
# EM24-DIN

## COMMUNICATION PROTOCOL

**Version 3 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 EM24-DIN 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 EM24-DIN:

- 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 EM24-DIN 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 :<br>01h: illegal function<br>02h: illegal data address<br>03h: illegal data value<br>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 :<br>01h: illegal function<br>02h: illegal data address<br>03h: illegal data value<br>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 :<br>01h: illegal function<br>02h: illegal data address<br>03h: illegal data value<br>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.
EM24-DIN 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 :<br>01h: illegal function<br>02h: illegal data address<br>03h: illegal data value<br>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 EM24-DIN 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

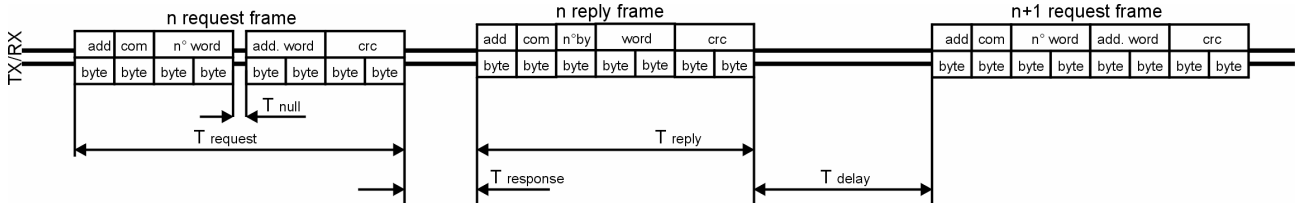



Fig. 1 : 2-wire timing diagram

| 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

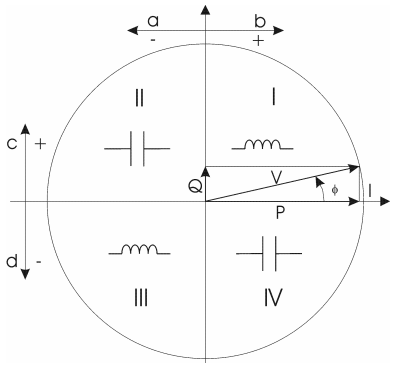
The variables are represented by integers or floating numbers, with 2's complement notation in case of "signed" format, using the following:

| 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 | $-(1+[1-2^{-23}])x2^{127}$ .. $2^{128}$ |

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 EM24-DIN

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

| | AV9 input option | | AV0 input option | | AV5 input option | | AV6 input option | |
|---|---|---|---|---|---|---|---|---|
| | **Max value** | **Min value** | **Max value** | **Min value** | **Max value** | **Min value** | **Max value** | **Min value** |
| VL-N | 280V | 0 | 150V | 0 | 485V | 0 | 150V | 0 |
| VL-L | 485V | 0 | 260V | 0 | 840V | 0 | 260V | 0 |
| A | 65A | 0 | 65A | 0 | 11A | 0 | 11A | 0 |
| VT ratio | | | | | 6000 | 1.0 | 6000 | 1.0 |
| CT ratio | | | | | 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 |

## 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<br>bit=0 input close<br>bit=1 input open | bit0=input status Ch1<br>bit1=input status Ch2<br>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<br>Value=1: tariff 2<br>Value=2: tariff 3<br>Value=3: tariff 4 |

