# EM511 Modbus

MODBUS COMMUNICATION PROTOCOL

## Public version

Version 1.14

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# 1 Introduction

The RS485 serial interface supports the Modbus (RTU) protocol. In this document only the information necessary to read/write from/to EM511 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 latest revision of the "Modbus_Application_Protocol" document that is downloadable from the www.modbus.org web site.

# 2 Modbus functions

These functions are available on EM511 SERIES:

- Reading of n "Holding Registers" (code 03h)
- Reading of n "Input Register" (code 04h)
- Writing of one "Holding Registers" (code 06h)
- Writing of one "Holding Registers" (code 10h)
- Broadcast mode (writing instruction on address 00h)

**IMPORTANT**:

- In this document the "Modbus address" field is indicated in two modes:
    - "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.
- The functions 03h and 04h have exactly the same effect and can be used indifferently.
- The communication parameters are to be set according to the configuration of the instrument.

## 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 125 registers (words) [250 bytes] 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).

**Table 3.1 - Request frame Function 03h**

| 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 14h (1 to 20) | Byte order: MSB, LSB |
| CRC | 2 bytes | - | - |

**Table 3.2 - Response frame (correct action) Function 03h**

| 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 | - | - |

**Table 3.3 - Response frame (incorrect action) Function 03h**

| 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 | - | |

## 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) [250 bytes] 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).

**Table 3.4 - Request frame Function 04h**

| 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 14h (1 to 20) | Byte order: MSB, LSB |
| CRC | 2 bytes | - | - |

**Table 3.5 - Response frame (correct action) Function 04h**

| 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 | - | - |

**Table 3.6 - Response frame (incorrect action) Function 04h**

| 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 | - | |

## 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.

**Table 3.7 - Request frame Function 06h**

| 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 | - | - |

**Table 3.8 - Response frame (correct action) Function 06h**

| 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 | - | - |

**Table 3.9 - Response frame (incorrect action) Function 06h**

| 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 | - | |

## 2.4 Function 10h (Write multiple registers)

This function code is used to write a block of contiguous registers (maximum 123 word [246 bytes]). 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.

**Table 3.10 - Request frame Function 10h**

| Description | Length | Value | Note |
|---|---|---|---|
| Physical Address | 1 byte | 1 to F7 (1 to 247) | - |
| Function code | 1 byte | 10h | - |
| Starting Address | 2 bytes | 0000h to FFFFh | Byte order: MSB, LSB |
| Quantity of Registers (**N** word) | 2 bytes | 0001h to 0078h | Byte order: MSB, LSB |
| Byte count | 1 byte | **N** word * 2 | - |
| Register value | **N** * 2 bytes | value | Byte order: MSB, LSB |
| CRC | 2 bytes | - | - |

**Table 3.11 - Response frame (correct action) Function 10h**

| Description | Length | Value | Note |
|---|---|---|---|
| Physical Address | 1 byte | 1 to F7 (1 to 247) | - |
| Function code | 1 byte | 10h | - |
| Starting Address | 2 bytes | 0000h to FFFFh | Byte order: MSB, LSB |
| Quantity of Registers (**N** word) | 2 bytes | 0001h to 0078h | Byte order: MSB, LSB |
| CRC | 2 bytes | - | - |

**Table 3.12 - Response frame (Incorrect action) Function 10h**

| Description | Length | Value | Note |
|---|---|---|---|
| Physical Address | 1 byte | 1 to F7 (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 | 90h | |
| Exception code | 1 byte | 01h, 02h, 03h, 04h | |
| CRC | 2 bytes | - | |

## 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 and 10h using address 00h.

## 2.6 Application notes, RS485 general considerations

- To avoid errors due to the signal reflections or line coupling, it is necessary to terminate the bus at the beginning (master side, if not already embedded, by inserting a 120 ohm 1/2W 5% resistor between line B and A) and at the end (in EM511 interface by connecting the terminal B+ with the terminal T in the last instrument.
- The network termination is necessary even in case of point-to-point connection and/or of short distances.
- For connections longer than 1000m or if in the network there are more than 160 instruments (with 1/5 unit load as used in EM511 interface), a signal repeater is necessary.
- For bus connection it is suggested to use an AWG24 balanced pair cable and to add a third wire for GND connection. If a shielded cable is used, connect the shield to GND.
- The GND should be connected to ground only at the host side.
- 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.

