
5	RS485 / RS232 port (Modbus RTU Protocol)	Manual (by means of keyboard) or via Modbus	**M C 485 232**	Z0
7	Ethernet (Modbus TCP/IP protocol)	Automatic	**M C ETH**	Z0
8	Ethernet (Modbus TCP/IP & Bacnet protocol)	Automatic	**M C BAC IP**	Z0
11	Relay output	Manual	**M O R2**	Z0
12	Opto-Mos output	Manual	**M O O2**	Z0
18	Ethernet (Modbus TCP/IP protocol) RS 485 (Bacnet protocol)	Automatic	**M C BAC MS**	Z0
20	Profibus	Automatic	**M C PB**	Z0

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

MODBUS: read and write mode Table 2.99 -2

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
304097	1000h	1	Password	UINT 16	Minimum valid value: 0d Maximum valid value: 9999d	Z0
304098	1001h	1	Electrical system selection	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)	Z0
304101	1004h	1	Backlight mode	UINT 16	The timing backlight is programmable from 0 (always ON) to 255 minutes	Z0
304102	1005h	1	Home page type	UINT 16	0 = rotating page mode 1 to 14 = preset home page	Z0
304108	100Bh	1	DMD - Time interval	UINT 16	Value=0: 1 min Value=1: 5 min Value=2: 10 min Value=3: 15 min Value=4: 20 min Value=5: 30 min Value=6: 60 min	Z0

304113	1010h	1	(**) Optical port - baud rate selection	UINT 16	Value=0: 9600 Value=1: 19200 Value=2: 38400 Value=3: 115200	Z0
304114	1011h	1	(**) Optical port - parity selection	UINT 16	Value=0: No parity Value=1: Odd parity Value=2: Even parity	Z0
304121	1018h	2	CT - Current transformer ratio	32 bit IEEE 754	1.0 to 9999.0	Z0
304123	101Ah	2	VT(PT) - Voltage transformer ratio	32 bit IEEE 754	1.0 to 9999.0	Z0
304127	101Eh	2	Filter Span parameter	32 bit IEEE 754	Value min = 0.0 Value max = 100.0 (Disabled = 0.0)	Z0
304129	1020h	2	Filter Coefficient	32 bit IEEE 754	Value min = 1.0 Value max = 256.0	Z0
304149	1034h	2	Threshold current for Hours counter	32 bit IEEE 754	Min = 0.001A	Z0
304177	1050h	16	Virtual Alarm AL1 (Alarm icon)	Customized Base Alarm data structure	Refer to the Table 2.12-3	Z0
304193	1060h	16	Virtual Alarm AL2 (Alarm icon)			Z0

(**) The values are updated only after sending the “update optical communication setting” command or switching off and on the instrument.

Base module - Virtual Alarm configuration parameters — Table 2.9-3

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
Block address +0	Block address +0	1	Alarm N - Enabling	UINT 16	Value=1: alarm N enabled Value=0: alarm N disabled All other values are considered as value=0	Z0
Block address +1	Block address +1	1	Alarm N - Variable type to be linked to	UINT 16	Refer to the Code Variable List (2.12.12)	Z0
Block address +2	Block address +2	1	Alarm N - Delay ON activation (s)	UINT 16	Value min=0 Value max=3600 If the set value exceeds the allowed range, the instrument automatically sets the value to 0	Z0
Block address +3	Block address +3	2	Alarm N – Set point 1	32 bit IEEE 754	Value min = -9999M Value max = 9999M If the set value exceeds the allowed range, the instrument automatically sets the value to 0.000	Z0
Block address +5	Block address +5	2	Alarm N – Set point 2	32 bit IEEE 754	Value min = -9999M Value max = 9999M If the set value exceeds the allowed range, the instrument automatically sets the value to 0.000	Z0
Block address +7	Block address +7	9	*Reserved*			

2.9.3 RS485 – RS232 (Module Ref. 5)

MODBUS: Read and write mode — Table 2.99-4

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
304401	1130h	1	(**) RS485 instrument address selection	UINT 16	Value min = 1 Value max = 247 If the set value exceeds the allowed range, the instrument automatically sets the value to 1	Z0
304402	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	Z0
304403	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	Z0

(**) The values are updated only after sending the “update serial communication setting” command or switching off and on the instrument.