## 2.6 Firmware version and revision code

**MODBUS**: read only mode with functions code 03 and 04 limited to a word at a time Table 2.6-1

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|---|---|---|---|---|---|
| 300771 | 0302h | 1 | Version code | UINT 16 | Value=0: EM24DINAV93xO2x<br>**Value=1: EM24DINAV93xISx**<br>Value=2: EM24DINAV53xO2x<br>**Value=3: EM24DINAV53xISx**<br>Value=4: EM24DINAV93xR2x<br>Value=5: EM24DINAV53xR2x<br>Value=6: EM24DINAV63xR2x<br>Value=7: EM24DINAV93xO2x<br>**Value=8: EM24DINAV93xISx**<br>Value=11: EM24DINAV63xO2x<br>**Value=12: EM24DINAV63xISx**<br>Value=13: EM24DINAV53xXXx<br>Value=14: EM24DINAV93xXXx<br>Value=15: EM24DINAV23xXXx<br>Value=16: EM24DINAV63xXXx |
| 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<br>Value=2: keypad unlocked<br>Value=1: keypad unlocked<br>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=45: EM24-DIN AV9 input product code<br>Value=46: EM24-DIN AV0 input product code<br>Value=47: EM24-DIN AV5 input product code<br>Value=48: EM24-DIN AV6 input 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 |
|---|---|---|---|---|---|
| **n.a.** | n.a. | n.a. | n.a. | n.a. | n.a. |

**Note:** in EM24 the digital outputs are not available with serial communication port.

## 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 |
|---|---|---|---|---|---|
| **3**04353 | 1100h | 1 | PASSWORD | UINT 16 | Minimum valid value: 0d<br>Maximum valid value: 9999d<br>If the value is outside the limits the instrument considers that the value is equal to 0. |

### 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 |
|---|---|---|---|---|---|
| **3**04354 | 1101h | 1 | Type of application | UINT 16 | Value=0: “A” application<br>Value=1: “B” application<br>Value=2: “C” application<br>Value=3: “D” application<br>Value=4: “E” application<br>Value=5: “F” application<br>Value=6: “G” application<br>Value=7: “H” application<br>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 |
|---|---|---|---|---|---|
| **3**04355 | 1102h | 1 | Measuring system | UINT 16 | Value=0: “3Pn”<br>Value=1: “3P1”<br>Value=2: “2P”<br>Value=3: “1P”<br>Value=4: “3P”<br>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 |
|---|---|---|---|---|---|
| **3**04356 | 1103h | 1 | Interval time | UINT 16 | Value min = 1<br>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<br>Value=1: Page 2<br>Value=2: Page 3<br>Value=3: Page 4<br>Value=4: Page 5<br>Value=5: Page 6<br>Value=6: Page 7<br>Value=7: Page 8<br>Value=8: Page 9<br>Value=9: Page 10<br>Value=10: Page 11<br>Value=11: Page 12<br>Value=12: Page 13<br>Value=13: Page 14<br>Value=14: Page 15<br>Value=15: Page 16<br>Value=16: Page 17<br>Value=17: Page 18<br>Value=18: Page 19<br>Value=19: Page 20<br>Value=20: Page 21<br>Value=21: Page 22<br>Value=22: Page 23<br>Value=23: Page 24<br>Value=24: Page 25<br>Value=25: Page 26<br>Value=26: Page 27<br>Value=27: Page 28<br>Value=28: Page 29<br>Value=29: Page 30<br>Value=30: Page 31<br>All the other possible values corresponds to “Page 1” |
| 304358 | 1105h | 1 | Position selector: 2 | UINT 16 | |
| 304359 | 1106h | 1 | Position selector: 1 | UINT 16 | |
| 304360 | 1107h | 1 | Position selector: 0 | UINT 16 | |

### 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<br>Value max = 100 |
| 304362 | 1109h | 1 | Filter coefficient | UINT 16 | Value min = 1<br>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<br>Value max = 247 |
| 304364 | 110Bh | 1 | RS485 baud rate | UINT 16 | Value=0: 4800<br>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<br>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 **(not available in EM24 with serial port)**