## 2.7 Modbus timing

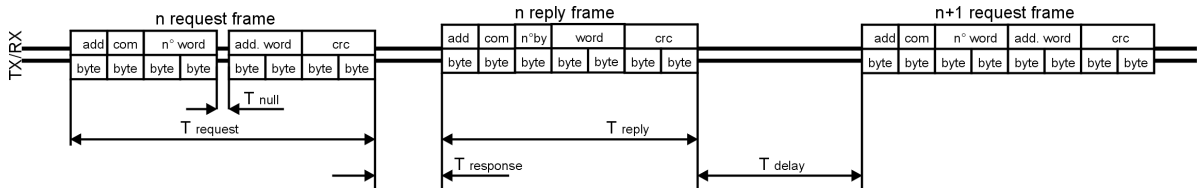



***Fig. 1*** *:* 2-wire timing diagram

**Table 3.13 - Timing of reading function**

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

# 3 Data Format, Variables and parameters

## 3.1 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:

**Table 3.1 - Data format**

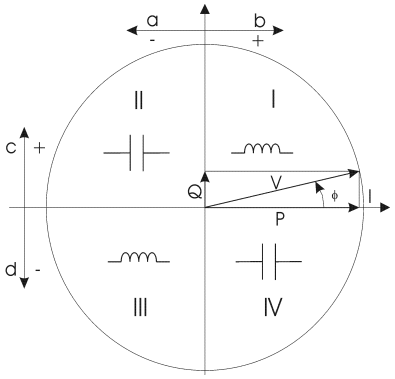
| Format | IEC data type | Description | Bits | Range |
|---|---|---|---|---|
| INT16 | INT | Integer | 16 | -32768 .. 32767 |
| UINT16 | UINT | Unsigned integer | 16 | 0 .. 65535 |
| INT32 | DINT | Double integer | 32 | $-2^{31}$ .. $2^{31}$ |
| UINT32 | UDINT | Unsigned double integer | 32 | 0 .. $2^{32}$-1 |
| 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.

## 3.2 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:

**Table 3.2 - Geometric representation of variables**




a = Exported active power

b = Imported active power

c = Imported reactive power

d = Exported reactive power

According to the measurement mode, the following sign convention is used.

- P < or > 0 (with indication of "-" sign),
- kWh+ increasing only when P > 0,
- kWh- increasing only when P < 0,
- kvarh+ increasing only when Q > 0,
- kvarh- increasing only when Q < 0,
- PF with ±C or ±L indication,

## 3.3 Maximum electrical values

If the input is above the maximum value, the display shows “EEE”. When in “EEE” the relevant Modbus variable is represented as 0x7FFF for 16-bit registers, 0x7FFFFFFF for 32-bit registers.

## 3.4 Other input error conditions

There are two particular input conditions that influence different variables other than the one with the value out of range:

- When the frequency is outside the limits, the Voltage, the Current, the PF, the THDs are in error (i.e. the display shows “EEE” and the Modbus reading returns 0x7FFF for 16-bit registers, 0x7FFFFFFF for 32-bit registers).
- When the current is below the Istart (20mA) the Power Factor is forced to 1 (read as 1000) and the “Inductive/Capacitive Load” is forced to L (read as 1).

## 3.5 Part number available

| Part Number | Family | SubFamily | Gavazzi Code | | FW | Note |
|---|---|---|---|---|---|---|
| | | | Decimal Format | Hex16 format | | |
| EM511DINAV81XS1X | EM511 | X | 1792 | 0700 | X | EM511 with RS485, dig IN, standard device |
| EM511DINAV81XS1PFA | EM511 | PFA | 1793 | 0701 | PFx | EM511 with RS485, dig IN, MID Absolute Counter |
| EM511DINAV81XS1PFB | EM511 | PFB | 1794 | 0702 | PFx | EM511 with RS485, dig IN, MID Bidirectional Counter |
| EM511DINAV81XS1SFA | EM511 | SFA | 1795 | 0702 | PFx | EM511 with RS485, dig IN ,SWISS MID Absolute Counter |
| EM511DINAV81XS1PFA70 | EM511 | PFA70 | 1796 | 0704 | PFx70 | EM511 with RS485, dig IN, MID Absolute Counter, 70°C |
| EM511DINAV81XS1PFB70 | EM511 | PFB70 | 1797 | 0705 | PFx70 | EM511 with RS485, dig IN, MID Bidirectional Counter, 70°C |

Protocol ID shall be used into Modbus map to distinguish the differences between models. If registers are available for every model the FW code shall be substituted with ALL.

***IMPORTANT***:

- Reading values in addresses not specified in the below tables returns an illegal data address exception;
- writing is inhibited when in menu Setup or Reset.

# 4 Tables

## 4.1 Instantaneous variables and meters

### 4.1.1 *Instantaneous variables and meters grouped by variable type*

**Table 4.1 - Modbus: read only mode with functions code 03 and 04**

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|---|---|---|---|---|---|
| 300001 | 0000h | 2 | V L-N | INT32 | Value weight: Volt*10 |
| 300003 | 0002h | 2 | A | INT32 | Value weight: Ampere*1000 |
| 300005 | 0004h | 2 | W | INT32 | Value weight: Watt*10 |
| 300007 | 0006h | 2 | VA | INT32 | Value weight: VA*10 |
| 300009 | 0008h | 2 | Var | INT32 | Value weight: var*10 |
| 300011 | 000Ah | 2 | W dmd | INT32 | Value weight: Watt*10 |
| 300013 | 000Ch | 2 | W dmd peak | INT32 | Value weight: Watt*10 |
| 300015 | 000Eh | 1 | PF (IEC convention – see Note) | INT16 | Value weight: PF*1000 |
| 300016 | 000Fh | 1 | Hz | INT16 | Value weight: Hz*10 |
| 300017 | 0010h | 2 | kWh (+) TOT | INT32 | Value weight: kWh*10 |
| 300019 | 0012h | 2 | Kvarh (+) TOT | INT32 | Value weight: kvarh*10 |
| 300021 | 0014h | 2 | kWh (+) PARTIAL | INT32 | Value weight: kWh*10 |
| 300023 | 0016h | 2 | Kvarh (+) PARTIAL | INT32 | Value weight: kvarh*10 |
| 300025 | 0018h | 2 | kWh (+) t1 | INT32 | Value weight: kWh*10 |
| 300027 | 001Ah | 2 | kWh (+) t2 | INT32 | Value weight: kWh*10 |
| 300029 | 001Ch | 2 | n.a. | INT32 | Not available, value =0 |
| 300031 | 001Eh | 2 | n.a. | INT32 | Not available, value =0 |
| 300033 | 0020h | 2 | kWh (-) TOT | INT32 | Value weight: kWh*10 |
| 300035 | 0022h | 2 | kvarh (-) TOT | INT32 | Value weight: kvarh*10 |
| 300037 | 0024h | 2 | kWh (-) PARTIAL | INT32 | Value weight: kWh*10 |
| 300039 | 0026h | 2 | kvarh (-) PARTIAL | INT32 | Value weight: kvarh*10 |
| 300041 | 0028h | 2 | kVAh TOT | INT32 | Value weight: kVAh*10 |
| 300043 | 002Ah | 2 | kVAh PARTIAL | INT32 | Value weight: kVAh*10 |
| 300045 | 002Ch | 2 | Hour counter | INT32 | Value weight: hours*100 |
| 300047 | 002Eh | 2 | Hour counter Neg | INT32 | Value weight: hours*100, |
| 300049 | 0030h | 2 | Lifetime counter | INT32 | Value weight: hours*100, |
| 300051 | 0032h | 2 | THD A | INT32 | Value weight: %*100 |
| 300053 | 0034h | 2 | THD V L-N | INT32 | Value weight: %*100 |
| 300055 | 0036h | 2 | Hour counter PARTIAL | INT32 | Value weight: hours*100 |
| 300057 | 0038h | 2 | Hour counter Neg PARTIAL | INT32 | Value weight: hours*100, |
| 300059 | 003Ah | 2 | A dmd | INT32 | Value weight: Ampere*1000 |
| 300061 | 003Ch | 2 | A dmd peak | INT32 | Value weight: Ampere*1000 |
| 300063 | 003Eh | 2 | n.a. | INT32 | Not available, value =0 |
| 300065 | 0040h | 2 | VA dmd | INT32 | Value weight: VA*10 |
| 300067 | 0042h | 2 | VA dmd peak | INT32 | Value weight: VA*10 |
| 300069 to 300112 | 0044h to 006Fh | | n.a. | INT32 | Not available, value =0 |
| 300113 | 0070h | 1 | PF (L/C convention – see Note) | INT16 | Value weight: PF*1000 |
| 300114 | 0071h | 1 | Inductive/Capacitive Load | INT16 | L=+1, C = -1 |

### 4.1.2 *Instantaneous variables and meters grouped by phase*

**Table 4.2 - Modbus: read only mode with functions code 03 and 04**

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|---|---|---|---|---|---|
| **System variables** | | | | | |
| 300257 | 0100h | 2 | A | INT32 | Value weight: Ampere*1000 |
| 300259 | 0102h | 2 | V L-N | INT32 | Value weight: Volt*10 |
| … | … | … | … | … | … |
| 300263 | 0106h | 2 | W | INT32 | Value weight: Watt*10 |
| 300265 | 0108h | 2 | VA | INT32 | Value weight: VA*10 |
| 300267 | 010Ah | 2 | var | INT32 | Value weight: var*10 |
| 300269 | 010Ch | 2 | PF (IEC convention – see Note table 4.1-1) | INT32 | Value weight: PF*1000 |
| … | … | … | … | … | … |
| 300273 | 0110h | 2 | Hz | INT32 | Value weight: Hz*10 |
| **Total energies and dmd** | | | | | |
| 300275 | 0112h | 2 | kWh (+) TOT | INT32 | Value weight: kWh*10 |
| 300277 | 0114h | 2 | kvarh (+) TOT | INT32 | Value weight: kvarh*10 |
| 300279 | 0116h | 2 | kWh (-) TOT | INT32 | Value weight: kWh*10 |
| 300281 | 0118h | 2 | kvarh (-) TOT | INT32 | Value weight: kvarh*10 |
| 300283 | 011Ah | 2 | W dmd | INT32 | Value weight: Watt*10 |
| 300285 | 011Ch | 2 | W dmd peak | INT32 | Value weight: Watt*10 |
| … | … | … | … | … | … |
| 300289 | 0120h | 2 | A dmd | INT32 | Value weight: Ampere*1000 |
| 300291 | 0122h | 2 | A dmd peak | INT32 | Value weight: Ampere*1000 |
| … | … | … | … | … | … |
| 300295 | 0126h | 2 | VA dmd | INT32 | Value weight: VA*10 |
| 300297 | 0128h | 2 | VA dmd peak | INT32 | Value weight: VA*10 |
| … | … | … | … | … | … |
| **Other energies** | | | | | |
| **300329** | 0148h | 2 | kWh (+) PARTIAL | INT32 | Value weight: kWh*10 |
| **300331** | 014Ah | 2 | Kvarh (+) PARTIAL | INT32 | Value weight: kvarh*10 |
| 300333 | 014Ch | 2 | n.a. | INT32 | Not available, value =0 |
| 300335 | 014Eh | 2 | n.a. | INT32 | Not available, value =0 |
| 300337 | 0150h | 2 | n.a. | INT32 | Not available, value =0 |
| **300339** | 0152h | 2 | kWh (+) t1 | INT32 | Value weight: kWh*10 |
| **300341** | 0154h | 2 | kWh (+) t2 | INT32 | Value weight: kWh*10 |
| 300343 | 0156h | 2 | n.a. | INT32 | Not available, value =0 |
| 300347 | 015Ah | 2 | kWh (-) PARTIAL | INT32 | Value weight: kWh*10 |
| 300349 | 015Ch | 2 | Kvarh (-) PARTIAL | INT32 | Value weight: kvarh*10 |
| 300351 | 015Eh | 2 | kVAh TOT | INT32 | Value weight: kVAh*10 |
| 300353 | 0160h | 2 | kVAh PARTIAL | INT32 | Value weight: kVAh *10 |

***IMPORTANT:*** Table 4.1 and 4.2 are equivalent and, apart from the “Hour counter” and “Lifetime” register, includes a copy of the same variable values.