2.9.4 Ethernet / Bacnet (See 2.9.1 Table: Module Ref. 7, Module Ref. 8)

MODBUS: Read and write mode — Table 2.99-5

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
304433	1150h	1	IP Address (**A**.B.C.D)	UINT 16	Value min = 0 Value max = 255 All the other values are considered as value=255	Z0
304434	1151h	1	IP Address (A.**B**.C.D)	UINT 16	Value min = 0 Value max = 255 All the other values are considered as value=255	Z0
304435	1152h	1	IP Address (A.B.**C**.D)	UINT 16	Value min = 0 Value max = 255 All the other values are considered as value=255	Z0
304436	1153h	1	IP Address (A.B.C.**D**)	UINT 16	Value min = 0 Value max = 255 All the other values are considered as value=255	Z0
304437	1154h	1	Subnet mask (**A**.B.C.D)	UINT 16	Value min = 0 Value max = 255 All the other values are considered as value=255	Z0
304438	1155h	1	Subnet mask (A.**B**.C.D)	UINT 16	Value min = 0 Value max = 255 All the other values are considered as value=255	Z0
304439	1156h	1	Subnet mask (A.B.**C**.D)	UINT 16	Value min = 0 Value max = 255 All the other values are considered as value=255	Z0
304440	1157h	1	Subnet mask (A.B.C.**D**)	UINT 16	Value min = 0 Value max = 255 All the other values are considered as value=255	Z0
304441	1158h	1	Default Gateway (**A**.B.C.D)	UINT 16	Value min = 0 Value max = 255 All the other values are considered as value=255	Z0
304442	1159h	1	Default Gateway (A.**B**.C.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255	Z0
304443	115Ah	1	Default Gateway (A.B.**C**.D)	UINT 16	Value min = 0 Value max = 255 All the other values are considered as value=255	Z0
304444	115Bh	1	Default Gateway (A.B.C.**D**)	UINT 16	Value min = 0 Value max = 255 All the other values are considered as value=255	Z0
304445	115Ch	1	Modbus TCP/IP port	UINT 16	Value min = 1 Value max = 9999 (default = 502)	Z0
304447	115Eh	1	Bacnet Device Instance Number (LSW) (only for **BACNET MODULE**)	UINT 16	Value min = 0 Value max = 65535	Z0
304448	115Fh	1	Bacnet Device Instance Number (MSW) (only for **BACNET MODULE**)	UINT 16	Value min = 0 Value max = 65535	Z0
304449	1160h	1	Update Ethernet	UINT 16	Value min = 0 Value max = 1 (when the configuration is changed)	Z0
304450	1161h	1	Baud Rate (only for **MC BAC MS**)	UINT 16	Value=0: 9600 Value=1: 19200 Value=2: 38400 Value=3: 76800 Default: 9600	Z0
304451	1162h	1	MAX_INFO_FRAMES (only for **MC BAC MS**)	UINT 16	Default Value: 1	Z0
304452	1163h	1	MAX_MASTER (only for **MC BAC MS**)	UINT 16	Default: 127, Range 0-127	Z0
304453	1164h	1	MAC-Address (only for **MC BAC MS**)	UINT 16	Range 0-127	Z0
304456	**1167h**	**1**	**Foreign Device Enable (only for MC BAC IP)**	**UINT 16**	**Value=0: NO Value=1: YES**	**Z0**
304457	**1168h**	**1**	**Ip address BBMD (A.B.C.D)**	**UINT 16**	**Value min = 0**	**Z0**

			(only for MC BAC IP)		Value max = 255 All the other values are considered as value=255	
304458	1169h	1	Ip address BBMD (A.B.C.D) (only for MC BAC IP)	UINT 16	Value min = 0 Value max = 255 All the other values are considered as value=255	Z0
304459	116Ah	1	Ip address BBMD (A.B.C.D) (only for MC BAC IP)	UINT 16	Value min = 0 Value max = 255 All the other values are considered as value=255	Z0
304460	116Bh	1	Ip address BBMD (A.B.C.D) (only for MC BAC IP)	UINT 16	Value min = 0 Value max = 255 All the other values are considered as value=255	Z0
304461	116Ch	1	UDP Port (only for MC BAC IP)	UINT 16	Value min = 0x1 Value max = 0xFFFF (default = 0xBAC0)	Z0
304462	116Dh	1	Re-register time (s) (only for MC BAC IP)	UINT 16	Value min = 1 Value max = 60	Z0

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

MODBUS: Read and write mode — Table 2.99-6

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
304865	1300h	1	Digital output channel 1: enabling	UINT16	0=Remote; 1=Alarm; 2= Pulse	Z0
304866	1301h	1	Digital output channel 1: output working mode	UINT16	0=NO; 1=NC (only if selected “Alarm” type)	Z0
304867	1302h	1	Digital output channel 1: linked alarm	UINT16	0=AL1; 1=AL2; 2=AL3; 3=AL4 (only if selected “Alarm” type)	Z0
304868	1303h	1	Channel 1: linked counter variable	UINT16	0=Total KWh+ 1=Total Kvarh+ 2=Total KWh- 3=Total Kvarh-	Z0
304869	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	Z0
304871	1306h	1	Digital output channel 2: enabling	UINT16	0=Remote; 1=Alarm; 2= Pulse	Z0
304872	1307h	1	Digital output channel 2: output working mode	UINT16	0=NO; 1=NC (only if selected “Alarm” type)	Z0
304873	1308h	1	Digital output channel 2: linked alarm	UINT16	0=AL1; 1=AL2; 2=AL3; 3=AL4 (only if selected “Alarm” type)	Z0
304874	1309h	1	Channel 2: linked counter variable	UINT16	0=Total KWh+ 1=Total Kvarh+ 2=Total KWh- 3=Total Kvarh-	Z0
304875	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	Z0

2.9.6 Profibus (See 2.9.1 Table: Module Ref. 20)

MODBUS: Read and write mode — Table 2.99-7

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
306145	1800h	32	Profile 0 variables configuration	Customized data structure		Z0
306177	1820h	32	Profile 1 variables configuration	Customized data structure		Z0
306209	1840h	32	Profile 2 variables configuration	Customized data structure		Z0
306241	1860h	32	Profile 3 variables configuration	Customized data structure		Z0
306273	1880h	32	Profile 4 variables configuration	Customized data structure		Z0
306305	18A0h	32	Profile 5 variables configuration	Customized data structure		Z0
306337	18C0h	32	Profile 6 variables configuration	Customized data structure		Z0
306369	18E0h	32	Profile 7 variables configuration	Customized data structure		Z0

306401	1900h	32	Profile 8 variables configuration	Customized data structure		Z0
306433	1920h	32	Profile 9 variables configuration	Customized data structure		Z0
306465	1940h	32	Profile 10 variables configuration	Customized data structure		Z0
306497	1960h	32	Profile 11 variables configuration	Customized data structure		Z0
306529	1980h	1	Profibus address	UINT16	Value min = 2 Value max = 125 Default = 126	Z0
306530	1981h	1	Profile 0 endian configuration	UINT16	Big endian = 0 (Default) Little endian = 1	Z0
306531	1982h	1	Profile 1 endian configuration	UINT16	Big endian = 0 (Default) Little endian = 1	Z0
306532	1983h	1	Profile 2 endian configuration	UINT16	Big endian = 0 (Default) Little endian = 1	Z0
306533	1984h	1	Profile 3 endian configuration	UINT16	Big endian = 0 (Default) Little endian = 1	Z0
306534	1985h	1	Profile 4 endian configuration	UINT16	Big endian = 0 (Default) Little endian = 1	Z0
306535	1986h	1	Profile 5 endian configuration	UINT16	Big endian = 0 (Default) Little endian = 1	Z0
306536	1987h	1	Profile 6 endian configuration	UINT16	Big endian = 0 (Default) Little endian = 1	Z0
306537	1988h	1	Profile 7 endian configuration	UINT16	Big endian = 0 (Default) Little endian = 1	Z0
306538	1989h	1	Profile 8 endian configuration	UINT16	Big endian = 0 (Default) Little endian = 1	Z0
306539	198Ah	1	Profile 9 endian configuration	UINT16	Big endian = 0 (Default) Little endian = 1	Z0
306540	198Bh	1	Profile 10 endian configuration	UINT16	Big endian = 0 (Default) Little endian = 1	Z0
306541	198Ch	1	Profile 11 endian configuration	UINT16	Big endian = 0 (Default) Little endian = 1	Z0
306542	198Dh	1	Current Profibus profile	UINT16	Only read mode Value min = 0 Value max = 11	Z0

Profibus variables configuration Table 2.99-8

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
Block address +0	Block address +0	1	Profibus Profile Variable 0	UINT16	(*)	Z0
Block address +1	Block address +1	1	Profibus Profile Variable 1	UINT16	(*)	Z0
Block address +2	Block address +2	1	Profibus Profile Variable 2	UINT16	(*)	Z0
Block address +3	Block address +3	1	Profibus Profile Variable 3	UINT16	(*)	Z0
Block address +4	Block address +4	1	Profibus Profile Variable 4	UINT16	(*)	Z0
Block address +5	Block address +5	1	Profibus Profile Variable 5	UINT16	(*)	Z0
Block address +6	Block address +6	1	Profibus Profile Variable 6	UINT16	(*)	Z0
Block address +7	Block address +7	1	Profibus Profile Variable 7	UINT16	(*)	Z0
Block address +8	Block address +8	1	Profibus Profile Variable 8	UINT16	(*)	Z0
Block address +9	Block address +9	1	Profibus Profile Variable 9	UINT16	(*)	Z0
Block address +10	Block address +10	1	Profibus Profile Variable 10	UINT16	(*)	Z0
Block address +11	Block address +11	1	Profibus Profile Variable 11	UINT16	(*)	Z0
Block address +12	Block address +12	1	Profibus Profile Variable 12	UINT16	(*)	Z0
Block address +13	Block address +13	1	Profibus Profile Variable 13	UINT16	(*)	Z0
Block address +14	Block address +14	1	Profibus Profile Variable 14	UINT16	(*)	Z0
Block address +15	Block address +15	1	Profibus Profile Variable 15	UINT16	(*)	Z0
Block address +16	Block address +16	1	Profibus Profile Variable 16	UINT16	(*)	Z0

Block address +17	Block address +17	1	Profibus Profile Variable 17	UINT16	(*)	Z0
Block address +18	Block address +18	1	Profibus Profile Variable 18	UINT16	(*)	Z0
Block address +19	Block address +19	1	Profibus Profile Variable 19	UINT16	(*)	Z0
Block address +20	Block address +20	1	Profibus Profile Variable 20	UINT16	(*)	Z0
Block address +21	Block address +21	1	Profibus Profile Variable 21	UINT16	(*)	Z0
Block address +22	Block address +22	1	Profibus Profile Variable 22	UINT16	(*)	Z0
Block address +23	Block address +23	1	Profibus Profile Variable 23	UINT16	(*)	Z0
Block address +24	Block address +24	1	Profibus Profile Variable 24	UINT16	(*)	Z0
Block address +25	Block address +25	1	Profibus Profile Variable 25	UINT16	(*)	Z0
Block address +26	Block address +26	1	Profibus Profile Variable 26	UINT16	(*)	Z0
Block address +27	Block address +27	1	Profibus Profile Variable 27	UINT16	(*)	Z0
Block address +28	Block address +28	1	Profibus Profile Variable 28	UINT16	(*)	Z0
Block address +29	Block address +29	1	Profibus Profile Variable 29	UINT16	(*)	Z0
Block address +30	Block address +30	1	Profibus Profile Variable 30	UINT16	(*)	Z0
Block address +31	Block address +31	1	Profibus Profile Variable 31	UINT16	(*)	Z0

(*) Refer to the Variable List (paragraphs 2.5-2.10): the variable is identified by its own Modbus address and will be transmitted in Float 32 format.
To transmit the variables in INT format, add 8000h to its own Modbus address.
To transmit energy meters or counters values, the addresses of both 32-bit high part and 32-bit low part must be set in 2 consecutive Profile variables.
In case of energy meters and counters values, the 32-bit low part transmitted by Profibus is relevant to units, the 32-bit high part transmitted by Profibus is elevant to G (giga) multiplier.
It is possible also to transmit status words (e.g. 4000h, virtual alarm status). In Profibus the format is the same.
If the address is set as FFFFh, the relevant input value is 0.

2.9.7 Commands table

MODBUS: write only mode

Table 2.9-9

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
312371	3052h	1	(*) External serial communication configuration updating	UINT 16	Value=1: command executed Value≠1: no effect	Z0
312372	3053h	1	(*) Optical serial communication configuration updating	UINT 16	Value=1: command executed Value≠1: no effect	Z0
312373	3054h	1	Set/reset **MOR2**	UINT 16	Value=1: module enabled Value=0: module disabled	Z0
312374	3055h	1	Set/reset **MO02**	UINT 16	Value=1: module enabled Value=0: module disable	Z0
312375	3056h	1	Set/reset **MC232485**	UINT 16	Value=1: module enabled Value=0: module disabled	Z0
312379	3060h	1	Reset Bacnet Description to default value	UINT 16	Value=1: command executed (English Language) Value=2: command executed (German Language) Value≠1,2: no effect	Z0
312545	3100h	1	Reset all remote outputs (**MOR2** / **MO02**)	UINT 16	Value=1: command executed Value≠1: no effect	Z0
312546	3101h	1	Remote output command on port 1 (**MOR2** / **MOO2**)	UINT 16	Value=0: reset port Value≠0: set port	Z0
312547	3102h	1	Remote output command on port 2 (**MOR2** / **MOO2**)	UINT 16	Value=0: reset port Value≠0: set port	Z0
312548	3103h	1	Set all remote outputs (**MOR2** / **MOO2**)	UINT 16	Value=1: command executed Value≠1: no effect	Z0
			RESERVED			
312813	320Ch	1	Reset W L1	UINT 16	Bit0 = Max Value (Z0) Bit1 = DMD (Z0) Where the bit is set to "1", there is reset	
312814	320Dh	1	Reset W L2	UINT 16		
312815	320Eh	1	Reset W L3	UINT 16		
312816	320Fh	1	Reset W Σ	UINT 16		
312817	3210h	1	Reset VA L1	UINT 16		
312818	3211h	1	Reset VA L2	UINT 16		
312819	3212h	1	Reset VA L3	UINT 16		
312820	3213h	1	Reset VA Σ	UINT 16		
312821	3214h	1	Reset VAR L1	UINT 16		
312822	3215h	1	Reset VAR L2	UINT 16		
312823	3216h	1	Reset VAR L3	UINT 16		
312824	3217h	1	Reset VAR Σ	UINT 16		
313569	3500h	1	Reset Total KWh+	UINT 16	Value=1: command executed	Z0
313570	3501h	1	Reset Total Kvarh+	UINT 16	Value=1: command executed	Z0
313571	3502h	1	Reset Total KWh-	UINT 16	Value=1: command executed	Z0
313572	3503h	1	Reset Total Kvarh-	UINT 16	Value=1: command executed	Z0
313573	3504h	1	Reset Partial KWh+	UINT 16	Value=1: command executed	Z0
313574	3505h	1	Reset Partial Kvarh+	UINT 16	Value=1: command executed	Z0
313575	3506h	1	Reset Partial KWh-	UINT 16	Value=1: command executed	Z0
313576	3507h	1	Reset Partial Kvarh-	UINT 16	Value=1: command executed	Z0
313577	3508h	1	Reset Run Hours	UINT 16	Value=1: command executed	Z0

(*) Wait at least 6 seconds before communicating with the new parameter.

2.9.8 Status

MODBUS: Read mode

Table 2.9-10

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Firmware compatibility
316385	4000h	1	Virtual alarm	UINT 16	Bit value: 0 = OFF Bit value: 1 = ON Bit position (LSB concept): 0: Alarm1 1: Alarm2	Z0
316386	4001h	1	Output (port)	UINT 16	Bit value: 0 = OFF Bit value: 1 = ON (Note: only if the port is not linked to the counter) Bit position (LSB concept): 0: Port1 1: Port2	Z0

316387	4002h	1	HW modules configuration	UINT 16	Bit value: 0 = module not present Bit value: 1 = module present Bit position: 0: HW_MOR2 1: HW_MOO2 2: HW_MC485232 3: HW_MCETH 4: HW_MCBACIP 5: HW_MCBACMS 6: HW_MCPB	Z0

2.9.9 Code Variables List

Protocol Code Z0	VARIABLE ENG. UNIT	Notes	Firmware compatibility
0	V L1-N		Z0
1	V L2-N		Z0
2	V L3-N		Z0
3	V L-N ∑		Z0
4	V L1-L2		Z0
5	V L2-L3		Z0
6	V L3-L1		Z0
7	V L-L ∑		Z0
8	A L1		Z0
9	A L2		Z0
10	A L3		Z0
11	A N		Z0
12	W L1		Z0
13	W L2		Z0
14	W L3		Z0
15	W ∑		Z0
16	VA L1		Z0
17	VA L2		Z0
18	VA L3		Z0
19	VA ∑		Z0
20	VAR L1		Z0
21	VAR L2		Z0
22	VAR L3		Z0
23	VAR ∑		Z0
24	PF L1		Z0
25	PF L2		Z0
26	PF L3		Z0
27	PF ∑		Z0
28	Hz		Z0
29	Phase sequence		Z0
30	THD tot VL1-N		Z0
31	THD tot VL2-N		Z0
32	THD tot VL3-N		Z0
33	THD tot VL12		Z0
34	THD tot VL23		Z0
35	THD tot VL31		Z0
36	THD tot AL1		Z0
37	THD tot AL2		Z0
38	THD tot AL3		Z0
39	A ∑		Z0
40	W L1 dmd		Z0
41	W L2 dmd		Z0
42	W L3 dmd		Z0
43	W ∑ dmd		Z0
44	VA L1 dmd		Z0
45	VA L2 dmd		Z0
46	VA L3 dmd		Z0
47	VA ∑ dmd		Z0
48	VAR L1 dmd		Z0
49	VAR L2 dmd		Z0
50	VAR L3 dmd		Z0
51	VAR ∑ dmd		Z0

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).

4 Revisions

Previous revisions are not available as they refer to both WM30 and WM40 models.