**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<br>Value=2: Alarm VLN sys Value=3: Alarm V1-LN<br>Value=4: Alarm V2-LN Value=5: Alarm V3-LN<br>Value=6: Alarm VLL sys Value=7: Alarm V12<br>Value=8: Alarm V23 Value=9: Alarm V31<br>Value=10: Alarm AL1 Value=11: Alarm AL2<br>Value=12: Alarm AL3 Value=13: Alarm W sys<br>Value=14: Alarm WDMD sys Value=15: Alarm WL1<br>Value=16: Alarm WL2 Value=17: Alarm WL3<br>Value=18: Alarm VA sys Value=19: Alarm VADMD sys<br>Value=20: Alarm VAL1 Value=21: Alarm VAL2<br>Value=22: Alarm VAL3 Value=23: Alarm var sys<br>Value=24: Alarm var1 Value=25: Alarm var2<br>Value=26: Alarm var3 Value=27: Alarm PF sys<br>Value=28: Alarm PF1 Value=29: Alarm PF2<br>Value=30: Alarm PF3 Value=31: Alarm Hz<br>Value=32: Alarm Phase Sequence<br>All other values are considered as value=0 |
| | 1110h | 2 | Out1 pulse | UINT 32 | Value min = 1 (0,1 pulse/KWh)<br>Value max = 1000000 (pulse/KWh)<br>If the value is outside the limits the instrument considers that the value is equal to 1 |
| 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.<br>If the value is outside the limits the instrument considers that the value is equal to the minimum value |
| 304373 | 1114h | 2 | Alarm1 set point off | UINT 32 | |
| 304375 | 1116h | 1 | Alarm1 delay | UINT 16 | Value min = 0 (second)<br>Value max = 255 (second)<br>If the value is outside the limits the instrument considers that the value is equal to 0 |
| 304376 | 1117h | 1 | Alarm1 status | UINT 16 | Value=0: nd (normally de-energised)<br>Value=1: nE (normally energised)<br>All other values are considered as value=0 |
| 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 |

### 2.10.10 Digital input configuration menu *

**MODBUS**: read and write mode

Table 2.10-10

| 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<br>Value=1: Tariff mode<br>Value=2: Gas counter<br>Value=3: H2O cold counter<br>Value=4: H2O hot counter<br>Value=5: H2O hot KWh counter<br>Value=6: REM (remote function)<br>All other values are considered as value=0 |
| 304387 | 1122h | 1 | Digital input 2 type | UINT 16 | Value=0: Sync mode<br>Value=1: Tariff mode<br>Value=2: Gas counter<br>Value=3: H2O cold counter<br>Value=4: H2O hot counter<br>Value=5: H2O hot KWh counter<br>Value=6: REM (remote function)<br>All other values are considered as value=0 |
| 304388 | 1123h | 1 | Digital input 3 type | UINT 16 | Value=0: Gas counter<br>Value=1: H2O cold counter<br>Value=2: H2O hot counter<br>Value=3: H2O hot KWh counter<br>Value=4: REM (remote function)<br>All other values are considered as value=0 |
| 304389 | 1124h | 1 | Digital input 1 prescaler | UINT 16 | Value min = 1<br>Value max = 9999<br>If the value is outside the limits the instrument considers that the value is equal to 1 |
| 304390 | 1125h | 1 | Digital input 2 prescaler | UINT 16 | |
| 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**:

a) If 2 or more digital inputs are linked to the same meter, it is enabled only the first meter having that selection
b) If 2 inputs are set in Sync mode, the switching of any of the inputs is considered as a synchronisation signal.
c) If only one of the inputs is set in Tariff mode, only tariffs 1 and 2 are managed.
d) 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 2.10-11

| 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)<br>Value max = 600000 (CT=60000.0) |
| 304399 | 112Eh | 2 | Voltage transformer ratio | UINT 32 | Value min = 10 (VT=1,0)<br>Value max = 60000 (VT=6000.0) |

2.10.12 Reset commands

**MODBUS**: write only mode

Table 2.10-12

| 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<br>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

# 3 REVISIONS

## 3.1 Modifications from Version 1 Revision 0

The maximum number of requested word is 11, not 16 (see par. 1.2.1, 1.2.2)

## 3.2 Modifications from Version 1 Revision 1

Tables 2.6-1, 2.9-1, and 2.10-12 updated

## 3.3 Modifications from Version 2 Revision 1

Tables 2.1-1, 2.6-1, 2.10-3, 2.10-7, and 2.10-10 updated