### 4.1.3 *Other Instantaneous variables and meters read only*

**Table 4.3 - Modbus: read only mode with functions code 03 and 04**

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes |
|---|---|---|---|---|---|
| 300769 | 0300h | 1 | Digital input status | INT16 | 0 = input open<br>1 = input closed |
| 300770 | 0301h | 1 | Active tariff | INT16 | 0 = no-one<br>1 = tariff 1<br>2 = tariff 2 |
| 300774 | 0305h | 1 | Reserved | UINT 16 | - |
| 300775 | 0306h | 1 | Alarm status | INT16 | 0 = not active (including waiting for delay to elapse)<br>1 = active |
| 300776 | 0307h | 1 | Internal MCU temperature | INT16 | Value weight: °C<br>Range: from -40°C to +100°C<br>Available only on PFx70 |
| | | | | | |
| 301279 | 04FEh | 2 | Reserved | INT32 | - |
| 301281 | 0500h | 4 | kWh (+) TOT | INT64 | Value weight: Wh |
| 301285 | 0504h | 4 | Kvarh (+) TOT | INT64 | Value weight: VARh |
| 301289 | 0508h | 4 | kWh (+) PARTIAL | INT64 | Value weight: Wh |
| 301293 | 050Ch | 4 | Kvarh (+) PARTIAL | INT64 | Value weight: VARh |
| … | … | … | … | … | … |
| 301309 | 051Ch | 4 | kWh (-) TOT | INT64 | Value weight: Wh |
| 301313 | 0520h | 4 | kWh (-) PARTIAL | INT64 | Value weight: Wh |
| 301317 | 0524h | 4 | kvarh (-) TOT | INT64 | Value weight: varh |
| 301321 | 0528h | 4 | kvarh (-) Partial | INT64 | Value weight: varh |
| 301325 | 052Ch | 4 | kVAh TOT | INT64 | Value weight: VAh |
| 301329 | 0530h | 4 | kVAh PARTIAL | INT64 | Value weight: VAh |
| 301333 | 0534h | 2 | Run hour meter | INT32 | Value weight: hours*100 |
| 301335 | 0536h | 2 | Run hour meter kWh (-) | INT32 | Value weight: hours*100 |
| 301337 | 0538h | 2 | Run hour meter PARTIAL | INT32 | Value weight: hours*100 |
| 301339 | 053Ah | 2 | Run hour meter kWh (-) PARTIAL | INT32 | Value weight: hours*100 |
| 301341 | 053Ch | 2 | Hz | INT32 | Value weight: Hz*1000 |
| 301343 | 053Eh | 2 | Run hour Life Counter | INT32 | Value weight: hours*100 |

### 4.1.4 *High resolution energy counters (read only)*

**Table 4.4 - Modbus: read only mode with functions code 03 and 04**

| Modicom address | Physical address | Length (words) | VARIABLE ENG. UNIT | Data Format | Notes | FW |
|---|---|---|---|---|---|---|
| 301537 | 0600h | 4 | kWh (+) TOT | INT64 | Value weight: Wh*10 | X 1.2 |
| 301541 | 0604h | 4 | kWh (-) TOT | INT64 | Value weight: Wh*10 | X 1.2 |

***IMPORTANT:*** These registers are available for all products from serial number “YR2024”, “BY135” or “KY135” onward.

## 4.2 Firmware version and revision code

**Table 4.5 - Modbus: read only mode with functions code 03 and 04 limited to a word at a time**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 300771 | 0302h | 1 | Major, Minor and Revision | UINT 16 | MSB: Bit 0..3 = Minor<br>Bit 4..7 = Major<br>(e.g. 01000011b / 43h / 67d = 4.3)<br>LSB: Revision | N/A | ALL |
| 300772 | 0303h | 1 | Reserved | UINT 16 | - | N/A | ALL |
| 300785 | 0310h | 1 | Reserved | UINT 16 | - | N/A | ALL |

## 4.3 Firmware version and revision code

**Table 4.6 - Modbus read only mode with functions code 03 and 04 limited to a word at a time**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 300012 | 000Bh | 1 | Carlo Gavazzi Controls identification code | UINT 16 | See Part number available | N/A | ALL |

## 4.4 *Programming parameter tables*

### 4.4.1 *Password configuration menu*

**Table 4.7 - Modbus function 0x03, 0x04, 0x06 and 0x10**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 304097 | 1000h | 1 | PASSWORD | UINT 16 | Min value: 0d (no password)<br>Max valid value: 9999d | 0 | ALL |

### 4.4.2 *DMD time calculation*

**Table 4.8 - Modbus function 0x03, 0x04, 0x06 and 0x10**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 304113 | 1010h | 2 | Integration time for DMD power calculation | UINT 32 | Value 0 = 1 min<br>Value 1 = 5 min<br>Value 2 = 10 min<br>Value 3 = 15 min<br>Value 4 = 20 min<br>Value 5 = 30 min<br>Value 6 = 60 min | 3 (15 min) | ALL |

### 4.4.3 *Alarm configuration*

**Table 4.9 - