WM5-96 and PQT H

instruments' revisions 2.0 and following only

COMMUNICATION PROTOCOL

Version 1 Revision 3

September 5th, 2006

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IMPORTANT NOTE:
The differences between the protocol for instrument versions 1.x and the 2.x and following are highlighed with a yellow background.

1 COMMUNICATION PROTOCOL

1.1 Introduction

The optional interfaces (RS485 and RS232) and the infrared local port use the MODBUS/JBUS (RTU) or the ANSI C12.18 protocol. In this document it is reported only the information necessary to read and write from/to WM5 or PQT-H products (not all parts of the protocols are implemented).
On WM5 (and PQT-H) a server MODBUS TCP/IP has been implemented according to the "MODBUS over TCP/IP protocol", which can be used with the optional Ethernet port AR1061.
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.
For a complete description of the ANSI C12.18 protocol refer to ANSI C12.18-1996 American National Standard.

1.2 MODBUS functions

These functions are available on WM5 and PQT-H:

- Reading of n "Holding Registers" (code 03h)
- Reading of n "Input Register" (code 04h)
- Writing of one "Holding Registers" (code 06h)
- Writing of multiple register (code 10h)
- Diagnostic (code 08h with sub-function code 00h)
- Reading of "record file" (code 14h with sub-code 06h)
- Broadcast mode (writing instruction on address 00h)

IMPORTANT:

1) In this document the "Modbus address" field is indicated in two mode:
   1.1) "**Modicom 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".
   1.2) "**Physical address**": it is the "word address" value included in the communication frame.
2) The functions 03h and 04h have exactly the same effect.
3) The communication parameters must be set in according to the configuration of the instrument (refer to WM5 or PQT-H 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 : 01h: illegal function 02h: illegal data address 03h: illegal data value 04h: slave device failure
Function code	1 byte	86h	
Exception code	1 byte	01h, 02h, 03h, 04h	
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.
WM5-PQT-H 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	
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 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 ANSI C12.18 functions

These functions are available on WM5 and PQT-H:

- Identification service (code 20h)
- Full read service (code 30h)
- Full write service (code 40h)
- Logon service (code 50h)
- Security service (code 51h)
- Logoff service (code 52h)
- Negotiate service (code 61h)
- Terminate service (code 21h)

Note: It is implemented only the single request (packet) transmission with packet size set to 4096 byte. The multiple packet is not implemented.

To communicate with this protocol it is necessary to carry out the following procedure:

a) Execute the **Identification** service
b) Execute the **Negotiate** service
c) Execute the **Logon** service
d) Execute the **Security** service
e) Execute **Read** or **Write** services
f) Execute the **Logoff** service
g) Execute the **Terminate** service

The communication parameters must be set to “no parity”, 1 stop bit and 9600 baud (default condition).
After a time-out of 6 seconds from the last valid packet or acknowledgement, the device will terminate the communication. In this case it is necessary to repeat the procedure from point “a”.
The maximum inter-character time-out is 500msec, the maximum response time-out is 2 sec.

1.3.1 Function 20h (Identification service)

This service must be the first service to be issued. The service returns the version and the revision of the protocol.

Request frame (from host to instrument)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is toggled for each new request sent
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	0001h	Byte order: MSB, LSB
Identification service code	1 byte	20h	
CRC	2 bytes		

Response frame (from instrument to host)

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

In case of ack and request accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	0005h	Byte order: MSB, LSB
Response code	1 byte	00h	00h: request accepted
Protocol identification (fixed byte)	1 byte	00h	
Reference standard version number	1 byte	00h	Fixed value
Reference standard revision number	1 byte	01h	Fixed value
Fixed byte	1 byte	00h	
CRC	2 bytes		

In case of ack and request not accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	0001h	Byte order: MSB, LSB
Response code	1 byte	01h	01h: request not accepted
CRC	2 bytes		

Acknowledgement response frame (from host to instrument)

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

1.3.2 Function 61h (Negotiate service)

Negotiate service is used to reconfigure the communication parameters. Number of packets and packets size must be set to 1 and 4096 respectively. With this service it is possible to change the baud rate.

Request frame (from host to instrument)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is toggled for each new request sent
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	0005h	Byte order: MSB, LSB
Negotiate service code	1 byte	61h	
Packet size	2 bytes	1000h	Fixed value
Number of packet	1 byte	01h	Fixed value
Baud rate	1 byte	01h…08h, 0ah	01h: 300baud 02h: 600 baud 03h: 1200 baud 04h: 2400 baud 05h: 4800 baud 06h: 9600 baud 07h: 14400 baud 08h: 19200 baud 0Ah: 57600 baud
CRC	2 bytes		

Acknowledgement response frame (from instrument to host)

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

Response frame in case of ack and request accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	0005h	Byte order: MSB, LSB
Response code	1 byte	00h	00h: request accepted
Packet size	2 bytes	1000h	Fixed value
Number of packet	1 byte	01h	Fixed value
Baud rate	1 byte	01h…08h, 0ah	01h: 300baud 02h: 600 baud 03h: 1200 baud 04h: 2400 baud 05h: 4800 baud 06h: 9600 baud 07h: 14400 baud 08h: 19200 baud 0Ah: 57600 baud
CRC	2 bytes		

Response frame in case of ack and request not accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	0001h	Byte order: MSB, LSB
Response code	1 byte	01h	01h: request not accepted
CRC	2 bytes		

Acknowledgement response frame (from host to instrument)

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

Note: The next service must be sent with the new baud rate.

1.3.3 Function 50h (Logon service)

This service is used to indicate to the instrument the identity of the operator requesting the creation of a communication session.

Request frame (from host to instrument)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is toggled for each new request sent
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	0dh	Byte order: MSB, LSB
Logon service code	1 byte	50h	
User identification code	2 bytes	0000h to FFFFh	Byte order: MSB, LSB
User identification description	10 bytes		ASCII format
CRC	2 bytes		

Response frame

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

In case of ack and request accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	(0001h)	Byte order: MSB, LSB
Response code	1 byte	00h	00h: request accepted
CRC	2 bytes		

In case of ack and request not accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	0001h	Byte order: MSB, LSB
Response code	1 byte	01h	01h: request not accepted
CRC	2 bytes		

Acknowledgement response frame (from host to instrument)

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

1.3.4 Function 51h (Security service)

To access to read or write services it is necessary to carry out the security service. A password of 20 characters (ASCII format) must be sent to the instrument.
The security password is fixed on set "**energy meter**" in ASCII code.

Request frame (from host to instrument)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is toggled for each new request sent
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	15h	Byte order: MSB, LSB
Security service code	1 byte	51h	
Password	20 bytes	energy meter	ASCII format
CRC	2 bytes		

Response frame

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

In case of ack and request accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	(0001h)	Byte order: MSB, LSB
Response code	1 byte	00h	00h: request accepted
CRC	2 bytes		

In case of ack and request not accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	Eeh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	0001h	Byte order: MSB, LSB
Response code	1 byte	01h	01h: request not accepted
CRC	2 bytes		

Acknowledgement response frame (from host to instrument)

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

1.3.5 Function 30h (Full read service)

This service is used to read information from the device. It is implemented only the full read table command.

Request frame (from host to instrument)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is toggled for each new request sent
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	0003h	Byte order: MSB, LSB
Full read service code	1 byte	30h	
Table reference	2 bytes	0000h to FFFFh	Byte order: MSB, LSB
CRC	2 bytes		

Response frame (from instrument to host)

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

In case of ack and request accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	(4+**N**)	Byte order: MSB, LSB
Response code	1 byte	00h	00h: request accepted
Number of byte sent (**N**)	2 bytes		Byte order: MSB, LSB
Table data	**N** byte		
Table checksum	1 byte		The checksum is computed by summing the bytes (ignoring overflow) and negating the results (2's complement)
CRC	2 bytes		

In case of ack and request not accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	0001h	Byte order: MSB, LSB
Response code	1 byte	01h	01h: request not accepted
CRC	2 bytes		

Acknowledgement response frame (from host to instrument)

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

1.3.6 Function 40h (Full write service)

This service is used to write information in the device. It is implemented only the full write table command.

Request frame (from host to instrument)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is toggled for each new request sent
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	(6+**N**)	Byte order: MSB, LSB
Full write service code	1 byte	40h	
Table reference	2 bytes	0000h to FFFFh	Byte order: MSB, LSB
Number of byte sent (**N**)	2 bytes		Byte order: MSB, LSB
Table data	**N** byte		
Table checksum	1 byte		The checksum is computed by summing the bytes (ignoring overflow) and negating the results (2's complement)
CRC	2 bytes		

Response frame (from instrument to host)

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

In case of ack and request accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	(0001h)	Byte order: MSB, LSB
Response code	1 byte	00h	00h: request accepted
CRC	2 bytes		

In case of ack and request not accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	0001h	Byte order: MSB, LSB
Response code	1 byte	01h	01h: request not accepted
CRC	2 bytes		

Acknowledgement response frame (from host to instrument)

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

1.3.7 Function 52h (Logoff service)

This service is used to indicate to the instrument the shutdown of the session established by the logon service.

Request frame (from host to instrument)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is toggled for each new request sent
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	01h	Byte order: MSB, LSB
Logoff service code	1 byte	52h	
CRC	2 bytes		

Response frame (from instrument to host)

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

In case of ack and request accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	(0001h)	Byte order: MSB, LSB
Response code	1 byte	00h	00h: request accepted
CRC	2 bytes		

In case of ack and request not accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	0001h	Byte order: MSB, LSB
Response code	1 byte	01h	01h: request not accepted
CRC	2 bytes		

Acknowledgement response frame (from host to instrument)

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

1.3.8 Function 21h (Terminate service)

This service provides an immediate cessation of the communication session.

Request frame (from host to instrument)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is toggled for each new request sent
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	01h	Byte order: MSB, LSB
Terminate service code	1 byte	21h	
CRC	2 bytes		

Response frame (from instrument to host)

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

In case of ack and request accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	EEh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	(0001h)	Byte order: MSB, LSB
Response code	1 byte	00h	00h: request accepted
CRC	2 bytes		

In case of ack and request not accepted (from instrument to host)

Description	Length	Value	Note
Start of frame	1 byte	Eeh	
Fixed byte	1 byte	00h	
Control field	1 byte	00h or 20h	The value is same of the one present in the request
Number of packet	1 byte	00h	The value is always 00h
Number of byte in the packet	2 bytes	0001h	Byte order: MSB, LSB
Response code	1 byte	01h	01h: request not accepted
CRC	2 bytes		

Acknowledgement response frame (from host to instrument)

Description	Length	Value	Note
Acknowledgement	1 byte	06h or 15h	06h for ack, 15h for nak

1.4 Application notes

1.4.1 General consideration

1. In case of RS485 interface: 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. If this is not enough, it is also possible to bias the Host transmission (in case of 2-wire connection, it is only possible to either terminate or bias the Host, not both). The termination on both the instrument and the host is necessary even in case of point-to-point connection, within short distances.
2. In case of RS485 interface: the GND connection is optional if a shielded cable is used.
3. In case of RS485 interface: 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.

1.4.2 MODBUS timing

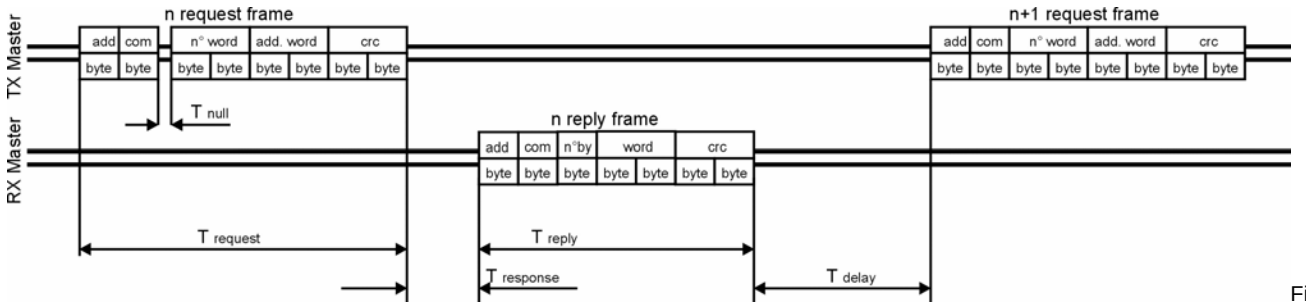


Fig. 1 : 4-wire timing diagram

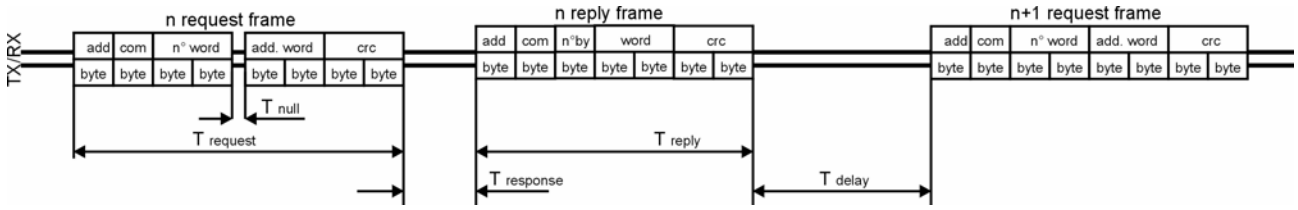


Fig. 2 : 2-wire timing diagram

Timing characteristics of reading function:	**msec**
T response: Max answering time	500ms
T response: Typical answering time	40ms
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

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

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

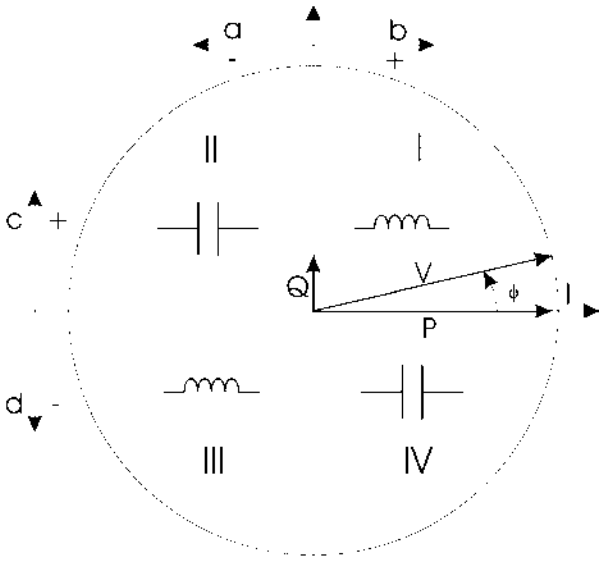
The byte order in the MODBUS (and ANSI) frame is:

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.

VL-N nom : 400V for AV5 model, 120V for AV6 model (Vmax = Vnom x 1,20)
VL-L nom : 690V for AV5 model, 208V for AV6 model (Vmax = Vnom x 1,20)
Inom = 5A (Imax = 10A)
VTmax = 6000, **CTmax** = 6000

Engineering unit	Input model AV5 (400VL-L)		Input model AV6 (120VL-L)	
	max value	min value	max value	min value
V (L-N)	$2.88*10^6$ =VL-Nnom*1.2*VTmax	0	$864*10^3$ =VL-Nnom*1.2*VTmax	0
V (L-L)	$4.968*10^6$ =VL-Lnom*1.2*VTmax	0	$1.4976*10^6$ =VL-Lnom*1.2*VTmax	0
A	$60*10^3$ =Imax*CTmax	0	$60*10^3$ =Imax*CTmax	0
W	$172.8*10^9$	$-172.8*10^9$	$51.84*10^9$	$-51.84*10^9$
VA	$172.8*10^9$	0	$51.84*10^9$	0
VAR	$172.8*10^9$	$-172.8*10^9$	$51.84*10^9$	$-51.84*10^9$
Phase sequence (*)	1	−1	1	−1
PF	1	−1	1	−1
Hz	440	42	440	42
Asymmetry (**)	300	0	300	0
KWh	999999999.999	0	999999999.999	0
KVARh	999999999.999	0	999999999.999	0
Harmonic phase angle	360	0	360	0
Phase angles	360	0	360	0

Note :
(*) This variable doesn't have any engineering unit. Its value is a convention.
(**) This variable doesn't have any engineering unit. Its value is a convention percentage.

2.2 Istantaneous variables

MODBUS: read only mode with functions code 03 and 04
ANSI C12.18: read only mode, table reference 0000h

Table 2.2-1

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
300001	0000h	2	V L1-N	32 bit IEEE 754	
300003	0002h	2	V L2-N	32 bit IEEE 754	
300005	0004h	2	V L3-N	32 bit IEEE 754	
300007	0006h	2	V L1-L2	32 bit IEEE 754	
300009	0008h	2	V L2-L3	32 bit IEEE 754	
300011	000Ah	2	V L3-L1	32 bit IEEE 754	
300013	000Ch	2	A L1	32 bit IEEE 754	
300015	000Eh	2	A L2	32 bit IEEE 754	
300017	0010h	2	A L3	32 bit IEEE 754	
300019	0012h	2	A N	32 bit IEEE 754	
300021	0014h	2	W L1	32 bit IEEE 754	
300023	0016h	2	W L2	32 bit IEEE 754	
300025	0018h	2	W L3	32 bit IEEE 754	
300027	001Ah	2	VA L1	32 bit IEEE 754	
300029	001Ch	2	VA L2	32 bit IEEE 754	
300031	001Eh	2	VA L3	32 bit IEEE 754	
300033	0020h	2	VAR L1	32 bit IEEE 754	
300035	0022h	2	VAR L2	32 bit IEEE 754	
300037	0024h	2	VAR L3	32 bit IEEE 754	
300039	0026h	2	Phase sequence	32 bit IEEE 754	Value –1 correspond to L1-L2-L3 sequence, value +1 correspond to L1-L3-L2 sequence
300041	0028h	2	PF L1	32 bit IEEE 754	Negative values correspond to lead(C), positive value correspond to lag(L)
300043	002Ah	2	PF L2	32 bit IEEE 754	
300045	002Ch	2	PF L3	32 bit IEEE 754	
300047	002Eh	2	V L-N Σ	32 bit IEEE 754	
300049	0030h	2	V L-L Σ	32 bit IEEE 754	
300051	0032h	2	W Σ	32 bit IEEE 754	
300053	0034h	2	VA Σ	32 bit IEEE 754	
300055	0036h	2	VAR Σ	32 bit IEEE 754	
300057	0038h	2	PF Σ	32 bit IEEE 754	Negative values correspond to lead(C), positive value correspond to lag(L)
300059	003Ah	2	Hz	32 bit IEEE 754	
300061	003Ch	2	Asymmetry L-N %	32 bit IEEE 754	
300063	003Eh	2	Asymmetry L-L %	32 bit IEEE 754	
300065	0040h	2	THD tot VL1-N	32 bit IEEE 754	
300067	0042h	2	THD odd VL1-N	32 bit IEEE 754	
300069	0044h	2	THD even VL1-N	32 bit IEEE 754	
300071	0046h	2	THD tot VL2-N	32 bit IEEE 754	
300073	0048h	2	THD odd VL2-N	32 bit IEEE 754	
300075	004Ah	2	THD even VL2-N	32 bit IEEE 754	
300077	004Ch	2	THD tot VL3-N	32 bit IEEE 754	
300079	004Eh	2	THD odd VL3-N	32 bit IEEE 754	
300081	0050h	2	THD even VL3-N	32 bit IEEE 754	
300083	0052h	2	THD tot VL1	32 bit IEEE 754	
300085	0054h	2	THD odd VL1	32 bit IEEE 754	
300087	0056h	2	THD even VL1	32 bit IEEE 754	
300099	0058h	2	THD tot VL2	32 bit IEEE 754	
300091	005Ah	2	THD odd VL2	32 bit IEEE 754	
300093	005Ch	2	THD even VL2	32 bit IEEE 754	
300095	005Eh	2	THD tot VL3	32 bit IEEE 754	
300097	0060h	2	THD odd VL3	32 bit IEEE 754	
300099	0062h	2	THD even VL3	32 bit IEEE 754	
300101	0064h	2	THD tot AL1	32 bit IEEE 754	
300103	0066h	2	THD odd AL1	32 bit IEEE 754	
300105	0068h	2	THD even AL1	32 bit IEEE 754	
300107	006Ah	2	THD tot AL2	32 bit IEEE 754	
300109	006Ch	2	THD odd AL2	32 bit IEEE 754	
300111	006Eh	2	THD even AL2	32 bit IEEE 754	
300113	0070h	2	THD tot AL3	32 bit IEEE 754	
300115	0072h	2	THD odd AL3	32 bit IEEE 754	
300117	0074h	2	THD even AL3	32 bit IEEE 754	

2.3 Maximum variables

MODBUS: read only mode with functions code 03 and 04
ANSI C12.18: read only mode, table reference 0001h

Table 2.3-1

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
300257	0100h	2	Max V L1-N	32 bit IEEE 754	
300259	0102h	2	Max V L2-N	32 bit IEEE 754	
300261	0104h	2	Max V L3-N	32 bit IEEE 754	
300263	0106h	2	Max V L1-L2	32 bit IEEE 754	
300265	0108h	2	Max V L2-L3	32 bit IEEE 754	
300267	010Ah	2	Max V L3-L1	32 bit IEEE 754	
300269	010Ch	2	Max A L1	32 bit IEEE 754	
300271	010Eh	2	Max A L2	32 bit IEEE 754	
300273	0110h	2	Max A L3	32 bit IEEE 754	
300275	0112h	2	Max A N	32 bit IEEE 754	
300277	0114h	2	Max W L1	32 bit IEEE 754	
300279	0116h	2	Max W L2	32 bit IEEE 754	
300281	0118h	2	Max W L3	32 bit IEEE 754	
300283	011Ah	2	Max VA L1	32 bit IEEE 754	
300285	011Ch	2	Max VA L2	32 bit IEEE 754	
300287	011Eh	2	Max VA L3	32 bit IEEE 754	
300289	0120h	2	Max VAR L1	32 bit IEEE 754	
300291	0122h	2	Max VAR L2	32 bit IEEE 754	
300293	0124h	2	Max VAR L3	32 bit IEEE 754	
300295	0126h	2			
300297	0128h	2	Max PF L1	32 bit IEEE 754	Negative values correspond to lead(C), positive value correspond to lag(L)
300299	012Ah	2	Max PF L2	32 bit IEEE 754	
300301	012Ch	2	Max PF L3	32 bit IEEE 754	
300303	012Eh	2	Max V L-N Σ	32 bit IEEE 754	
300305	0130h	2	Max V L-L Σ	32 bit IEEE 754	
300307	0132h	2	Max W Σ	32 bit IEEE 754	
300309	0134h	2	Max VA Σ	32 bit IEEE 754	
300311	0136h	2	Max VAR Σ	32 bit IEEE 754	
300313	0138h	2	Max PF Σ	32 bit IEEE 754	Negative values correspond to lead(C), positive value correspond to lag(L)
300315	013Ah	2	Max Hz	32 bit IEEE 754	
300317	013Ch	2	Max Asymmetry L-N %	32 bit IEEE 754	
300319	013Eh	2	Max Asymmetry L-L %	32 bit IEEE 754	
300321	0140h	2	Max THD tot VL1-N	32 bit IEEE 754	
300323	0142h	2	Max THD odd VL1-N	32 bit IEEE 754	
300325	0144h	2	Max THD even VL1-N	32 bit IEEE 754	
300327	0146h	2	Max THD tot VL2-N	32 bit IEEE 754	
300329	0148h	2	Max THD odd VL2-N	32 bit IEEE 754	
300331	014Ah	2	Max THD even VL2-N	32 bit IEEE 754	
300333	014Ch	2	Max THD tot VL3-N	32 bit IEEE 754	
300335	014Eh	2	Max THD odd VL3-N	32 bit IEEE 754	
300337	0150h	2	Max THD even VL3-N	32 bit IEEE 754	
300339	0152h	2	Max THD tot VL1	32 bit IEEE 754	
300341	0154h	2	Max THD odd VL1	32 bit IEEE 754	
300343	0156h	2	Max THD even VL1	32 bit IEEE 754	
300345	0158h	2	Max THD tot VL2	32 bit IEEE 754	
300347	015Ah	2	Max THD odd VL2	32 bit IEEE 754	
300349	015Ch	2	Max THD even VL2	32 bit IEEE 754	
300351	015Eh	2	Max THD tot VL3	32 bit IEEE 754	
300353	0160h	2	Max THD odd VL3	32 bit IEEE 754	
300355	0162h	2	Max THD even VL3	32 bit IEEE 754	
300357	0164h	2	Max THD tot AL1	32 bit IEEE 754	
300359	0166h	2	Max THD odd AL1	32 bit IEEE 754	
300361	0168h	2	Max THD even AL1	32 bit IEEE 754	
300363	016Ah	2	Max THD tot AL2	32 bit IEEE 754	
300365	016Ch	2	Max THD odd AL2	32 bit IEEE 754	
300367	016Eh	2	Max THD even AL2	32 bit IEEE 754	
300369	0170h	2	Max THD tot AL3	32 bit IEEE 754	
300371	0172h	2	Max THD odd AL3	32 bit IEEE 754	
300373	0174h	2	Max THD even AL3	32 bit IEEE 754	

2.4 Minimum variables

MODBUS: read only mode with functions code 03 and 04
ANSI C12.18: read only mode, table reference 0002h

Table 2.4-1

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
300513	0200h	2	Min V L1-N	32 bit IEEE 754	
300515	0202h	2	Min V L2-N	32 bit IEEE 754	
300517	0204h	2	Min V L3-N	32 bit IEEE 754	
300519	0206h	2	Min V L1-L2	32 bit IEEE 754	
300521	0208h	2	Min V L2-L3	32 bit IEEE 754	
300523	020Ah	2	Min V L3-L1	32 bit IEEE 754	
300525	020Ch	2	Min A L1	32 bit IEEE 754	
300527	020Eh	2	Min A L2	32 bit IEEE 754	
300529	0210h	2	Min A L3	32 bit IEEE 754	
300531	0212h	2	Min A N	32 bit IEEE 754	
300533	0214h	2	Min W L1	32 bit IEEE 754	
300535	0216h	2	Min W L2	32 bit IEEE 754	
300537	0218h	2	Min W L3	32 bit IEEE 754	
300539	021Ah	2	Min VA L1	32 bit IEEE 754	
300541	021Ch	2	Min VA L2	32 bit IEEE 754	
300543	021Eh	2	Min VA L3	32 bit IEEE 754	
300545	0220h	2	Min VAR L1	32 bit IEEE 754	
300547	0222h	2	Min VAR L2	32 bit IEEE 754	
300549	0224h	2	Min VAR L3	32 bit IEEE 754	
300551	0226h	2			
300553	0228h	2	Min PF L1	32 bit IEEE 754	Negative values correspond to lead(C), positive value correspond to lag(L)
300555	022Ah	2	Min PF L2	32 bit IEEE 754	
300557	022Ch	2	Min PF L3	32 bit IEEE 754	
300559	022Eh	2	Min V L-N Σ	32 bit IEEE 754	
300561	0230h	2	Min V L-L Σ	32 bit IEEE 754	
300563	0232h	2	Min W Σ	32 bit IEEE 754	
300565	0234h	2	Min VA Σ	32 bit IEEE 754	
300567	0236h	2	Min VAR Σ	32 bit IEEE 754	
300569	0238h	2	Min PF Σ	32 bit IEEE 754	Negative values correspond to lead(C), positive value correspond to lag(L)
300571	023Ah	2	Min Hz	32 bit IEEE 754	
300573	023Ch	2	Min Asymmetry L-N %	32 bit IEEE 754	
300575	023Eh	2	Min Asymmetry L-L %	32 bit IEEE 754	
300577	0240h	2	Min THD tot VL1-N	32 bit IEEE 754	
300579	0242h	2	Min THD odd VL1-N	32 bit IEEE 754	
300581	0244h	2	Min THD even VL1-N	32 bit IEEE 754	
300583	0246h	2	Min THD tot VL2-N	32 bit IEEE 754	
300585	0248h	2	Min THD odd VL2-N	32 bit IEEE 754	
300587	024Ah	2	Min THD even VL2-N	32 bit IEEE 754	
300589	024Ch	2	Min THD tot VL3-N	32 bit IEEE 754	
300591	024Eh	2	Min THD odd VL3-N	32 bit IEEE 754	
300593	0250h	2	Min THD even VL3-N	32 bit IEEE 754	
300595	0252h	2	Min THD tot VL1	32 bit IEEE 754	
300597	0254h	2	Min THD odd VL1	32 bit IEEE 754	
300599	0256h	2	Min THD even VL1	32 bit IEEE 754	
300601	0258h	2	Min THD tot VL2	32 bit IEEE 754	
300603	025Ah	2	Min THD odd VL2	32 bit IEEE 754	
300605	025Ch	2	Min THD even VL2	32 bit IEEE 754	
300607	025Eh	2	Min THD tot VL3	32 bit IEEE 754	
300609	0260h	2	Min THD odd VL3	32 bit IEEE 754	
300611	0262h	2	Min THD even VL3	32 bit IEEE 754	
300613	0264h	2	Min THD tot AL1	32 bit IEEE 754	
300615	0266h	2	Min THD odd AL1	32 bit IEEE 754	
300617	0268h	2	Min THD even AL1	32 bit IEEE 754	
300619	026Ah	2	Min THD tot AL2	32 bit IEEE 754	
300621	026Ch	2	Min THD odd AL2	32 bit IEEE 754	
300623	026Eh	2	Min THD even AL2	32 bit IEEE 754	
300625	0270h	2	Min THD tot AL3	32 bit IEEE 754	
300627	0272h	2	Min THD odd AL3	32 bit IEEE 754	
300629	0274h	2	Min THD even AL3	32 bit IEEE 754	

2.5 DMD variables

MODBUS: read only mode with functions code 03 and 04
ANSI C12.18: read only mode, table reference 0003h

Table 2.5-1

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
300769	0300h	2	DMD V L1-N	32 bit IEEE 754	
300771	0302h	2	DMD V L2-N	32 bit IEEE 754	
300773	0304h	2	DMD V L3-N	32 bit IEEE 754	
300775	0306h	2	DMD V L1-L2	32 bit IEEE 754	
300777	0308h	2	DMD V L2-L3	32 bit IEEE 754	
300779	030Ah	2	DMD V L3-L1	32 bit IEEE 754	
300781	030Ch	2	DMD A L1	32 bit IEEE 754	
300783	030Eh	2	DMD A L2	32 bit IEEE 754	
300785	0310h	2	DMD A L3	32 bit IEEE 754	
300787	0312h	2	DMD A N	32 bit IEEE 754	
300789	0314h	2	DMD W L1	32 bit IEEE 754	
300791	0316h	2	DMD W L2	32 bit IEEE 754	
300793	0318h	2	DMD W L3	32 bit IEEE 754	
300795	031Ah	2	DMD VA L1	32 bit IEEE 754	
300797	031Ch	2	DMD VA L2	32 bit IEEE 754	
300799	031Eh	2	DMD VA L3	32 bit IEEE 754	
300801	0320h	2	DMD VAR L1	32 bit IEEE 754	
300803	0322h	2	DMD VAR L2	32 bit IEEE 754	
300805	0324h	2	DMD VAR L3	32 bit IEEE 754	
300807	0326h	2			
300809	0328h	2	DMD PF L1	32 bit IEEE 754	Negative values correspond to lead(C), positive value correspond to lag(L)
300811	032Ah	2	DMD PF L2	32 bit IEEE 754	
300813	032Ch	2	DMD PF L3	32 bit IEEE 754	
300815	032Eh	2	DMD V L-N Σ	32 bit IEEE 754	
300817	0330h	2	DMD V L-L Σ	32 bit IEEE 754	
300819	0332h	2	DMD W Σ	32 bit IEEE 754	
300821	0334h	2	DMD VA Σ	32 bit IEEE 754	
300823	0336h	2	DMD VAR Σ	32 bit IEEE 754	
300825	0338h	2	DMD PF Σ	32 bit IEEE 754	Negative values correspond to lead(C), positive value correspond to lag(L)
300827	033Ah	2	DMD Hz	32 bit IEEE 754	
300829	033Ch	2	DMD Asymmetry L-N %	32 bit IEEE 754	
300831	033Eh	2	DMD Asymmetry L-L %	32 bit IEEE 754	
300833	0340h	2	DMD THD tot VL1-N	32 bit IEEE 754	
300835	0342h	2	DMD THD odd VL1-N	32 bit IEEE 754	
300837	0344h	2	DMD THD even VL1-N	32 bit IEEE 754	
300839	0346h	2	DMD THD tot VL2-N	32 bit IEEE 754	
300841	0348h	2	DMD THD odd VL2-N	32 bit IEEE 754	
300843	034Ah	2	DMD THD even VL2-N	32 bit IEEE 754	
300845	034Ch	2	DMD THD tot VL3-N	32 bit IEEE 754	
300847	034Eh	2	DMD THD odd VL3-N	32 bit IEEE 754	
300849	0350h	2	DMD THD even VL3-N	32 bit IEEE 754	
300851	0352h	2	DMD THD tot VL1	32 bit IEEE 754	
300853	0354h	2	DMD THD odd VL1	32 bit IEEE 754	
300855	0356h	2	DMD THD even VL1	32 bit IEEE 754	
300857	0358h	2	DMD THD tot VL2	32 bit IEEE 754	
300859	035Ah	2	DMD THD odd VL2	32 bit IEEE 754	
300861	035Ch	2	DMD THD even VL2	32 bit IEEE 754	
300863	035Eh	2	DMD THD tot VL3	32 bit IEEE 754	
300865	0360h	2	DMD THD odd VL3	32 bit IEEE 754	
300867	0362h	2	DMD THD even VL3	32 bit IEEE 754	
300869	0364h	2	DMD THD tot AL1	32 bit IEEE 754	
300871	0366h	2	DMD THD odd AL1	32 bit IEEE 754	
300873	0368h	2	DMD THD even AL1	32 bit IEEE 754	
300875	036Ah	2	DMD THD tot AL2	32 bit IEEE 754	
300877	036Ch	2	DMD THD odd AL2	32 bit IEEE 754	
300879	036Eh	2	DMD THD even AL2	32 bit IEEE 754	
300881	0370h	2	DMD THD tot AL3	32 bit IEEE 754	
300883	0372h	2	DMD THD odd AL3	32 bit IEEE 754	
300885	0374h	2	DMD THD even AL3	32 bit IEEE 754	

2.6 Maximum DMD variables

MODBUS: read only mode, with functions code 03 and 04
ANSI C12.18: read only mode, table reference 0004h

Table 2.6-1

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
301025	0400h	2	Max DMD V L1-N	32 bit IEEE 754	
301027	0402h	2	Max DMD V L2-N	32 bit IEEE 754	
301029	0404h	2	Max DMD V L3-N	32 bit IEEE 754	
301031	0406h	2	Max DMD V L1-L2	32 bit IEEE 754	
301033	0408h	2	Max DMD V L2-L3	32 bit IEEE 754	
301035	040Ah	2	Max DMD V L3-L1	32 bit IEEE 754	
301037	040Ch	2	Max DMD A L1	32 bit IEEE 754	
301039	040Eh	2	Max DMD A L2	32 bit IEEE 754	
301041	0410h	2	Max DMD A L3	32 bit IEEE 754	
301043	0412h	2	Max DMD A N	32 bit IEEE 754	
301045	0414h	2	Max DMD W L1	32 bit IEEE 754	
301047	0416h	2	Max DMD W L2	32 bit IEEE 754	
301049	0418h	2	Max DMD W L3	32 bit IEEE 754	
301051	041Ah	2	Max DMD VA L1	32 bit IEEE 754	
301053	041Ch	2	Max DMD VA L2	32 bit IEEE 754	
301055	041Eh	2	Max DMD VA L3	32 bit IEEE 754	
301057	0420h	2	Max DMD VAR L1	32 bit IEEE 754	
301059	0422h	2	Max DMD VAR L2	32 bit IEEE 754	
301061	0424h	2	Max DMD VAR L3	32 bit IEEE 754	
301063	0426h	2			
301065	0428h	2	Max DMD PF L1	32 bit IEEE 754	Negative values correspond to lead(C), positive value correspond to lag(L)
301067	042Ah	2	Max DMD PF L2	32 bit IEEE 754	
301069	042Ch	2	Max DMD PF L3	32 bit IEEE 754	
301071	042Eh	2	Max DMD V L-N Σ	32 bit IEEE 754	
301073	0430h	2	Max DMD V L-L Σ	32 bit IEEE 754	
301075	0432h	2	Max DMD W Σ	32 bit IEEE 754	
301077	0434h	2	Max DMD VA Σ	32 bit IEEE 754	
301079	0436h	2	Max DMD VAR Σ	32 bit IEEE 754	
301081	0438h	2	Max DMD PF Σ	32 bit IEEE 754	Negative values correspond to lead(C), positive value correspond to lag(L)
301083	043Ah	2	Max DMD Hz	32 bit IEEE 754	
301085	043Ch	2	Max DMD Asymmetry L-N %	32 bit IEEE 754	
301087	043Eh	2	Max DMD Asymmetry L-L %	32 bit IEEE 754	
301089	0440h	2	Max DMD THD tot VL1-N	32 bit IEEE 754	
301091	0442h	2	Max DMD THD odd VL1-N	32 bit IEEE 754	
301093	0444h	2	Max DMD THD even VL1-N	32 bit IEEE 754	
301095	0446h	2	Max DMD THD tot VL2-N	32 bit IEEE 754	
301097	0448h	2	Max DMD THD odd VL2-N	32 bit IEEE 754	
301099	044Ah	2	Max DMD THD even VL2-N	32 bit IEEE 754	
301101	044Ch	2	Max DMD THD tot VL3-N	32 bit IEEE 754	
301103	044Eh	2	Max DMD THD odd VL3-N	32 bit IEEE 754	
301105	0450h	2	Max DMD THD even VL3-N	32 bit IEEE 754	
301107	0452h	2	Max DMD THD tot VL1	32 bit IEEE 754	
301109	0454h	2	Max DMD THD odd VL1	32 bit IEEE 754	
301111	0456h	2	Max DMD THD even VL1	32 bit IEEE 754	
301113	0458h	2	Max DMD THD tot VL2	32 bit IEEE 754	
301115	045Ah	2	Max DMD THD odd VL2	32 bit IEEE 754	
301117	045Ch	2	Max DMD THD even VL2	32 bit IEEE 754	
301119	045Eh	2	Max DMD THD tot VL3	32 bit IEEE 754	
301121	0460h	2	Max DMD THD odd VL3	32 bit IEEE 754	
301123	0462h	2	Max DMD THD even VL3	32 bit IEEE 754	
301125	0464h	2	Max DMD THD tot AL1	32 bit IEEE 754	
301127	0466h	2	Max DMD THD odd AL1	32 bit IEEE 754	
301129	0468h	2	Max DMD THD even AL1	32 bit IEEE 754	
301131	046Ah	2	Max DMD THD tot AL2	32 bit IEEE 754	
301133	046Ch	2	Max DMD THD odd AL2	32 bit IEEE 754	
301135	046Eh	2	Max DMD THD even AL2	32 bit IEEE 754	
301137	0470h	2	Max DMD THD tot AL3	32 bit IEEE 754	
301139	0472h	2	Max DMD THD odd AL3	32 bit IEEE 754	
301141	0474h	2	Max DMD THD even AL3	32 bit IEEE 754	

2.7 Total and partial (tariff) energy meters

MODBUS: read only mode with functions code 03 and 04
ANSI C12.18: read only mode, table reference 0005h

Table 2.7-1

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
301281	0500h	4	Total KWh+	UINT 64	
301285	0504h	4	Total Kvarh+	UINT 64	
301289	0508h	4	Total KWh-	UINT 64	
301293	050Ch	4	Total Kvarh-	UINT 64	
301297	0510h	4	Phase L1 KWh+	UINT 64	
301301	0514h	4	Phase L1 Kvarh+	UINT 64	
301305	0518h	4	Phase L1 KWh-	UINT 64	
301309	051Ch	4	Phase L1 Kvarh-	UINT 64	
301313	0520h	4	Phase L2 KWh+	UINT 64	
301317	0524h	4	Phase L2 Kvarh+	UINT 64	
301321	0528h	4	Phase L2 KWh-	UINT 64	
301325	052Ch	4	Phase L2 Kvarh-	UINT 64	
301329	0530h	4	Phase L3 KWh+	UINT 64	
301333	0534h	4	Phase L3 Kvarh+	UINT 64	
301337	0538h	4	Phase L3 KWh-	UINT 64	
301341	053Ch	4	Phase L3 Kvarh-	UINT 64	
301345	0540h	4	Tariff 1 KWh+	UINT 64	
301349	0544h	4	Tariff 1 Kvarh+	UINT 64	
301353	0548h	4	Tariff 1 KWh-	UINT 64	
301357	054Ch	4	Tariff 1 Kvarh-	UINT 64	
301361	0550h	4	Tariff 2 KWh+	UINT 64	
301365	0554h	4	Tariff 2 Kvarh+	UINT 64	
301369	0558h	4	Tariff 2 KWh-	UINT 64	
301373	055Ch	4	Tariff 2 Kvarh-	UINT 64	
301377	0560h	4	Tariff 3 KWh+	UINT 64	
301381	0564h	4	Tariff 3 Kvarh+	UINT 64	
301385	0568h	4	Tariff 3 KWh-	UINT 64	
301389	056Ch	4	Tariff 3 Kvarh-	UINT 64	
301393	0570h	4	Tariff 4 KWh+	UINT 64	
301397	0574h	4	Tariff 4 Kvarh+	UINT 64	
301401	0578h	4	Tariff 4 KWh-	UINT 64	
301405	057Ch	4	Tariff 4 Kvarh-	UINT 64	Values in Wh or varh
301409	0580h	4	Tariff 5 KWh+	UINT 64	
301413	0584h	4	Tariff 5 Kvarh+	UINT 64	
301417	0588h	4	Tariff 5 KWh-	UINT 64	
301421	058Ch	4	Tariff 5 Kvarh-	UINT 64	
301425	0590h	4	Tariff 6 KWh+	UINT 64	
301429	0594h	4	Tariff 6 Kvarh+	UINT 64	
301433	0598h	4	Tariff 6 KWh-	UINT 64	
301437	059Ch	4	Tariff 6 Kvarh-	UINT 64	
301441	05A0h	4	Tariff 7 KWh+	UINT 64	
301445	05A4h	4	Tariff 7 Kvarh+	UINT 64	
301449	05A8h	4	Tariff 7 KWh-	UINT 64	
301453	05ACh	4	Tariff 7 Kvarh-	UINT 64	
301457	05B0h	4	Tariff 8 KWh+	UINT 64	
301461	05B4h	4	Tariff 8 Kvarh+	UINT 64	
301465	05B8h	4	Tariff 8 KWh-	UINT 64	
301469	05BCh	4	Tariff 8 Kvarh-	UINT 64	
301473	05C0h	4	Tariff 9 KWh+	UINT 64	
301477	05C4h	4	Tariff 9 Kvarh+	UINT 64	
301481	05C8h	4	Tariff 9 KWh-	UINT 64	
301485	05CCh	4	Tariff 9 Kvarh-	UINT 64	
301489	05D0h	4	Tariff 10 KWh+	UINT 64	
301493	05D4h	4	Tariff 10 Kvarh+	UINT 64	
301497	05D8h	4	Tariff 10 KWh-	UINT 64	
301501	05DCh	4	Tariff 10 Kvarh-	UINT 64	
301505	05E0h	4	Tariff 11 KWh+	UINT 64	
301509	05E4h	4	Tariff 11 Kvarh+	UINT 64	
301513	05E8h	4	Tariff 11 KWh-	UINT 64	
301517	05ECh	4	Tariff 11 Kvarh-	UINT 64	
301521	05F0h	4	Tariff 12 KWh+	UINT 64	
301525	05F4h	4	Tariff 12 Kvarh+	UINT 64	
301529	05F8h	4	Tariff 12 KWh-	UINT 64	
301533	05FCh	4	Tariff 12 Kvarh-	UINT 64	

2.8 Month energy meters

MODBUS: read only mode, with functions code 03 and 04
ANSI C12.18: read only mode, table reference 0006h

Table 2.8-1

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
301537	0600h	4	January total KWh+	UINT 64	
301541	0604h	4	January total Kvarh+	UINT 64	
301545	0608h	4	January total KWh-	UINT 64	
301549	060Ch	4	January total Kvarh-	UINT 64	
301553	0610h	4	February total KWh+	UINT 64	
301557	0614h	4	February total Kvarh+	UINT 64	
301561	0618h	4	February total KWh-	UINT 64	
301565	061Ch	4	February total Kvarh-	UINT 64	
301569	0620h	4	March total KWh+	UINT 64	
301573	0624h	4	March total Kvarh+	UINT 64	
301577	0628h	4	March total KWh-	UINT 64	
301581	062Ch	4	March total Kvarh-	UINT 64	
301585	0630h	4	April total KWh+	UINT 64	
301589	0634h	4	April total Kvarh+	UINT 64	
301593	0638h	4	April total KWh-	UINT 64	
301597	063Ch	4	April total Kvarh-	UINT 64	
301601	0640h	4	May total KWh+	UINT 64	
301605	0644h	4	May total Kvarh+	UINT 64	
301609	0648h	4	May total KWh-	UINT 64	
301613	064Ch	4	May total Kvarh-	UINT 64	
301617	0650h	4	June total KWh+	UINT 64	
301621	0654h	4	June total Kvarh+	UINT 64	
301625	0658h	4	June total KWh-	UINT 64	
301629	065Ch	4	June total Kvarh-	UINT 64	
301633	0660h	4	July total KWh+	UINT 64	Values in Wh or varh
301637	0664h	4	July total Kvarh+	UINT 64	
301641	0668h	4	July total KWh-	UINT 64	
301645	066Ch	4	July total Kvarh-	UINT 64	
301649	0670h	4	August total KWh+	UINT 64	
301653	0674h	4	August total Kvarh+	UINT 64	
301657	0678h	4	August total KWh-	UINT 64	
301661	067Ch	4	August total Kvarh-	UINT 64	
301665	0680h	4	September total KWh+	UINT 64	
301669	0684h	4	September total Kvarh+	UINT 64	
301673	0688h	4	September total KWh-	UINT 64	
301677	068Ch	4	September total Kvarh-	UINT 64	
301681	0690h	4	October total KWh+	UINT 64	
301685	0694h	4	October total Kvarh+	UINT 64	
301689	0698h	4	October total KWh-	UINT 64	
301693	069Ch	4	October total Kvarh-	UINT 64	
301697	06A0h	4	November total KWh+	UINT 64	
301701	06A4h	4	November total Kvarh+	UINT 64	
301705	06A8h	4	November total KWh-	UINT 64	
301709	06ACh	4	November total Kvarh-	UINT 64	
301713	06B0h	4	December total KWh+	UINT 64	
301717	06B4h	4	December total Kvarh+	UINT 64	
301721	06B8h	4	December total KWh-	UINT 64	
301725	06BCh	4	December total Kvarh-	UINT 64	

2.9 Harmonic phase angles

MODBUS: read only mode with functions code 03 and 04
ANSI C12.18: read only mode, table reference 0007h

Table 2.9-1

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
301793	0700h	1	1° harmonic Ph. Angle VL1-N→AL1 [°]	UINT 16	
301794	0701h	1	2° harmonic Ph. Angle VL1-N→AL1 [°]	UINT 16	
301854	073Dh	1	62° harmonic Ph. Angle VL1-N→AL1 [°]	UINT 16	
301855	073Eh	1	63° harmonic Ph. Angle VL1-N→AL1 [°]	UINT 16	
301856	073Fh	1	Not used		
301857	0740h	1	1° harmonic Ph. Angle VL2-N→AL2 [°]	UINT 16	
301858	0741h	1	2° harmonic Ph. Angle VL2-N→AL2 [°]	UINT 16	
301918	077Dh	1	62° harmonic Ph. Angle VL2-N→AL2 [°]	UINT 16	
301919	077Eh	1	63° harmonic Ph. Angle VL2-N→AL2 [°]	UINT 16	
301920	077Fh	1	Not used		
301921	0780h	1	1° harmonic Ph. Angle VL3-N→AL3 [°]	UINT 16	
301922	0781h	1	2° harmonic Ph. Angle VL3-N→AL3 [°]	UINT 16	
301982	07BDh	1	62° harmonic Ph. Angle VL3-N→AL3 [°]	UINT 16	
301983	07BEh	1	63° harmonic Ph. Angle VL3-N→AL3 [°]	UINT 16	
301984	07BFh	1	Not used		

2.10 Single Harmonic amplitudes

MODBUS: read only mode with functions code 03 and 04
ANSI C12.18: read only mode, table reference 0008h

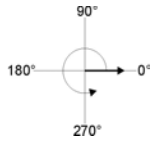
Table 2.10-1

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
301985	07C0h	1	1° harmonic VL1-N %	UINT 16	
301986	07C1h	1	2° harmonic VL1-N %	UINT 16	
					The value must be divided by 10 to obtain the correct resolution (%)
302046	07FDh	1	62° harmonic VL1-N %	UINT 16	
302047	07FEh	1	63° harmonic VL1-N %	UINT 16	
302048	07FFh	1	Not used		
302049	0800h	1	1° harmonic VL2-N %	UINT 16	
302050	0801h	1	2° harmonic VL2-N %	UINT 16	
					The value must be divided by 10 to obtain the correct resolution (%)
302110	083Dh	1	62° harmonic VL2-N %	UINT 16	
302111	083Eh	1	63° harmonic VL2-N %	UINT 16	
302112	083Fh	1	Not used		
302113	0840h	1	1° harmonic VL3-N %	UINT 16	
302114	0841h	1	2° harmonic VL3-N %	UINT 16	
					The value must be divided by 10 to obtain the correct resolution (%)
302174	087Dh	1	62° harmonic VL3-N %	UINT 16	
302175	087Eh	1	63° harmonic VL3-N %	UINT 16	
302176	087Fh	1	Not used		
302177	0880h	1	1° harmonic AL1 %	UINT 16	
302178	0881h	1	2° harmonic AL1 %	UINT 16	
					The value must be divided by 10 to obtain the correct resolution (%)
302238	08BDh	1	62° harmonic AL1-N %	UINT 16	
302239	08BEh	1	63° harmonic AL1-N %	UINT 16	
302240	08BFh	1	Not used		
302241	08C0h	1	1° harmonic AL2 %	UINT 16	
302242	08C1h	1	2° harmonic AL2 %	UINT 16	
					The value must be divided by 10 to obtain the correct resolution (%)
302302	08FDh	1	62° harmonic AL2 %	UINT 16	
302303	08FEh	1	63° harmonic AL2 %	UINT 16	
302304	08FFh	1	Not used		
302305	0900h	1	1° harmonic AL3 %	UINT 16	
302306	0901h	1	2° harmonic AL3 %	UINT 16	
					The value must be divided by 10 to obtain the correct resolution (%)
302366	093Dh	1	62° harmonic AL3 %	UINT 16	
302367	093Eh	1	63° harmonic AL3 %	UINT 16	
302368	093Fh	1	Not used		
302369	0940h	1	1° harmonic VL1 %	UINT 16	
302370	0941h	1	2° harmonic VL1 %	UINT 16	
					The value must be divided by 10 to obtain the correct resolution (%)
302430	097Dh	1	62° harmonic VL1 %	UINT 16	
302431	097Eh	1	63° harmonic VL1 %	UINT 16	
302432	097Fh	1	Not used		
302433	0980h	1	1° harmonic VL2 %	UINT 16	
302434	0981h	1	2° harmonic VL2 %	UINT 16	
					The value must be divided by 10 to obtain the correct resolution (%)
302494	09BDh	1	62° harmonic VL2 %	UINT 16	
302495	09BEh	1	63° harmonic VL2 %	UINT 16	
302496	09BFh	1	Not used		
302497	09C0h	1	1° harmonic VL3 %	UINT 16	
302498	09C1h	1	2° harmonic VL3 %	UINT 16	
					The value must be divided by 10 to obtain the correct resolution (%)
302558	09FDh	1	62° harmonic VL3 %	UINT 16	
302559	09FEh	1	63° harmonic VL3 %	UINT 16	
302560	09FFh	1	Not used		

2.11 Phase angles

MODBUS: read only mode with functions code 03 and 04
ANSI C12.18: read only mode, table reference 0009h

Table 2.11-1

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
306657	1A00h	1	Phase angle VL1-N [°]	UINT 16	The value must be divided by 10 to obtain the correct resolution (°) 
306658	1A01h	1	Phase angle VL2-N [°]	UINT 16	
306659	1A02h	1	Phase angle VL3-N [°]	UINT 16	
306660	1A03h	1	Phase angle AL1 [°]	UINT 16	
306661	1A04h	1	Phase angle AL2 [°]	UINT 16	
306662	1A05h	1	Phase angle AL3 [°]	UINT 16	

2.12 Digital input, digital output and alarm status

MODBUS: read only mode with functions code 03 and 04
ANSI C12.18: read only mode, table reference 000Ah

* CLOSE = ON (on display)
** OPEN = OFF (on display)

Table 2.12-1

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
306913	1B00h	1	Digital input status	UINT 16 Bit=0 input close* Bit=1 input open**	Bit0: input Slot A, Channel 1 Bit1: input Slot A, Channel 2 Bit2: input Slot A, Channel 3 Bit3: not used Bit4: input Slot B, Channel 1 Bit5: input Slot B, Channel 2 Bit6: input Slot B, Channel 3 Bit7: not used Bit8: input Slot C, Channel 1 Bit9: input Slot C, Channel 2 Bit10: input Slot C, Channel 3 Bit11: not used Bit12: input Slot D, Channel 1 Bit13: input Slot D, Channel 2 Bit14: input Slot D, Channel 3 Bit15: not used
306914	1B01h	1	Digital input enabling (presence of the input)	UINT 16 Bit=0 input is disabled Bit=1 input is enabled	
306915	1B02h	1	Digital output status (physical condition for alarm and remote mode)	UINT 16 Bit=0 output is open Bit=1 output is close	Bit0: output Slot A, Channel 1 (0) Bit1: output Slot A, Channel 2 (1) Bit2: output Slot A, Channel 3 Bit3: output Slot A, Channel 4 Bit4: output Slot B, Channel 1 (0) Bit5: output Slot B, Channel 2 (1) Bit6: output Slot B, Channel 3 Bit7: output Slot B, Channel 4 Bit8: output Slot C, Channel 1 (0) Bit9: output Slot C, Channel 2 (1) Bit10: output Slot C, Channel 3 Bit11: output Slot C, Channel 4 Bit12: output Slot D, Channel 1 (0) Bit13: output Slot D, Channel 2 (1) Bit14: output Slot D, Channel 3 Bit15: output Slot D, Channel 4 **See note**
306916	1B03h	1	Digital output enabling (presence of the output)	UINT 16 Bit=0 output is disabled Bit=1 output is enabled	
306917	1B04h	1	Alarm status (condition of virtual alarm)	UINT 16 Bit=0 alarm is deactivated Bit=1 alarm is activated	Bit0: Alarm 1 Bit1: Alarm 2 Bit2: Alarm 3 Bit3: Alarm 4 Bit4: Alarm 5 Bit5: Alarm 6 Bit6: Alarm 7 Bit7: Alarm 8 Bit8: Alarm 9 Bit9: Alarm 10 Bit10: Alarm 11 Bit11: Alarm 12 Bit12: Alarm 13 Bit13: Alarm 14 Bit14: Alarm 15 Bit15: Alarm 16
306918	1B05h	1	Alarm enabled (presence of the virtual alarm)	UINT 16 Bit=0 alarm is disabled Bit=1 alarm is enabled	

Note: in case of a dual output module, the channels are named 0 and 1, while with a 4-output module they are named 1, 2, 3, and 4.

2.13 Current tariff

MODBUS: read only mode with functions code 03 and 04 Table 2.13-1
ANSI C12.18: read only mode, table reference 000Bh

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
306919	1B06h	1	Current tariff	UINT 16	Value=1 : tariff 1 Value=2 : tariff 2 Value=3 : tariff 3 Value=4 : tariff 4 Value=5 : tariff 5 Value=6 : tariff 6 Value=7 : tariff 7 Value=8 : tariff 8 Value=9 : tariff 9 Value=10 : tariff 10 Value=11 : tariff 11 Value=12 : tariff 12

2.14 Firmware version and revision code

MODBUS: read only mode with functions code 03 and 04 Table 2.14-1
ANSI C12.18: read only mode, table reference 000Ch

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
306920	1B07h	1	Version code	UINT 16	
306921	1B08h	1	Revision code	UINT 16	
306922	1B09h	1	Input module version code and model	UINT 16	LSB : version code MSB : model (5 = AV5, 6 = AV6)
306923	1B0Ah	1	Input module revision code	UINT 16	

2.15 Keypad Lock status

MODBUS: read only mode with functions code 03 and 04 Table 2.15-1
ANSI C12.18: read only mode, table reference 0029h

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
306924	1B0Bh	1	Keypad lock status	UINT 16	Value=1 : keypad locked Value=0 : keypad unlocked

2.16 Clock information

MODBUS: read only mode with functions code 03 and 04 Table 2.16-1
ANSI C12.18: read only mode, table reference 000Dh

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
307169	1C00h	1	Current year	UINT 16	Only european format (24 hours)
307170	1C01h	1	Current month		
307171	1C02h	1	Current day		
307172	1C03h	1	Current hour		
307173	1C04h	1	Current minute		
307174	1C05h	1	Current second		

2.17 Carlo Gavazzi Controls identification code

MODBUS: read only mode with functions code 03 and 04 Table 2.17-1
ANSI C12.18: not available

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
300012	000Bh	1	Carlo Gavazzi Controls identification code	UINT 16	Value=41: WM5 product code Value=42: PQT-H product code

2.18 Programming parameter tables

2.18.1 Password configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 000Eh

Table 2.18-1

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
308193	2000h	1	PASSWORD	UINT 16	Minimum valid value: 0d Maximum valid value: 1000d If the value is outside the limits the instrument considers the value equal to 0.

2.18.2 Module configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 000Fh

Table 2.18-2

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
308194	2001h	1	SLOT "A" configuration	UINT 16	Value=0: no module available Value=1: AQ1038 3 dig. input Value=2: AQ1042 3 dig. input + Aux Value=4: AO1036 2 o.c. output Value=5: AO1037 4 o.c. output Value=6: AO1058 1 relay output Value=7: AO1059 1 o.c. output Value=8: AO2050 2 0-20mA output Value=9: AO2051 2 0-10V output Value=13: AO2052 2 +/-5mA output Value=14: AR1061 ethernet port All other values corresponds to no module available
308195	2002h	1	SLOT "B" configuration	UINT 16	Value=0: no module available Value=1: AQ1038 3 dig. input Value=2: AQ1042 3 dig. input + Aux Value=4: AO1036 2 o.c. output Value=5: AO1037 4 o.c. output Value=6: AO1058 1 relay output Value=7: AO1059 1 o.c. output Value=8: AO2050 2 0-20mA output Value=9: AO2051 2 0-10V output Value=10: AR1034 RS485 9.6K output Value=12: AR2040 RS485 115K output Value=13: AO2052 2 +/-5mA output All other values corresponds to no module available
308196	2003h	1	SLOT "C" configuration	UINT 16	Value=0: no module available Value=1: AQ1038 3 dig. input Value=2: AQ1042 3 dig. input + Aux Value=3: AO1035 2 relay output Value=4: AO1036 2 o.c. output Value=5: AO1037 4 o.c. output Value=6: AO1058 1 relay output Value=7: AO1059 1 o.c. output Value=9: AO2051 2 0-10V output Value=13: AO2052 2 +/-5mA output All other values corresponds to no module available
308197	2004h	1	SLOT "D" configuration	UINT 16	Value=0: no module available Value=1: AQ1038 3 dig. input Value=2: AQ1042 3 dig. Input + Aux Value=3: AO1035 2 relay output Value=4: AO1036 2 o.c. output Value=5: AO1037 4 o.c. output Value=6: AO1058 1 relay output Value=7: AO1059 1 o.c. output Value=9: AO2051 2 0-10V output Value=13: AO2052 2 +/-5mA output All other values corresponds to no module available
308198	2005h	1	SLOT "E" configuration	UINT 16	Value=0: no module available Value=11: AQ1039 RS232+RTC module All other values corresponds to no module available

2.18.3 System configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 0010h

Table 2.18-3

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
308209	2010h	1	Measuring system configuration	UINT 16	Value=0: 1-phase 2-wire Value=1: 2-phase 3-wire Value=2: 3-phase 3-wire 1 CT Value=3: 3-phase 3-wire Value=4: 3-phase 4-wire All other values corresponds to 3-phase 4-wire system

2.18.4 CT configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 0011h

Table 2.18-4

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
308210	2011h	2	Current transformer ratio	32 bit IEEE 754	Value min = 0.1 Value max = 6000.0 If the value is outside the limits the instrument considers the value equal to 1.0

2.18.5 PT configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 0012h

Table 2.18-5

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
308212	2013h	2	Current transformer ratio	32 bit IEEE 754	Value min = 0.1 Value max = 6000.0 If the value is outside the limits the instrument considers the value equal to 1.0

2.18.6 DMD/AVG calculation configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 0013h

Table 2.18-6

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
308225	2020h	1	DMD/AVG type calculation selection	UINT 16	Value=0: Fixed type Value=1: Slide type All other values are considered as value=0
308226	2021h	1	Interval time selection	UINT 16	Value=0: 5 minutes Value=1: 10 minutes Value=2: 15 minutes Value=3: 20 minutes Value=4: 30 minutes Value=5: 60 minutes All other values are considered as value=0
308227	2022h	1	Synchronisation source	UINT 16	Value=0: OFF (sync is disabled) Value=1: Clock Value=2: Contact (by digital input) All other values are considered as value=0

2.18.7 Installed power configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 0014h

Table 2.18-7

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
308241	2030h	2	Nominal installed power (W)	32 bit IEEE 754	Value min = 1000 (1K) Value max = 9999000000 (9999M) If the value is outside the limits the instrument considers the value equal to 1000

2.18.8 Meter configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 0015h

Table 2.18-8

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
308257	2040h	1	Tariff selection mode	UINT 16	Value=0: Tariff selection by clock Value=1: Tariff selection by digital inputs All other values are considered as value=0
308258	2041h	1	Monday day type selection	UINT 16	Value=0: Day is selected as “Working” Value=1: Day is selected as “Holiday” All other values are considered as value=0
308259	2042h	1	Tuesday day type selection	UINT 16	Value=0: Day is selected as “Working” Value=1: Day is selected as “Holiday” All other values are considered as value=0
308260	2043h	1	Wednesday day type selection	UINT 16	Value=0: Day is selected as “Working” Value=1: Day is selected as “Holiday” All other values are considered as value=0
308261	2044h	1	Thursday day type selection	UINT 16	Value=0: Day is selected as “Working” Value=1: Day is selected as “Holiday” All other values are considered as value=0
308262	2045h	1	Friday day type selection	UINT 16	Value=0: Day is selected as “Working” Value=1: Day is selected as “Holiday” All other values are considered as value=0
308263	2046h	1	Saturday day type selection	UINT 16	Value=0: Day is selected as “Working” Value=1: Day is selected as “Holiday” All other values are considered as value=0
308264	2047h	1	Sunday day type selection	UINT 16	Value=0: Day is selected as “Working” Value=1: Day is selected as “Holiday” All other values are considered as value=0
308265	2048h	1	Default tariff selection	UINT 16	Value=1: Default tariff is T1 Value=2: Default tariff is T2 Value=3: Default tariff is T3 Value=4: Default tariff is T4 Value=5: Default tariff is T5 Value=6: Default tariff is T6 Value=7: Default tariff is T7 Value=8: Default tariff is T8 Value=9: Default tariff is T9 Value=10: Default tariff is T10 Value=11: Default tariff is T11 Value=12: Default tariff is T12 All other values are considered as value=1
308273	2050h (L-word **N**)	1	Line 1 period description	UNIT64	Refer to Table 2.18-9
308669	21DCh (L-word **N+99**)	1	Line 100 period description	UNIT64	

The “period description” lines allow to define the tariff calendar over the year. For each tariff, every period (from starting date to ending date, from starting time to ending time, limited to working days, holidays or both of them) which includes that tariff is to be defined.

Table 2.18-9: Line period description

L-Word Address	Bit 63..56	Bit 55..48	Bit 47..40	Bit 39..32	Bit 31..24	Bit 23..16	Bit 15..8	Bit 7..0
L-word **N**	Working Holiday Mode	Tariff value	End day value	End month value	Start day value	Start month value	Start time value	End time value
Programmable values	Value=1: Working day are enabled Value=2: Holiday day are enabled Value=3: Working and Holiday day are enabled	Values from 1 to 12 correspond to tariff 1 to 12	From 1 to 31	From 1 to 12	From 1 to 31	From 1 to 12	From 0 to 23	From 1 to 24
	If there is a value outside the limits the line is not considered (the relevant **N** line position is free for a new writing)							

To activate the new meter configuration (for all the parameters in table 2.18-8 except “Tariff selection mode”) it is necessary to send the “updating of meter configuration” command (refer to 2.18.264) or switch off and on the instrument.

2.18.9 Display page configuration menu

MODBUS: read and write mode

ANSI C12.18: read and write mode, table reference 0016h

Table 2.18-10

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
308673	21E0h	1	First field configuration 1	UINT 16	Value of the variable identification code (see Table 2.18-11). If the value is not present in the table, W1 DMD is selected.
308674	21E1h	1	Second field configuration 2	UINT 16	Value of the variable identification code (see Table 2.18-11). If the value is not present in the table, W2 DMD is selected.
308675	21E2h	1	Third field configuration 3	UINT 16	Value of the variable identification code (see Table 2.18-11). If the value is not present in the table, W3 DMD is selected.

Table 2.18-11: Variable identification code

Type	Instantaneous	Maximum	Minimum	DMD	Maximum DMD
V1	0000h	0100h	0200h	0300h	0400h
V2	0001h	0101h	0201h	0301h	0401h
V3	0002h	0102h	0202h	0302h	0402h
VL Σ	0003h	0103h	0203h	0303h	0403h
V12	0004h	0104h	0204h	0304h	0404h
V23	0005h	0105h	0205h	0305h	0405h
V31	0006h	0106h	0206h	0306h	0406h
VLL Σ	0007h	0107h	0207h	0307h	0407h
A1	0008h	0108h	0208h	0308h	0408h
A2	0009h	0109h	0209h	0309h	0409h
A3	000Ah	010Ah	020Ah	030Ah	040Ah
An	000Bh	010Bh	020Bh	030Bh	040Bh
W1	000Ch	010Ch	020Ch	030Ch	040Ch
W2	000Dh	010Dh	020Dh	030Dh	040Dh
W3	000Eh	010Eh	020Eh	030Eh	040Eh
W Σ	000Fh	010Fh	020Fh	030Fh	040Fh
var1	0010h	0110h	0210h	0310h	0410h
var2	0011h	0111h	0211h	0311h	0411h
var3	0012h	0112h	0212h	0312h	0412h
var Σ	0013h	0113h	0213h	0313h	0413h
VA1	0014h	0114h	0214h	0314h	0414h
VA2	0015h	0115h	0215h	0315h	0415h
VA3	0016h	0116h	0216h	0316h	0416h
VA Σ	0017h	0117h	0217h	0317h	0417h
PF1	0018h	0118h	0218h	0318h	0418h
PF2	0019h	0119h	0219h	0319h	0419h
PF3	001Ah	011Ah	021Ah	031Ah	041Ah
PF Σ	001Bh	011Bh	021Bh	031Bh	041Bh
HZ	001Ch	011Ch	021Ch	031Ch	041Ch
ASY VL	001Dh	011Dh	021Dh	031Dh	041Dh
ASY VLL	001Eh	011Eh	021Eh	031Eh	041Eh
THD V1	001Fh	011Fh	021Fh	031Fh	041Fh
THD V2	0020h	0120h	0220h	0320h	0420h
THD V3	0021h	0121h	0221h	0321h	0421h
THD V12	0022h	0122h	0222h	0322h	0422h
THD V23	0023h	0123h	0223h	0323h	0423h
THD V31	0024h	0124h	0224h	0324h	0424h
THD A1	0025h	0125h	0225h	0325h	0425h
THD A2	0026h	0126h	0226h	0326h	0426h
THD A3	0027h	0127h	0227h	0327h	0427h
THDoddV1	0028h	0128h	0228h	0328h	0428h
THDoddV2	0029h	0129h	0229h	0329h	0429h
THDoddV3	002Ah	012Ah	022Ah	032Ah	042Ah
THDoddV12	002Bh	012Bh	022Bh	032Bh	042Bh
THDoddV23	002Ch	012Ch	022Ch	032Ch	042Ch
THDoddV31	002Dh	012Dh	022Dh	032Dh	042Dh
THDoddA1	002Eh	012Eh	022Eh	032Eh	042Eh
THDoddA2	002Fh	012Fh	022Fh	032Fh	042Fh
THDoddA3	0030h	0130h	0230h	0330h	0430h
THDevenV1	0031h	0131h	0231h	0331h	0431h
THDevenV2	0032h	0132h	0232h	0332h	0432h
THDevenV3	0033h	0133h	0233h	0333h	0433h
THDevenV12	0034h	0134h	0234h	0334h	0434h
THDevenV23	0035h	0135h	0235h	0335h	0435h
THDevenV31	0036h	0136h	0236h	0336h	0436h
THDevenA1	0037h	0137h	0237h	0337h	0437h
THDevenA2	0038h	0138h	0238h	0338h	0438h
THDevenA3	0039h	0139h	0239h	0339h	0439h
Phase Sequence	003Ah	013Ah	023Ah	033Ah	043Ah

2.18.10 Digital input configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 0017h

Table 2.18-12

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
308689	21F0h	1	Slot A, channel 1 function	UINT 16	Value=0: Remote mode Value=1: Sync mode Value=2: Lsb Tariff selection mode Value=3: Msb Tariff selection mode All other values corresponds to remote mode NOTE: If the Lsb tariff or Msb tariff is already present,the new value will be accepted and the previous input will be set to remote mode.
308690	21F1h	1	Slot A, channel 2 function	UINT 16	
308691	21F2h	1	Slot A, channel 3 function	UINT 16	
308692	21F3h	1	Slot B, channel 1 function	UINT 16	
308693	21F4h	1	Slot B, channel 2 function	UINT 16	
308694	21F5h	1	Slot B, channel 3 function	UINT 16	
308695	21F6h	1	Slot C, channel 1 function	UINT 16	
308696	21F7h	1	Slot C, channel 2 function	UINT 16	
308697	21F8h	1	Slot C, channel 3 function	UINT 16	
308698	21F9h	1	Slot D, channel 1 function	UINT 16	
308699	21FAh	1	Slot D, channel 2 function	UINT 16	
308700	21FBh	1	Slot D, channel 3 function	UINT 16	

2.18.11 Digital output configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 0018h

Table 2.18-13

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
308705	2200h	1	Slot A, channel 1 (0) function	UINT 16	Value=0: Pulse mode Value=1: Alarm mode Value=2: Remote mode All other values corresponds to remote mode
308706	2201h	1	Slot A, channel 2 (1)function	UINT 16	
308707	2202h	1	Slot A, channel 3 function	UINT 16	
308708	2203h	1	Slot A, channel 4 function	UINT 16	
308709	2204h	1	Slot B, channel 1 (0)function	UINT 16	
308710	2205h	1	Slot B, channel 2 (1)function	UINT 16	
308711	2206h	1	Slot B, channel 3 function	UINT 16	
308712	2207h	1	Slot B, channel 4 function	UINT 16	
308713	2208h	1	Slot C, channel 1 (0)function	UINT 16	
308714	2209h	1	Slot C, channel 2 (1)function	UINT 16	
308715	220Ah	1	Slot C, channel 3 function	UINT 16	
308716	220Bh	1	Slot C, channel 4 function	UINT 16	
308717	220Ch	1	Slot D, channel 1 (0)function	UINT 16	
308718	220Dh	1	Slot D, channel 2 (1)function	UINT 16	
308719	220Eh	1	Slot D, channel 3 function	UINT 16	
308720	220Fh	1	Slot D, channel 4 function	UINT 16	
308721	2210h	1	Slot A, channel 1 (0) pulse output energy type	UINT 16	Value=0: KWh+ Value=1: KWh- Value=2: Kvarh+ Value=3: Kvarh- All other values are considered as value=0 (this selection is mandatory in case of PULSE mode selection) Pulse weight: see next table
308722	2211h	1	Slot A, channel 2 (1) pulse output energy type	UINT 16	
308723	2212h	1	Slot A, channel 3 pulse output energy type	UINT 16	
308724	2213h	1	Slot A, channel 4 pulse output energy type	UINT 16	
308725	2214h	1	Slot B, channel 1 (0) pulse output energy type	UINT 16	
308726	2215h	1	Slot B, channel 2 (1) pulse output energy type	UINT 16	
308727	2216h	1	Slot B, channel 3 pulse output energy type	UINT 16	
308728	2217h	1	Slot B, channel 4 pulse output energy type	UINT 16	
308729	2218h	1	Slot C, channel 1 (0) pulse output energy type	UINT 16	
308730	2219h	1	Slot C, channel 2 (1) pulse output energy type	UINT 16	
308731	221Ah	1	Slot C, channel 3 pulse output energy type	UINT 16	
308732	221Bh	1	Slot C, channel 4 pulse output energy type	UINT 16	
308733	221Ch	1	Slot D, channel 1 (0) pulse output energy type	UINT 16	
308734	221Dh	1	Slot D, channel 2 (1) pulse output energy type	UINT 16	
308735	221Eh	1	Slot D, channel 3 pulse output energy type	UINT 16	
308736	221Fh	1	Slot D, channel 4 pulse output energy type	UINT 16	
308737	2220h	1	Slot A, channel 1 (0) pulse output meter type	UINT 16	Value=0: Total counter Value=1: L1 phase meter Value=2: L2 phase meter Value=3: L3 phase meter Value=4: Tariff 1 meter Value=5: Tariff 2 meter Value=6: Tariff 3 meter Value=7: Tariff 4 meter Value=8: Tariff 5 meter Value=9: Tariff 6 meter Value=10: Tariff 7 meter Value=11: Tariff 8 meter Value=12: Tariff 9 meter Value=13: Tariff 10 meter Value=14: Tariff 11 meter Value=15: Tariff 12 meter All other values are considered as value=0 (this selection is mandatory in case of PULSE mode selection)
308738	2221h	1	Slot A, channel 2 (1) pulse output meter type	UINT 16	
308739	2222h	1	Slot A, channel 3 pulse output meter type	UINT 16	
308740	2223h	1	Slot A, channel 4 pulse output meter type	UINT 16	
308741	2224h	1	Slot B, channel 1 (0) pulse output meter type	UINT 16	
308742	2225h	1	Slot B, channel 2 (1) pulse output meter type	UINT 16	
308743	2226h	1	Slot B, channel 3 pulse output meter type	UINT 16	
308744	2227h	1	Slot B, channel 4 pulse output meter type	UINT 16	
308745	2228h	1	Slot C, channel 1 (0) pulse output meter type	UINT 16	
308746	2229h	1	Slot C, channel 2 (1) pulse output meter type	UINT 16	
308747	222Ah	1	Slot C, channel 3 pulse output meter type	UINT 16	
308748	222Bh	1	Slot C, channel 4 pulse output meter type	UINT 16	
308749	222Ch	1	Slot D, channel 1 (0) pulse output meter type	UINT 16	
308750	222Dh	1	Slot D, channel 2 (1) pulse output meter type	UINT 16	
308751	222Eh	1	Slot D, channel 3 pulse output meter type	UINT 16	

308752	222Fh	1	Slot D, channel 4 pulse output meter type	UINT 16	
308753	2230h	1	Slot A, channel 1 (0) alarm output NE/ND output condition	UINT 16	Value=0:ND (normally de-energized) Value=1:NE (normally energized) All other values are considered as value=0 (this selection is mandatory in case of alarm mode selection)
308754	2231h	1	Slot A, channel 2 (1) alarm output NE/ND output condition	UINT 16	
308755	2232h	1	Slot A, channel 3 alarm output NE/ND output condition	UINT 16	
308756	2233h	1	Slot A, channel 4 alarm output NE/ND output condition	UINT 16	
308757	2234h	1	Slot B, channel 1 (0) alarm output NE/ND output condition	UINT 16	
308758	2235h	1	Slot B, channel 2 (1) alarm output NE/ND output condition	UINT 16	
308759	2236h	1	Slot B, channel 3 alarm output NE/ND output condition	UINT 16	
308760	2237h	1	Slot B, channel 4 alarm output NE/ND output condition	UINT 16	
308761	2238h	1	Slot C, channel 1 (0) alarm output NE/ND output condition	UINT 16	
308762	2239h	1	Slot C, channel 2 (1) alarm output NE/ND output condition	UINT 16	
308763	223Ah	1	Slot C, channel 3 alarm output NE/ND output condition	UINT 16	
308764	223Bh	1	Slot C, channel 4 alarm output NE/ND output condition	UINT 16	
308765	223Ch	1	Slot D, channel 1 (0) alarm output NE/ND output condition	UINT 16	
308766	223Dh	1	Slot D, channel 2 (1) alarm output NE/ND output condition	UINT 16	
308767	223Eh	1	Slot D, channel 3 alarm output NE/ND output condition	UINT 16	
308768	223Fh	1	Slot D, channel 4 alarm output NE/ND output condition	UINT 16	

Note: in case of a dual output module, the channels are named 0 and 1, while with a 4-output module they are named 1, 2, 3, and 4.

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 002Ah

Table 2.18-14

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
309329	2470h	2	Digital output A0 pulses	32 bit IEEE 754	Pulse weight [Wh/pulse] or [varh/pulse]. Value min = 0.001 Value max = 1000
309331	2472h	2	Digital output A1 pulses	32 bit IEEE 754	
309333	2474h	2	Digital output A2 pulses	32 bit IEEE 754	
309335	2476h	2	Digital output A3 pulses	32 bit IEEE 754	
309337	2478h	2	Digital output B0 pulses	32 bit IEEE 754	
309339	247Ah	2	Digital output B1 pulses	32 bit IEEE 754	
309341	247Ch	2	Digital output B2 pulses	32 bit IEEE 754	
309343	247Eh	2	Digital output B3 pulses	32 bit IEEE 754	
309345	2480h	2	Digital output C0 pulses	32 bit IEEE 754	
309347	2482h	2	Digital output C1 pulses	32 bit IEEE 754	
309349	2484h	2	Digital output C2 pulses	32 bit IEEE 754	
309351	2486h	2	Digital output C3 pulses	32 bit IEEE 754	
309353	2488h	2	Digital output D0 pulses	32 bit IEEE 754	
309355	248Ah	2	Digital output D1 pulses	32 bit IEEE 754	
309357	248Ch	2	Digital output D2 pulses	32 bit IEEE 754	
309359	248Eh	2	Digital output D3 pulses	32 bit IEEE 754	

2.18.12 Alarm configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 0019h

Table 2.18-15

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
308769	2240h	16	Alarm 1 configuration parameters		Refer to the next table
308785	2250h	16	Alarm 2 configuration parameters		
308801	2260h	16	Alarm 3 configuration parameters		
308593	2270h	16	Alarm 4 configuration parameters		
308817	2280h	16	Alarm 5 configuration parameters		
308849	2290h	16	Alarm 6 configuration parameters		
308865	22A0h	16	Alarm 7 configuration parameters		
308881	22B0h	16	Alarm 8 configuration parameters		
308897	22C0h	16	Alarm 9 configuration parameters		
308913	22D0h	16	Alarm 10 configuration parameters		
308929	22E0h	16	Alarm 11 configuration parameters		
308945	22F0h	16	Alarm 12 configuration parameters		
308961	2300h	16	Alarm 13 configuration parameters		
308977	2310h	16	Alarm 14 configuration parameters		
308993	2320h	16	Alarm 15 configuration parameters		
309009	2330h	16	Alarm 16 configuration parameters		

Table 2.18-16: Alarm configuration parameters

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
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
Block address +1	Block address +1	1	Type of variable linked to Alarm **N**	UINT 16	Value of the identification variable code (refer to Table 2.18-11**)**. All the values not present in the table correspond to V1 (instantaneous).
Block address +2	Block address +2	1	Control type of alarm **N**	UINT 16	Value=0: UP control Value=1: DOWN control Value=2: IN control Value=3: OUT control All other values are considered as value=0
Block address +3	Block address +3	1	Latch enable of alarm **N**	UINT 16	Value=0: Latch of alarm condition is disabled Value=1: Latch of alarm condition is enabled All other values are considered as value=0
Block address +4	Block address +4	1	Alarm **N** start control condition	UINT 16	Value=0: The alarm control starts with power on Value=1: The alarm control starts with no alarm condition All other values are considered as value=0
Block address +5	Block address +5	1	ON delay of alarm **N** (sec)	UINT 16	Value min = 0 Value max = 255 If the value is outside the limits the instrument considers the value equal to 0
Block address +6	Block address +6	1	OFF delay of alarm **N** (sec)	UINT 16	Value min = 0 Value max = 255 If the value is outside the limits the instrument considers the value equal to 0
Block address +7	Block address +7	1	Physical output linked to alarm **N**	UINT 16	Value of the physical output code that is linked to the alarm control (refer to Table 2.18-17). All the values not present in the table correspond to no link condition (virtual control).
Block address +8	Block address +8	1	Priority level for alarm **N**	UINT 16	Value=0: high level (OR control) Value=1: low level (AND control) All other values are considered as value=0
Block address +9	Block address +9	2	Set 1 of Alarm **N**	32 bit IEEE 754	Value min = -9999G Value max = 9999G If the value is outside the limits the instrument considers value equal to 0.000
Block address +11	Block address +11	2	Set 2 of Alarm **N**	32 bit IEEE 754	

Table 2.18-17: Physical output code

Bit 15..8	Bit 7..0
Value=0: Output in Slot A Value=1: Output in Slot B Value=2: Output in Slot C Value=3: Output in Slot D	Value=0: Output 0 Value=1: Output 1 Value=2: Output 2 Value=3: Output 3
Physical output is not linked to the alarm if there is a value outside the limits.	

2.18.13 Event configuration menu

MODBUS: Read and write mode
ANSI C12.18: read and write mode, table reference 001Ah

Table 2.18-18

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
309025	2340h	1	Alarm event logging enabling	UINT 16 Bit**N**=0: Logging of alarm **N** is disabled Bit**N**=1: Logging of alarm **N** is enabled	Bit0: Alarm 1 Bit1: Alarm 2 Bit2: Alarm 3 Bit3: Alarm 4 Bit4: Alarm 5 Bit5: Alarm 6 Bit6: Alarm 7 Bit7: Alarm 8 Bit8: Alarm 9 Bit9: Alarm 10 Bit10: Alarm 11 Bit11: Alarm 12 Bit12: Alarm 13 Bit13: Alarm 14 Bit14: Alarm 15 Bit15: Alarm 16
309026	2341h (**N**)	1	MIN event logging enabling (Word **N**)	UINT 16	Refer to Table 2.18-19
309027	2342h (**N+1**)	1	MIN event logging enabling (Word **N+1**)	UINT 16	
309028	2343h (**N+2**)	1	MIN event logging enabling (Word **N+2**)	UINT 16	
309029	2344h (**N+3**)	1	MIN event logging enabling (Word **N+3**)	UINT 16	
309030	2345h (**N+4**)	1	MIN event logging enabling (Word **N+4**)	UINT 16	
309031	2346h (**N**)	1	MAX event logging enabling (Word **N**)	UINT 16	
309032	2347h (**N+1**)	1	MAX event logging enabling (Word **N+1**)	UINT 16	
309033	2348h (**N+2**)	1	MAX event logging enabling (Word **N+2**)	UINT 16	
309034	2349h (**N+3**)	1	MAX event logging enabling (Word **N+3**)	UINT 16	
309035	234Ah (**N+4**)	1	MAX event logging enabling (Word **N+4**)	UINT 16	
309036	234Bh (**N**)	1	MAX DMD event logging enabling (Word **N**)	UINT 16	
309037	234Ch (**N+1**)	1	MAX DMD event logging enabling (Word **N+1**)	UINT 16	
309038	234Dh (**N+2**)	1	MAX DMD event logging enabling (Word **N+2**)	UINT 16	
309039	234Eh (**N+3**)	1	MAX DMD event logging enabling (Word **N+3**)	UINT 16	
309040	234Fh (**N+4**)	1	MAX DMD event logging enabling (Word **N+4**)	UINT 16	
309041	2350h	1	Digital inputs event logging enabling	UINT 16 Bit**n**=0: Logging of the type **n** digital input event is disabled Bit**n**=1: Logging of the type **n** digital input event is enabled	Bit0: Logging of the digital inputs that are set in remote mode Bit1: Logging of the digital inputs that are set in sync mode Bit2: Logging of the digital inputs that are set in tariff selection mode
309042	2351h	1	Digital outputs event logging enabling	UINT 16 Bit**n**=0: Logging of the type **n** digital output event is disabled Bit**n**=1: Logging of the type **n** digital output event is enabled	Bit0: Logging of the digital outputs that are set in remote mode
309043	2352h	1	Reset command event logging enabling	UINT 16 Bit**n**=0: Logging of the type **n** reset event is disabled Bit**n**=1: Logging of the type **n** reset event is enabled	Bit0: Logging of Total + Partial meter reset (positive and negative type) Bit1: Logging of total meter reset (positive type) Bit2: Logging of total meter reset (negative type) Bit3: Logging of partial meter reset (positive type) Bit4: Logging of partial meter reset (negative type) Bit5: Logging of Minimum and Maximum reset Bit6: Logging of Maximum DMD reset Bit7: Logging of Latch reset

Table 2.18-19: Bit-map of MIN, MAX, MAX DMD event enable logging

Word Address	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15	NOTE
Word **N**	V1	V2	V3	VL Σ	V12	V23	V31	VLL Σ	A1	A2	A3	An	W1	W2	W3	W Σ	Bit = 0: the logging of the relevant Minimum event is disabled Bit = 1: the logging of the relevant Minimum event is enabled
Word **N**+1	var1	var2	var3	var Σ	VA1	VA2	VA3	VA Σ	PF1	PF2	PF3	PF Σ	HZ	ASY VL	ASY VLL	THD V1	
Word **N**+2	THD V2	THD V3	THD V12	THD V23	THD V31	THD A1	THD A2	THD A3	THDoddV1	THDoddV2	THDoddV3	THDoddV12	THDoddV23	THDoddV31	THDoddA1	THDoddA2	
Word **N**+3	THDoddA3	THDevenV1	THDevenV2	THDevenV3	THDevenV12	THDevenV23	THDevenV31	THDevenA1	THDevenA2	THDevenA3	0	0	0	0	0	0	
Word **N**+4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

2.18.14 Analogue output configuration menu

MODBUS: Read and write mode
ANSI C12.18: read and write mode, table reference 001Bh

Table 2.18-20

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
309057	2360h	16	Analogue output A0 configuration parameters		Refer to Table 2.18-21
309073	2370h	16	Analogue output A1 configuration parameters		
309089	2380h	16	Analogue output B0 configuration parameters		
309105	2390h	16	Analogue output B1 configuration parameters		
309121	23A0h	16	Analogue output C0 configuration parameters		
309137	23B0h	16	Analogue output C1 configuration parameters		
309153	23C0h	16	Analogue output D0 configuration parameters		
309169	23D0h	16	Analogue output D1 configuration parameters		

Table 2.18-21: Analogue output configuration parameters

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
Block address +0	Block address +0	1	Type of variable that is linked to **N** analogue output	UINT 16	Value of the identification variable code (refer to Table 2.18-11). All the values not present in the table correspond to V1 (instantaneous).
Block address +1	Block address +1	2	Minimum electric value for **N** analogue output	32 bit IEEE 754	Value min = -9999G Value max = 9999G If the value is outside the limits the instrument considers the value equal to 0.000
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 = 0.000 (AO2050, AO2051) Value min = -100.0 (AO2052) Value max = 100.0 If the value is outside the limits the instrument considers the value equal to Value min
Block address +7	Block address +7	2	Maximum output value for **N** analogue output	32 bit IEEE 754	

2.18.15 Serial port configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 001Ch

Table 2.18-22

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
309185	23E0h	1	For future use		
309186	23E1h	1	For future use		
309187	23E2h	1	RS232 parity selection	UINT 16	Value=0: No parity Value=1: Odd parity Value=2: Even parity All other values are considered as value=0
309188	23E3h	1	For future use	UINT 16	
309189	23E4h	1	RS232 character time-out	UINT 16	Value min = 0 Value max = 60000 If the value is outside the limits the instrument considers the value equal to 0 The formula to calculate the time-out is the following: Time-out=1.5char + Value*(1/baud)
309190	23E5h	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
309191	23E6h	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
309192	23E7h	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
309193	23E8h	1	For future use	UINT 16	
309194	23E9h	1	RS485 character time-out	UINT 16	Value min = 0 Value max = 60000 If the value is outside the limits the instrument considers the value equal to 0 The formula to calculate the time-out is the following: Time-out=1.5char + Value*(1/baud)
309195	23EAh	1	Optical port mode selection	UINT 16	Value=0: ANSI C12.18 communication protocol Value=1: MOSBUS communication protocol Value=2: Energy pulse output retransmission All other values are considered as value=0
309196	23EBh	1	For future use	UINT 16	
309197	23ECh	1	Optical port baud rate selection (mandatory in case of MODBUS mode selection)	UINT 16	Value=0: 9600 Value=1: 19200 Value=2: 38400 Value=3: 115200 All other values are considered as value=0
309198	23EDh	1	Optical port parity selection (mandatory in case of MODBUS mode selection)	UINT 16	Value=0: No parity Value=1: Odd parity Value=2: Even parity All other values are considered as value=0
309199	23EEh	1	For future use	UINT 16	
309200	23EFh	1	Optical port character time-out (mandatory in case of MODBUS mode selection)	UINT 16	Value min = 0 Value max = 60000 If the value is outside the limits the instrument considers the value equal to 0 The formula to calculate the time-out is the following: Time-out=1.5char + Value*(1/baud)
309201	23F0h	1	Optical port energy type selection (mandatory in case of PULSE mode selection)	UINT 16	Value=0: KWh+ Value=1: KWh- Value=2: Kvarh+ Value=3: Kvarh- All other values are considered as value=0
309202	23F1h	1	Optical port counter type selection (mandatory in case of PULSE mode selection)	UINT 16	Value=0: Total meter Value=1: L1 phase meter Value=2: L2 phase meter Value=3: L3 phase meter

					Value=4: Tariff 1 meter Value=5: Tariff 2 meter Value=6: Tariff 3 meter Value=7: Tariff 4 meter Value=8: Tariff 5 meter Value=9: Tariff 6 meter Value=10: Tariff 7 meter Value=11: Tariff 8 meter Value=12: Tariff 9 meter Value=13: Tariff 10 meter Value=14: Tariff 11 meter Value=15: Tariff 12 meter All other values are considered as value=0
309203	23F2h	2	Optical port pulses (mandatory in case of PULSE mode selection)	32 bit IEEE 754	Value min = 0.001 Value max = 1000

Note1: The number of stop bits is fixed to 1.
Note2: To activate the new configuration of the communication interface it is necessary to send the “updating of serial configuration” command (refer to 2.18.24) or switch off and on the instrument.

2.18.16 Ethernet port configuration menu

MODBUS: read and write mode Table 2.18-23
ANSI C12.18: read and write mode, table reference 002Fh

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
309377	24A0h	1	For future use		
309378	24A1h	1	IP Address (**A**.B.C.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255
309379	24A2h	1	IP Address (A.**B**.C.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255
309380	24A3h	1	IP Address (A.B.**C**.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255
309381	24A4h	1	IP Address (A.B.C.**D**)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255
309382	24A5h	1	Subnet mask (**A**.B.C.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255
309383	24A6h	1	Subnet mask (A.**B**.C.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255
309384	24A7h	1	Subnet mask (A.B.**C**.D)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255
309385	24A8h	1	Subnet mask (A.B.C.**D**)	UINT 16	Value min = 0 Value max = 255 All other values are considered as value=255
309386	24A9h	1	For future use		
309387	24AAh	1	For future use		
309388	24ABh	1	For future use		
309389	24ACh	1	For future use		
309390	24ADh	1	Modbus TCP/IP port	UINT 16	Value min = 1 Value max = 65535 All other values are considered as value=502 (standard MODBUS TCP/IP port number)

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.
Il controllo della coerenza degli indirizzi impostati avviene con l’esecuzione del commando di update: se ci sono delle incongruenze vengono impostati i valori di default (IP Address = 192.168.0.1, Subnet mask = 255.255.255.0)

2.18.17 Filter configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 001Dh

Table 2.18-24

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
309217	2400h	2	Filter span parameter	32 bit IEEE 754	Value min = 0.1 Value max = 100.0 If the value is outside the limits the instrument considers the value equal to 1.0
309218	2402h	1	Filter coefficient	UINT 16	Value min = 1 Value max = 255 If the value is outside the limits the instrument considers the value equal to 1

2.18.18 Clock configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 001Eh

Table 2.18-25

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
309233	2410h	1	Type of clock management	UINT 16	Value=0: No clock Value=1: Clock without backup Value=2: Clock with backup All other values are considered as value=0
309234	2411h	1	Type of clock format	UINT 16	Value=0: European format (24 hour) Value=1: USA format All other values are considered as value=0
309235	2412h	1	Synchronisation enable	UINT 16	Value=0: Disable clock synchronisation by digital input Value=1: Enable clock synchronisation by digital input All other values are considered as value=0

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 001Fh

Table 2.18-26

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
309281	2440h	32	Time zone path	ASCII string	Path description in ASCII format of time zone (refer to the following table)

Time zone path values:
The zone path is to written considering any capital letter and the line is to terminate with ASCII code 0 ('\0').
To activate the new configuration of the time zone it is necessary to send the "updating of time zone" command (refer to 2.18.26) or switch off and on the instrument.

Africa/Abidjan	Africa/Johannesburg	Africa/Timbuktu	America/Cayenne
Africa/Accra	Africa/Kampala	Africa/Tripoli	America/Cayman
Africa/Addis_Ababa	Africa/Khartoum	Africa/Tunis	America/Chicago
Africa/Algiers	Africa/Kigali	Africa/Windhoek	America/Chihuahua
Africa/Asmera	Africa/Kinshasa	America/Adak	America/Cordoba
Africa/Bamako	Africa/Lagos	America/Anchorage	America/Costa_Rica
Africa/Bangui	Africa/Libreville	America/Anguilla	America/Cuiaba
Africa/Banjul	Africa/Lome	America/Antigua	America/Curacao
Africa/Bissau	Africa/Luanda	America/Araguaina	America/Danmarkshavn
Africa/Blantyre	Africa/Lubumbashi	America/Aruba	America/Dawson
Africa/Brazzaville	Africa/Lusaka	America/Asuncion	America/Dawson_Creek
Africa/Bujumbura	Africa/Malabo	America/Atka	America/Denver
Africa/Cairo	Africa/Maputo	America/Bahia	America/Detroit
Africa/Casablanca	Africa/Maseru	America/Barbados	America/Dominica
Africa/Ceuta	Africa/Mbabane	America/Belem	America/Edmonton
Africa/Conakry	Africa/Mogadishu	America/Belize	America/Eirunepe
Africa/Dakar	Africa/Monrovia	America/Boa_Vista	America/El_Salvador
Africa/Dar_es_Salaam	Africa/Nairobi	America/Bogota	America/Ensenada
Africa/Djibouti	Africa/Ndjamena	America/Boise	America/Fort_Wayne
Africa/Douala	Africa/Niamey	America/Buenos_Aires	America/Fortaleza
Africa/El_Aaiun	Africa/Nouakchott	America/Cambridge_Bay	America/Glace_Bay
Africa/Freetown	Africa/Ouagadougou	America/Campo_Grande	America/Godthab
Africa/Gaborone	Africa/Porto-Novo	America/Cancun	America/Goose_Bay
Africa/Harare	Africa/Sao_Tome	America/Caracas	America/Grand_Turk
		America/Catamarca	America/Grenada

America/Guadeloupe
America/Guatemala
America/Guayaquil
America/Guyana
America/Halifax
America/Havana
America/Hermosillo
America/Indiana/Indianapolis
America/Indiana/Knox
America/Indiana/Marengo
America/Indiana/Vevay
America/Indianapolis
America/Inuvik
America/Iqaluit
America/Jamaica
America/Jujuy
America/Juneau
America/Kentucky/Louisville
America/Kentucky/Monticello
America/Knox_IN
America/La_Paz
America/Lima
America/Los_Angeles
America/Louisville
America/Maceio
America/Managua
America/Manaus
America/Martinique
America/Mazatlan
America/Mendoza
America/Menominee
America/Merida
America/Mexico_City
America/Miquelon
America/Monterrey
America/Montevideo
America/Montreal
America/Montserrat
America/Nassau
America/New_York
America/Nipigon
America/Nome
America/Noronha
America/North_Dakota/Center
America/Panama
America/Pangnirtung
America/Paramaribo
America/Phoenix
America/Port-au-Prince
America/Port_of_Spain
America/Porto_Acre
America/Porto_Velho
America/Puerto_Rico
America/Rainy_River
America/Rankin_Inlet
America/Recife
America/Regina
America/Rio_Branco
America/Rosario
America/Santiago
America/Santo_Domingo
America/Sao_Paulo
America/Scoresbysund
America/Shiprock
America/St_Johns
America/St_Kitts
America/St_Lucia
America/St_Thomas
America/St_Vincent
America/Swift_Current
America/Tegucigalpa
America/Thule
America/Thunder_Bay
America/Tijuana
America/Toronto
America/Tortola
America/Vancouver
America/Virgin
America/Whitehorse
America/Winnipeg
America/Yakutat
America/Yellowknife
Antarctica/Casey
Antarctica/Davis
Antarctica/DumontDUrville
Antarctica/Mawson
Antarctica/McMurdo
Antarctica/Palmer
Antarctica/Rothera
Antarctica/South_Pole
Antarctica/Syowa
Antarctica/Vostok
Arctic/Longyearbyen
Asia/Aden
Asia/Almaty
Asia/Amman
Asia/Anadyr
Asia/Aqtau
Asia/Aqtobe
Asia/Ashgabat
Asia/Ashkhabad
Asia/Baghdad
Asia/Bahrain
Asia/Baku
Asia/Bangkok
Asia/Beirut
Asia/Bishkek
Asia/Brunei
Asia/Calcutta
Asia/Choibalsan
Asia/Chongqing
Asia/Chungking
Asia/Colombo
Asia/Dacca
Asia/Damascus
Asia/Dhaka
Asia/Dili
Asia/Dubai
Asia/Dushanbe
Asia/Gaza
Asia/Harbin
Asia/Hong_Kong
Asia/Hovd
Asia/Irkutsk
Asia/Istanbul
Asia/Jakarta
Asia/Jayapura
Asia/Jerusalem
Asia/Kabul
Asia/Kamchatka
Asia/Karachi
Asia/Kashgar
Asia/Katmandu
Asia/Krasnoyarsk
Asia/Kuala_Lumpur
Asia/Kuching
Asia/Kuwait
Asia/Macao
Asia/Macau
Asia/Magadan
Asia/Makassar
Asia/Manila
Asia/Muscat
Asia/Nicosia
Asia/Novosibirsk
Asia/Omsk
Asia/Oral
Asia/Phnom_Penh
Asia/Pontianak
Asia/Pyongyang
Asia/Qatar
Asia/Qyzylorda
Asia/Rangoon
Asia/Riyadh
Asia/Riyadh87
Asia/Riyadh88
Asia/Riyadh89
Asia/Saigon
Asia/Sakhalin
Asia/Samarkand
Asia/Seoul
Asia/Shanghai
Asia/Singapore
Asia/Taipei
Asia/Tashkent
Asia/Tbilisi
Asia/Tehran
Asia/Tel_Aviv
Asia/Thimbu
Asia/Thimphu
Asia/Tokyo
Asia/Ujung_Pandang
Asia/Ulaanbaatar
Asia/Ulan_Bator
Asia/Urumqi
Asia/Vientiane
Asia/Vladivostok
Asia/Yakutsk
Asia/Yekaterinburg
Asia/Yerevan
Atlantic/Azores
Atlantic/Bermuda
Atlantic/Canary
Atlantic/Cape_Verde
Atlantic/Faeroe
Atlantic/Jan_Mayen
Atlantic/Madeira
Atlantic/Reykjavik
Atlantic/South_Georgia
Atlantic/St_Helena
Atlantic/Stanley
Australia/ACT
Australia/Adelaide
Australia/Brisbane
Australia/Broken_Hill
Australia/Canberra
Australia/Darwin
Australia/Hobart
Australia/LHI
Australia/Lindeman
Australia/Lord_Howe
Australia/Melbourne
Australia/NSW
Australia/North
Australia/Perth
Australia/Queensland
Australia/South
Australia/Sydney
Australia/Tasmania
Australia/Victoria
Australia/West
Australia/Yancowinna
Etc/GMT
Etc/GMT+0
Etc/GMT+1
Etc/GMT+10
Etc/GMT+11
Etc/GMT+12
Etc/GMT+2
Etc/GMT+3
Etc/GMT+4
Etc/GMT+5
Etc/GMT+6
Etc/GMT+7
Etc/GMT+8
Etc/GMT+9
Etc/GMT-0
Etc/GMT-1
Etc/GMT-10
Etc/GMT-11
Etc/GMT-12
Etc/GMT-13
Etc/GMT-14
Etc/GMT-2
Etc/GMT-3
Etc/GMT-4
Etc/GMT-5
Etc/GMT-6
Etc/GMT-7
Etc/GMT-8
Etc/GMT-9
Etc/GMT0
Etc/Greenwich
Etc/UCT
Etc/UTC
Etc/Universal
Etc/Zulu
Europe/Amsterdam
Europe/Andorra
Europe/Athens
Europe/Belfast
Europe/Belgrade
Europe/Berlin
Europe/Bratislava
Europe/Brussels
Europe/Bucharest
Europe/Budapest
Europe/Chisinau
Europe/Copenhagen
Europe/Dublin
Europe/Gibraltar
Europe/Helsinki
Europe/Istanbul
Europe/Kaliningrad
Europe/Kiev
Europe/Lisbon
Europe/Ljubljana
Europe/London
Europe/Luxembourg
Europe/Madrid
Europe/Malta
Europe/Minsk
Europe/Monaco
Europe/Moscow
Europe/Nicosia
Europe/Oslo
Europe/Paris
Europe/Prague
Europe/Riga
Europe/Rome
Europe/Samara
Europe/San_Marino
Europe/Sarajevo
Europe/Simferopol
Europe/Skopje
Europe/Sofia
Europe/Stockholm
Europe/Tallinn
Europe/Tirane
Europe/Tiraspol
Europe/Uzhgorod
Europe/Vaduz
Europe/Vatican
Europe/Vienna
Europe/Vilnius
Europe/Warsaw
Europe/Zagreb
Europe/Zaporozhye
Europe/Zurich
Indian/Antananarivo
Indian/Chagos
Indian/Christmas
Indian/Cocos
Indian/Comoro
Indian/Kerguelen
Indian/Mahe
Indian/Maldives
Indian/Mauritius
Indian/Mayotte
Indian/Reunion
Mideast/Riyadh87
Mideast/Riyadh88
Mideast/Riyadh89
Pacific/Apia
Pacific/Auckland
Pacific/Chatham
Pacific/Easter
Pacific/Efate
Pacific/Enderbury
Pacific/Fakaofo
Pacific/Fiji
Pacific/Funafuti
Pacific/Galapagos
Pacific/Gambier
Pacific/Guadalcanal
Pacific/Guam
Pacific/Honolulu
Pacific/Johnston
Pacific/Kiritimati
Pacific/Kosrae
Pacific/Kwajalein
Pacific/Majuro
Pacific/Marquesas
Pacific/Midway
Pacific/Nauru
Pacific/Niue
Pacific/Norfolk
Pacific/Noumea
Pacific/Pago_Pago
Pacific/Palau
Pacific/Pitcairn
Pacific/Ponape
Pacific/Port_Moresby
Pacific/Rarotonga
Pacific/Saipan
Pacific/Samoa
Pacific/Tahiti
Pacific/Tarawa
Pacific/Tongatapu
Pacific/Truk
Pacific/Wake
Pacific/Wallis
Pacific/Yap

2.18.19 Language configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 0020h

Table 2.18-27

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
309313	2460h	1	Type language selection	UINT 16	Value=0: English Value=1: Italian Value=2: Deutsche Value=3: French Value=4: Spanish All other values are considered as value=0

2.18.20 Meter Information configuration menu

MODBUS: read and write mode
ANSI C12.18: read and write mode, table reference 0030h

Table 2.18-28

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
309314	2461h	1	Meter Information type selection	UINT 16	Value=0: According to EN Value=1: According to CAN Value=2: According to ANSI All other values are considered as value=0

2.18.21 Reset commands

MODBUS: write only mode
ANSI C12.18: write only mode, table reference 0021h

Table 2.18-29

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
312289	3000h	1	Reset of all meters (positive and negative type)	UINT 16	Value=1: Command is executed All other values produce no effects
312290	3001h	1	Reset of positive total meters	UINT 16	
312291	3002h	1	Reset of negative total meters	UINT 16	
312292	3003h	1	Reset of positive partial meters	UINT 16	
312293	3004h	1	Reset of negative partial meters	UINT 16	
312294	3005h	1	Reset of all maximum and minimum values (no max DMD)	UINT 16	
312295	3006h	1	Reset of all maximum DMD values	UINT 16	
312296	3007h	1	Reset of all alarm latch conditions	UINT 16	
312297	3008h	1	Reset of all events stored	UINT 16	

2.18.22 Remote output command

MODBUS: write only mode
ANSI C12.18: write only mode, table reference 0022h

Table 2.18-30

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
312305	3010h	1	Remote output command	UINT 16 Bit**n**=0: Output **n** is open Bit**n**=1: Output **n** is close (Note: the **n** output are driven only if the relevant configuration is set to remote mode)	Bit0: Slot A, channel 1 (0) Bit1: Slot A, channel 2 (1) Bit2: Slot A, channel 3 Bit3: Slot A, channel 4 Bit4: Slot B, channel 1 (0) Bit5: Slot B, channel 2 (1) Bit6: Slot B, channel 3 Bit7: Slot B, channel 4 Bit8: Slot C, channel 1 (0) Bit9: Slot C, channel 2 (1) Bit10: Slot C, channel 3 Bit11: Slot C, channel 4 Bit12: Slot D, channel 1 (0) Bit13: Slot D, channel 2 (1) Bit14: Slot D, channel 3 Bit15: Slot D, channel 4

Note: in case of a dual output module, the channels are named 0 and 1, while with a 4-output module they are named 1, 2, 3, and 4.

2.18.23 Clock information configuration

MODBUS: write only mode
ANSI C12.18: write only mode, table reference 0023h

Table 2.18-31

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
312321	3020h	1	Current year	UINT 16	The value must be in the range 2000-2099
312322	3021h	1	Current month	UINT 16	The value must be in the range 1-12
312323	3022h	1	Current day	UINT 16	The value must be in the range 1-31
312324	3023h	1	Current hour	UINT 16	The value must be in the range 0-23
312325	3024h	1	Current minute	UINT 16	The value must be in the range 0-59
312326	3025h	1	Current second	UINT 16	The value must be in the range 0-59

Note: the answering time when writing single parameters with the Modbus function 06h can be higher than using function 10h (max answering time = 2000ms).

2.18.24 "Updating of serial configuration" commands

MODBUS :write only mode
ANSI C12.18: write only mode, table reference 0024h

Table 2.18-32

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
312337	3030h	1	Configuration updating of RS485 serial interface	UINT 16	Value=1: Command is executed All other values produce no effects
312338	3031h	1	Configuration updating of RS232 serial interface	UINT 16	
312339	3032h	1	Configuration updating of local port	UINT 16	

Note: wait at least 6 seconds before communicate with the new parameters

2.18.25 “Updating of ethernet configuration” command

MODBUS :write only mode Table 2.18-33
ANSI C12.18: write only mode, table reference 002Eh

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
312342	3035h	1	Configuration updating of ethernet interface	UINT 16	Value=1: Command is executed All other values produce no effects

Note: wait at least 6 seconds before communicating with the new parameters

2.18.26 “Updating of time zone” command

MODBUS: write only mode Table 2.18-34
ANSI C12.18: write only mode, table reference 0025h

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
312340	3033h	1	Time zone updating	UINT 16	Value=1: Command is executed All other values produce no effects

2.18.27 “Updating of meter configuration” command

MODBUS: write only mode Table 2.18-35
ANSI C12.18: write only mode, table reference 002Bh

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
312341	3034h	1	Updating of days types, dafault tariff and period description	UINT 16	Value=1: Command is executed All other values produce no effects

2.19 Reading of event logging file

Each of the maximum 10000 events is a record in the event logging file. The file is readable whith Modbus function code 14h: the file number is 0.
To read the event logging file it is necessary to execute the following actions:

1) Send the “load logging file” command with Modbus function code 06h
2) Read the number of record file (number of events) with Modbus function code 03h or 04h.
3) Read the records with Modbus function code 14h, sub-request 06h.

2.19.1 “Load logging file” command

MODBUS: write only mode with function 06h Table 2.19-1
ANSI C12.18: write only mode, table reference 0026h

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
312545	3100h	1	Load logging file in output buffer	UINT 16	Value=1: Command is executed All other values produce no effects

Number of file records reading

MODBUS: read only mode with function 03h or 04h
ANSI C12.18: read only mode, table reference 0027h

Table 2.19-2

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
312546	3101h	1	Number of records present in output buffer (logging file)	UINT 16	The maximum number of record is 10000, the address record value is from 0 to 9999

2.19.2 "Load logging file and reset events" command

MODBUS: write only mode with function 06h
ANSI C12.18: write only mode, table reference 0028h

Table 2.19-3

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
312547	3102h	1	Load logging file in output buffer and clear all the events	UINT 16	Value=1: Command is executed All other values produce no effects

2.19.3 Logging file record format

Every record is 12 words long. The format of the record is the following:

Table 2.19-4: Logging file record description

	Description	Format	Format	
Word N	Identification of the event type (byte MSB) and Value of the tariff in which the event is happened (LSB)	UINT 16	Byte MSB: Value=0: record is empty Value=1: ON alarm event Value=2: OFF alarm event Value=3: minimum event Value=4: maximum event Value=5: maximum DMD event Value=6: remote digital input event Value=7: synchronization event Value=8: change tariff from digital input (LSb) event Value=9: change tariff from digital input (MSb) event Value=10: remote digital output event Value=11: reset of all total and partial meter event Value=12: reset of all positive total meters event Value=13: reset of all negative total meters event Value=14: reset of all positive partial meters event Value=15: reset of all negative partial meters event Value=16: reset of all minimum and maximum variable event Value=17: reset of all maximum DMD variable event Value=18: reset of all alarm latch event Value=19: reset of single minimum variable event Value=20: reset of single maximum variable event Value=21: reset of single maximum DMD variable event	Byte LSB: From 1 to 12
Word N+1	Hour/Minute	UINT 16	Byte MSB: Hour (from 0 to 23)	Byte lsb: Minute (from 0 to 59)
Word N+2	Second / Day	UINT 16	Byte MSB: Second (from 0 to 59)	Byte lsb: Day (from 1 to 31)
Word N+3	Month / Year	UINT 16	Byte MSB: Month (from 1 to 12)	Byte lsb: Year (from 0 to 99 that corresponds to year 2000 to 2099)

Word N+4	In case of on alarm event, off alarm event, minimum event, maximum event, DMD maximum event, reset of single minimum variable event, reset of single maximum variable event, reset of single maximum DMD variable event: Type of variable	UINT 16	Refer to Table 2.18-11: Variable identification code	
	In case of remote digital input event, synchronization event, remote digital output event: input or output channel identification		**Bit 15..8** Value=0 : Input/Output in Slot A Value=1 : Input/Output in Slot B Value=2 : Input/Output in Slot C Value=3 : Input/Output in Slot D	**Bit 7..0** Value=0 : Output 0 / Input 1 Value=1 : Output 1 / Input 2 Value=2 : Output 2 / Input 3 Value=3 : Output 3
Word N+5	In case of on alarm event, off alarm event: Type of alarm control and Alarm number	UINT 16	**Bit 15..8** Value form 1 to 16: alarm number	**Bit 7..0** Value from 0 to 3 corresponds respectively to UP, DOWN, IN and OUT control
	In case of remote digital input event, synchronization event, remote digital output event: new status of input or output		Value=0 : input close / output open Value=1 : input open / output close	
	In case of change tariff from digital input (LSb) event, change tariff from digital input (MSb) event: new tariff		From 1 to 12	
Word N+6 N+7	Value of the variable (only in case of: on alarm event, off alarm event, minimum event, maximum event, maximum DMD event)	32 bit IEEE 754		
Word N+8 N+9	Value of the SET 1 (only in case of alarm event)	32 bit IEEE 754		
Word N+10 N+11	Value of the SET 2 (only in case of alarm event)	32 bit IEEE 754		