



EM26-96

COMMUNICATION PROTOCOL

Version 2 Revision 0

March 25th, 2008

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1.1 Introduction

The RS485 serial interface supports the MODBUS/JBUS (RTU) protocol. In this document only the information necessary to read/write from/to EM26-96 has been reported (not all the parts of the protocol have been implemented).

For a complete description of the MODBUS protocol please refer to the "Modbus_Application_Protocol_V1_1a.pdf" document that is downloadable from the www.modbus.org web site.

1.2 MODBUS functions

These functions are available on EM26-96:

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

IMPORTANT:

- 1) In this document the "Modbus address" field is indicated in two modes:
 - 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 Registers) replacing the first digit ("3") with the number "4".
 - 1.2) "**Physical address**": it is the "word address" value to be included in the communication frame.
- 2) The functions 03h and 04h have exactly the same effect and can be used indifferently.
- 3) The communication parameters are to be set according to the configuration of the instrument (refer to EM26-96 instruction manual)

1.2.1 Function 03h (Read Holding Registers)

This function 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 11 registers (words) with a single request, when not differently specified.

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 F7h (1 to 247) | |
| Function code | 1 byte | 03h | |
| Starting address | 2 bytes | 0000h to FFFFh | Byte order: MSB, LSB |
| Quantity of registers (N word) | 2 bytes | 1 to 10h (1 to 11) | Byte order: MSB, LSB |
| CRC | 2 bytes | | |

Response frame (correct action)

| Description | Length | Value | Note |
|-----------------------------|-----------|---------------------|----------------------|
| Physical address | 1 byte | 1 to F7h (1 to 247) | |
| Function code | 1 byte | 03h | |
| Quantity of requested bytes | 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 F7h (1 to 247) | Possible exception : 01h: illegal function 02h: illegal data address 03h: illegal data value 04h: slave device failure |
| Function code | 1 byte | 83h | |
| Exception code | 1 byte | 01h, 02h, 03h, 04h (see note) | |
| 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 11 register (word) with a single request, when not differently specified. 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 F7h (1 to 247) | |
| Function code | 1 byte | 04h | |
| Starting address | 2 bytes | 0000h to FFFFh | Byte order: MSB, LSB |
| Quantity of registers (N word) | 2 bytes | 1 to 10h (1 to 11) | Byte order: MSB, LSB |
| CRC | 2 bytes | | |

Response frame (correct action)

| Description | Length | Value | Note |
|-----------------------------|-----------|---------------------|----------------------|
| Physical address | 1 byte | 1 to F7h (1 to 247) | |
| Function code | 1 byte | 04h | |
| Quantity of requested bytes | 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 F7h (1 to 247) | Possible exception : 01h: illegal function 02h: illegal data address 03h: illegal data value 04h: slave device failure |
| Function code | 1 byte | 84h | |
| Exception code | 1 byte | 01h, 02h, 03h, 04h | |
| CRC | 2 bytes | | |

1.2.3 Function 06h (Write Single Holding Register)

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

Request frame

| Description | Length | Value | Note |
|------------------|---------|---------------------|----------------------|
| Physical address | 1 byte | 1 to F7h (1 to 247) | |
| Function code | 1 byte | 06h | |
| Starting address | 2 bytes | 0000h to FFFFh | Byte order: MSB, LSB |
| Register value | 2 bytes | 0000h to FFFFh | Byte order: MSB, LSB |
| CRC | 2 bytes | | |

Response frame (correct action)

| Description | Length | Value | Note |
|------------------|---------|---------------------|----------------------|
| Physical address | 1 byte | 1 to F7h (1 to 247) | |
| Function code | 1 byte | 06h | |
| Starting address | 2 bytes | 0000h to FFFFh | Byte order: MSB, LSB |
| Register value | 2 bytes | 0000h to FFFFh | Byte order: MSB, LSB |
| CRC | 2 bytes | | |

Response frame (incorrect action)

| Description | Length | Value | Note |
|------------------|---------|---------------------|--|
| Physical address | 1 byte | 1 to F7h (1 to 247) | 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 08h (Diagnostic with sub-function code 00h)

MODBUS function 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 in a server.

EM26-96 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 F7h (1 to 247) | |
| Function code | 1 byte | 08h | |
| Sub-function | 2 bytes | 0000h | |
| Data (N word) | N *2 bytes | Data | Byte order: MSB, LSB |
| CRC | 2 bytes | | |

Response frame (correct action)

| Description | Length | Value | Note |
|------------------|------------|--------------------|----------------------|
| Physical address | 1 byte | 1 to F7 (1 to 247) | |
| Function code | 1 byte | 08h | |
| Sub-function | 2 bytes | 0000h | |
| Data (N word) | N *2 bytes | Data | Byte order: MSB, LSB |
| CRC | 2 bytes | | |

Response frame (incorrect action)

| Description | Length | Value | Note |
|------------------|---------|---------------------|--|
| Physical address | 1 byte | 1 to F7h (1 to 247) | Possible exception : 01h: illegal function 02h: illegal data address 03h: illegal data value 04h: slave device failure |
| Function code | 1 byte | 88h | |
| Exception code | 1 byte | 01h, 02h, 03h, 04h | |
| CRC | 2 bytes | | |

1.2.5 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 using address 00h.

1.3 Application notes

1.3.1 RS485 general considerations

1. To avoid errors due to the signal reflections or line coupling, it is necessary to terminate the bus at the beginning and at the end (inserting a 120 ohm 1/2W 5% resistor between line B and A in the last instrument and in the Host interface).
2. The network termination is necessary even in case of point-to-point connection and/or of short distances.
3. For connections longer than 1000m or if in the network there are more than 160 instruments (with 1/5 unit load as used in EM26-96 interface), a signal repeater is necessary.
4. For bus connection it is suggested to use an AWG24 balanced pair cable and to add a third wire for GND connection. Connect GND to the shield if a shielded cable is used.
5. The GND is to be connected to ground only at the host side.
6. 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 is to be considered as not connected, faulty or reached with a wrong address. The same consideration is valid in case of CRC errors or incomplete response frames.

1.3.2 MODBUS timing

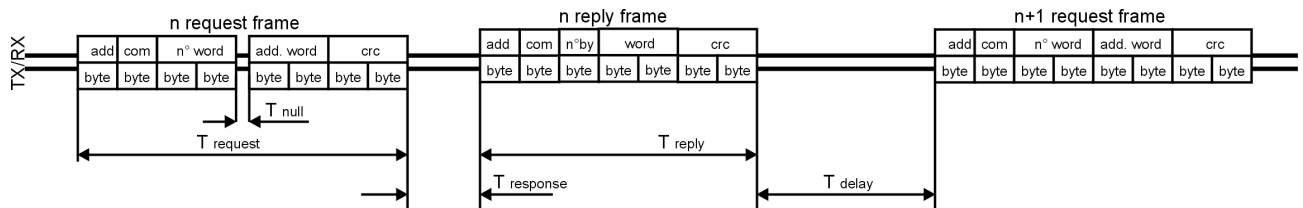


Fig. 1 : 2-wire timing diagram

| Timing characteristics of reading function: | msec |
|--|---------|
| T response: Max answering time | 500ms |
| T response: Typical answering time | 40ms |
| T delay: Minimum time before a new query | 3,5char |
| T null: Max interruption time during the request frame | 2,5char |

2 TABLES

2.1 Data format representation In Carlo Gavazzi instruments

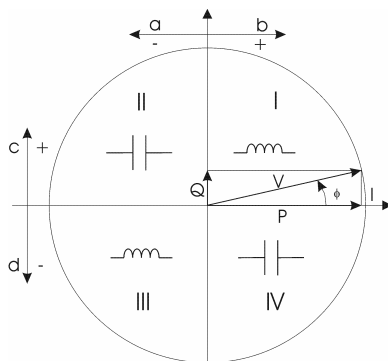
The variables are represented by integers or floating numbers, with 2's complement notation in case of "signed" format, using the following:

| 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 | $-(1+[1 - 2^{-23}]) \times 2^{127} .. 2^{128}$ |

For all the formats the byte order (inside the single word) is MSB->LSB. In INT32, UINT32 and UINT64 formats, 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 60253-23:



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

Fig. 2 : Geometric Representation

2.2 Maximum and minimum electrical values in EM26-96

The maximum electrical input values are reported in the following table. If the input is above the maximum value the display shows "----".

Table 2.1-1

| | AV5 input option | | AV6 input option | |
|------|------------------|-----------|------------------|-----------|
| | Max value | Min value | Max value | Min value |
| VL-N | 485V | 0 | 150V | 0 |
| VL-L | 840V | 0 | 260V | 0 |
| A | 11A | 0 | 11A | 0 |
| VT | 6000 | 1.0 | 6000 | 1.0 |
| CT | 60000 | 1.0 | 60000 | 1.0 |

The overflow indication "----" is displayed when the MSB value of the relevant variable is 7FFFh.

2.3 Instantaneous variables and meters

MODBUS: read only mode with functions code 03 and 04

Table 2.3-1

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|---------------------|-------------|--|
| 300001 | 0000h | 2 | V L1-N | INT32 | Value weight: Volt*10 |
| 300003 | 0002h | 2 | V L2-N | INT32 | |
| 300005 | 0004h | 2 | V L3-N | INT32 | |
| 300007 | 0006h | 2 | V L1-L2 | INT32 | |
| 300009 | 0008h | 2 | V L2-L3 | INT32 | |
| 300011 | 000Ah | 2 | V L3-L1 | INT32 | |
| 300013 | 000Ch | 2 | A L1 | INT32 | Value weight: Ampere*1000 |
| 300015 | 000Eh | 2 | A L2 | INT32 | |
| 300017 | 0010h | 2 | A L3 | INT32 | |
| 300019 | 0012h | 2 | W L1 | INT32 | Value weight: Watt*10 |
| 300021 | 0014h | 2 | W L2 | INT32 | |
| 300023 | 0016h | 2 | W L3 | INT32 | |
| 300025 | 0018h | 2 | VA L1 | INT32 | Value weight: VA*10 |
| 300027 | 001Ah | 2 | VA L2 | INT32 | |
| 300029 | 001Ch | 2 | VA L3 | INT32 | |
| 300031 | 001Eh | 2 | VAR L1 | INT32 | Value weight: var*10 |
| 300033 | 0020h | 2 | VAR L2 | INT32 | |
| 300035 | 0022h | 2 | VAR L3 | INT32 | |
| 300037 | 0024h | 2 | V L-N Σ | INT32 | Value weight: Volt*10 |
| 300039 | 0026h | 2 | V L-L Σ | INT32 | |
| 300041 | 0028h | 2 | W Σ | INT32 | Value weight: Watt*10 |
| 300043 | 002Ah | 2 | VA Σ | INT32 | Value weight: VA*10 |
| 300045 | 002Ch | 2 | VAR Σ | INT32 | Value weight: var*10 |
| 300047 | 002Eh | 2 | DMD W Σ | INT32 | Value weight: Watt*10 |
| 300049 | 0030h | 2 | DMD VA Σ | INT32 | Value weight: VA*10 |
| 300051 | 0032h | 1 | PF L1 | INT16 | Negative values correspond to lead(C), positive value correspond to lag(L) Value weight: PF*1000 |
| 300052 | 0033h | 1 | PF L2 | INT16 | |
| 300053 | 0034h | 1 | PF L3 | INT16 | |
| 300054 | 0035h | 1 | PF Σ | INT16 | |
| 300055 | 0036h | 1 | Phase sequence | INT16 | Value -1 correspond to L1-L3-L2 sequence, value 0 correspond to L1-L2-L3 sequence (this value is meaningful only in case of 3-phase systems) |
| 300056 | 0037h | 1 | Hz | INT16 | Value weight: Hz*10 |
| 300057 | 0038h | 2 | DMD W Σ max | INT32 | Value weight: Watt*10 |
| 300059 | 003Ah | 2 | DMD VA Σ max | INT32 | Value weight: VA*10 |
| 300061 | 003Ch | 2 | DMD A max | INT32 | Value weight: Ampere*1000 |
| 300063 | 003Eh | 2 | KWh(+) TOT | INT32 | Value weight: kWh*10 |
| 300065 | 0040h | 2 | Kvarh(+) TOT | INT32 | Value weight: kvarh*10 |
| 300067 | 0042h | 2 | KWh(+) PAR | INT32 | Value weight: kWh*10 |
| 300069 | 0044h | 2 | Kvarh(+) PAR | INT32 | Value weight: kvarh*10 |
| 300071 | 0046h | 2 | KWh(+) L1 | INT32 | Value weight: kWh*10 |
| 300073 | 0048h | 2 | KWh(+) L2 | INT32 | Value weight: kWh*10 |
| 300075 | 004Ah | 2 | KWh(+) L3 | INT32 | Value weight: kWh*10 |
| 300077 | 004Ch | 2 | KWh(+) T1 | INT32 | Value weight: kWh*10 |
| 300079 | 004Eh | 2 | KWh(+) T2 | INT32 | Value weight: kWh*10 |
| 300081 | 0050h | 2 | KWh(+) T3 | INT32 | Value weight: kWh*10 |
| 300083 | 0052h | 2 | KWh(+) T4 | INT32 | Value weight: kWh*10 |
| 300085 | 0054h | 2 | Kvarh(+) T1 | INT32 | Value weight: kvarh*10 |
| 300087 | 0056h | 2 | Kvarh(+) T2 | INT32 | Value weight: kvarh*10 |
| 300089 | 0058h | 2 | Kvarh(+) T3 | INT32 | Value weight: kvarh*10 |
| 300091 | 005Ah | 2 | Kvarh(+) T4 | INT32 | Value weight: kvarh*10 |
| 300093 | 005Ch | 2 | KWh(-) TOT | INT32 | Value weight: kWh*10 |
| 300095 | 005Eh | 2 | Kvarh(-) TOT | INT32 | Value weight: kvarh*10 |
| 300097 | 0060h | 2 | Hour | INT32 | Value weight: hour*100 |
| 300099 | 0062h | 2 | Counter 1 | INT32 | Value weight: Eng.Unit*10 |
| 300101 | 0064h | 2 | Counter 2 | INT32 | Value weight: Eng.Unit*10 |
| 300103 | 0066h | 2 | Counter 3 | INT32 | Value weight: Eng.Unit*10 |

continue



MODBUS: read only mode with functions code 03 and 04
continue

Table 2.3-2

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|--------------------|-------------|---------------------------|
| 300105 | 0068h | 2 | A L1 dmd | INT32 | Value weight: Ampere*1000 |
| 300107 | 006Ah | 2 | A L2 dmd | INT32 | |
| 300109 | 006Ch | 2 | A L3 dmd | INT32 | |
| 300111 | 006Eh | 1 | THD V L1-N | INT16 | Value weight: % *10 |
| 300112 | 006Fh | 1 | THD V L2-N | INT16 | |
| 300113 | 0070h | 1 | THD V L3-N | INT16 | |
| 300114 | 0071h | 1 | THD V L1-L2 | INT16 | |
| 300115 | 0072h | 1 | THD V L2-L3 | INT16 | |
| 300116 | 0073h | 1 | THD V L3-L1 | INT16 | |
| 300117 | 0074h | 1 | THD A L1 | INT16 | |
| 300118 | 0075h | 1 | THD A L2 | INT16 | |
| 300119 | 0076h | 1 | THD A L3 | INT16 | |

2.4 Digital input status

MODBUS: read only mode with functions code 03 and 04 limited to a word at a time

Table 2.4-1

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|----------------------|--|---|
| 300769 | 0300h | 1 | Digital input status | UINT 16 bit=0 input close bit=1 input open | bit0=input status Ch1 bit1=input status Ch2 bit2=input status Ch3 |

2.5 Current tariff

MODBUS: read only mode with functions code 03 and 04 limited to a word at a time

Table 2.5-1

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|--------------------|-------------|--|
| 300770 | 0301h | 1 | Current tariff | UINT 16 | Value=0: tariff 1 Value=1: tariff 2 Value=2: tariff 3 Value=3: tariff 4 |

2.6 Firmware version and revision code

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|--------------------|-------------|---|
| 300771 | 0302h | 1 | Version code | UINT 16 | Value=0: EM2696AV53H03S1XX Value=1: EM2696AV53HR2S1XX Value=2: EM2696AV53HI3S1XX Value=3: EM2696AV63H03S1XX Value=4: EM2696AV63HR2S1XX Value=5: EM2696AV63HI3S1XX Value=6: EM2696AV53H01XXXX Value=7: EM2696AV563H01XXXX |
| 300772 | 0303h | 1 | Revision code | UINT 16 | |

2.7 Front selector status

MODBUS: read only mode with functions code 03 and 04 limited to a word at a time

Table 2.7-1

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|-----------------------|-------------|--|
| 300773 | 0304h | 1 | Front selector status | UINT 16 | Value=3: keypad locked Value=2: keypad unlocked Value=1: keypad unlocked Value=0: keypad unlocked |

2.8 Carlo Gavazzi Controls identification code

MODBUS: read only mode with functions code 03 and 04 limited to a word at a time

Table 2.8-1

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|--|-------------|--|
| 300012 | 000Bh | 1 | Carlo Gavazzi Controls identification code | UINT 16 | Value=49: EM26-96 AV5 product code Value=50: EM26-96 AV6 product code |

2.9 Digital output status

MODBUS: read only mode with functions code 03 and 04 limited to a word at a time

Table 2.9-1

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|-----------------------|--|--|
| 300774 | 0305h | 1 | Digital output status | UINT 16 bit=0 output OFF bit=1 output ON | bit0=output status Ch1 bit1=output status Ch2 bit2=output status Ch3 |

2.10 Programming parameter tables

2.10.1 Password configuration menu

MODBUS: read and write mode

Table 2.10-1

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|--------------------|-------------|---|
| 304353 | 1100h | 1 | PASSWORD | UINT 16 | Minimum valid value: 0d Maximum valid value: 9999d |

2.10.2 "Application" menu

MODBUS: read and write mode

Table 2.10-2

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|---------------------|-------------|---|
| 304354 | 1101h | 1 | Type of application | UINT 16 | Value=0: "A" application Value=1: "B" application Value=2: "C" application Value=3: "D" application Value=4: "E" application Value=5: "F" application Value=6: "G" application Value=7: "H" application All other values corresponds to "A" application |

2.10.3 System configuration menu

MODBUS: read and write mode

Table 2.10-3

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|--------------------|-------------|--|
| 304355 | 1102h | 1 | Measuring system | UINT 16 | Value=0: "3Pn" Value=1: "3P1" Value=2: "2P" Value=3: "1P" Value=4: "3P" All the other possible values correspond to "3Pn" |

2.10.4 DMD integration time menu

MODBUS: read and write mode

Table 2.10-4

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|--------------------|-------------|---------------------------------|
| 304356 | 1103h | 1 | Interval time | UINT 16 | Value min = 1 Value max = 30 |

2.10.5 Selector menu

MODBUS: read and write mode

Table 2.10-5

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|----------------------|-------------|--|
| 304357 | 1104h | 1 | Position selector: 3 | UINT 16 | Value=0: Page 1 |
| 304358 | 1105h | 1 | Position selector: 2 | UINT 16 | Value=1: Page 2 |
| 304359 | 1106h | 1 | Position selector: 1 | UINT 16 | Value=2: Page 3 |
| 304360 | 1107h | 1 | Position selector: 0 | UINT 16 | Value=3: Page 4 Value=4: Page 5 Value=5: Page 6 Value=6: Page 7 Value=7: Page 8 Value=8: Page 9 Value=9: Page 10 Value=10: Page 11 Value=11: Page 12 Value=12: Page 13 Value=13: Page 14 Value=14: Page 15 Value=15: Page 16 Value=16: Page 17 Value=17: Page 18 Value=18: Page 19 Value=19: Page 20 Value=20: Page 21 Value=21: Page 22 Value=22: Page 23 Value=23: Page 24 Value=24: Page 25 Value=25: Page 26 Value=26: Page 27 Value=27: Page 28 Value=28: Page 29 Value=29: Page 30 Value=30: Page 31 All the other possible values corresponds to "Page 1" |

2.10.6 Filter configuration menu

MODBUS: read and write mode

Table 2.10-6

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|-----------------------|-------------|----------------------------------|
| 304361 | 1108h | 1 | Filter span parameter | UINT 16 | Value min = 0 Value max = 100 |
| 304362 | 1109h | 1 | Filter coefficient | UINT 16 | Value min = 1 Value max = 32 |



2.10.7 Serial port configuration menu

MODBUS: read and write mode

Table 2.10-7

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|--------------------------|-------------|----------------------------------|
| 304363 | 110Ah | 1 | RS485 instrument address | UINT 16 | Value min = 1 Value max = 247 |
| 304364 | 110Bh | 1 | RS485 baud rate | UINT 16 | Value=0: 4800 Value=1: 9600 |

Note: The number of stop bits is fixed to "1" and the parity control is fixed to "none".

2.10.8 User configuration menu

MODBUS: read and write mode

Table 2.10-8

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|--------------------|-------------|-----------------------------------|
| 304365 | 110Ch | 1 | ID code of user 1 | UINT 16 | Value min = 1 Value max = 9999 |
| 304366 | 110Dh | 1 | ID code of user 2 | UINT 16 | |
| 304367 | 110Eh | 1 | ID code of user 3 | UINT 16 | |

2.10.9 Digital output configuration menu and display colour

MODBUS: read and write mode

Table 2.10-9

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|----------------------|-------------|---|
| 304368 | 110Fh | 1 | Out1 type | UINT 16 | Value=0: Pulse KWh Value=1: Pulse Kvarh Value=2: Alarm VLN sys Value=3: Alarm V1-LN Value=4: Alarm V2-LN Value=5: Alarm V3-LN Value=6: Alarm VLL sys Value=7: Alarm V12 Value=8: Alarm V23 Value=9: Alarm V31 Value=10: Alarm AL1 Value=11: Alarm AL2 Value=12: Alarm AL3 Value=13: Alarm W sys Value=14: Alarm WMD sys Value=15: Alarm WL1 Value=16: Alarm WL2 Value=17: Alarm WL3 Value=18: Alarm VA sys Value=19: Alarm VADMD sys Value=20: Alarm VAL1 Value=21: Alarm VAL2 Value=22: Alarm VAL3 Value=23: Alarm var sys Value=24: Alarm var1 Value=25: Alarm var2 Value=26: Alarm var3 Value=27: Alarm PF sys Value=28: Alarm PF1 Value=29: Alarm PF2 Value=30: Alarm PF3 Value=31: Alarm Hz Value=32: Alarm Phase Sequence Value=33: Al. THD V1-LN Value=34: Al. THD V2-LN Value=35: Al. THD V3-LN Value=36: Al. THD V12 Value=37: Al. THD V23 Value=38: Al. THD V31 Value=39: Al. THD AL1 Value=40: Al. THD AL2 Value=41: Al. THD AL3 Value=42: REMOTE CONTROL |
| 304369 | 1110h | 2 | Out1 pulse | UINT 32 | Value min = 1 (0,1 pulse/KWh) Value max = 1000000 (pulse/KWh) |
| 304371 | 1112h | 2 | Alarm1 set point on | UINT 32 | The maximum and minimum limits of the set point value depend on the type of the variable according to paragraph 2.1.2. |
| 304373 | 1114h | 2 | Alarm1 set point off | UINT 32 | |
| 304375 | 1116h | 1 | Alarm1 delay | UINT 16 | Value min = 0 (second) Value max = 255 (second) |
| 304376 | 1117h | 1 | Alarm1 status | UINT 16 | Value=0: nd (normally de-energised) Value=1: nE (normally energised) |

continue



MODBUS: read and write mode continue

Table 2.10-10

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|----------------------|-------------|--|
| 304377 | 1118h | 1 | Out2 type | UINT 16 | See note on Out1 type |
| 304378 | 1119h | 2 | Out2 pulse | UINT 32 | See note on Out1 pulse |
| 304380 | 111Bh | 2 | Alarm2 set point on | UINT 32 | See note on Alarm 1 set point on/off |
| 304382 | 111Dh | 2 | Alarm2 set point off | UINT 32 | |
| 304384 | 111Fh | 1 | Alarm2 delay | UINT 16 | See note on Alarm 1 delay |
| 304385 | 1120h | 1 | Alarm2 status | UINT 16 | See note on Alarm 1 status |
| 304410 | 1139h | 1 | Out3 type | UINT 16 | See note on Out1 type |
| 304411 | 113Ah | 2 | Out3 pulse | UINT 32 | See note on Out1 pulse |
| 304413 | 113Ch | 2 | Alarm3 set point on | UINT 32 | See note on Alarm 1 set point on/off |
| 304415 | 113Eh | 2 | Alarm3 set point off | UINT 32 | |
| 304417 | 1140h | 1 | Alarm3 delay | UINT 16 | See note on Alarm 1 delay |
| 304418 | 1141h | 1 | Alarm3 status | UINT 16 | See note on Alarm 1 status |
| 304420 | 1143h | 1 | Display colour | UINT 16 | Value=0: backlight always OFF Value=1: backlight always white Value=2: backlight always blue Value=3: OFF, white/blue flashing in alarm Value=4: white, white/blue flashing in alarm Value=5: blue, blue/white flashing in alarm All other values corresponds to backlight OFF |

2.10.10 Digital input configuration menu *

MODBUS: read and write mode

Table 2.10-11

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|---|-------------|---|
| 304386 | 1121h | 1 | Digital input 1 type | UINT 16 | Value=0: Sync mode Value=1: Tariff mode Value=2: Gas counter Value=3: H2O cold counter Value=4: H2O hot counter Value=5: H2O hot KWh counter Value=6: REM (remote function) All other values are considered as value=0 |
| 304387 | 1122h | 1 | Digital input 2 type | UINT 16 | Value=0: Sync mode Value=1: Tariff mode Value=2: Gas counter Value=3: H2O cold counter Value=4: H2O hot counter Value=5: H2O hot KWh counter Value=6: REM (remote function) All other values are considered as value=0 |
| 304388 | 1123h | 1 | Digital input 3 type | UINT 16 | Value=0: Gas counter Value=1: H2O cold counter Value=2: H2O hot counter Value=3: H2O hot KWh counter Value=4: REM (remote function) All other values are considered as value=0 |
| 304389 | 1124h | 1 | Digital input 1 prescaler | UINT 16 | Value min = 1 Value max = 9999 |
| 304390 | 1125h | 1 | Digital input 2 prescaler | UINT 16 | If the value is outside the limits the instrument considers that the value is equal to 1 |
| 304391 | 1126h | 1 | Digital input 3 prescaler | UINT 16 | |
| 304392 | 1127h | 1 | Tariff managed via serial communication | UINT 16 | Writing in this cell, the multi-tariff can be managed via serial communication, excluding any influence of the digital inputs (only if the digital inputs are not set to tariff selection). To set a tariff, a frame including the following information is to be sent. LSB: 5Ah always; MSB: tariff (value from 0 to 3). |



NOTES:

- If 2 or more digital inputs are linked to the same meter, it is enabled only the first meter having that selection
- If 2 inputs are set in Sync mode, the switching of any of the inputs is considered as a synchronisation signal.
- If only one of the inputs is set in Tariff mode, only tariffs 1 and 2 are managed.
- If the tariff is selected by RS485, only the 4 tariff mode is managed.

2.10.11 PT and CT configuration menu

MODBUS: read and write mode

Table 2.10-12

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|---------------------------|-------------|--|
| 304397 | 112Ch | 2 | Current transformer ratio | UINT 32 | Value min = 10 (CT=1.0) Value max = 600000 (CT=60000.0) |
| 304399 | 112Eh | 2 | Voltage transformer ratio | UINT 32 | Value min = 10 (VT=1.0) Value max = 60000 (VT=6000.0) |

2.10.12 Reset commands

MODBUS: write only mode

Table 2.10-13

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|---|-------------|---|
| 312289 | 3000h | 1 | Reset of all meters (hour counter excluded) | UINT 16 | Value=1: Command is executed All other values produce no effects |
| 312290 | 3001h | 1 | Reset of total meters (see note 1), hour counter excluded | UINT 16 | |
| 312291 | 3002h | 1 | Reset of partial meters (see note 2) | UINT 16 | |
| 312292 | 3003h | 1 | Reset of hour counter | UINT 16 | |
| 312293 | 3004h | 1 | Reset counter 1, 2 and 3 | UINT 16 | |
| 312294 | 3005h | 1 | Reset dmd max | UINT 16 | |

Note 1: the total meters are

- total kWh imported
- total kvarh imported
- total kWh exported
- total kvarh exported
- kWh L1
- kWh L2
- kWh L3
- kWh T1
- kWh T2
- kWh T3

- kWh T4
- kvarh T1
- kvarh T2
- kvarh T3
- kvarh T4

Note 2: the partial meters are

- partial kWh
- partial kvarh

2.10.13 Remote digital output commands

MODBUS: write only mode

Table 2.10-12

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|-----------------|------------------|----------------|--------------------------|-------------|---------------------------------------|
| 312289 | 3010h | 1 | Remote command for out 1 | UINT 16 | Value=0: OFF |
| 312290 | 3011h | 1 | Remote command for out 2 | UINT 16 | Value=1: ON |
| 312291 | 3012h | 1 | Remote command for out 3 | UINT 16 | All other values switch on the output |

3 REVISIONS

3.1 Modifications from Version 1 Revision 0

Tables 2.10-3, 2.10-7, and 2.10-10 updated

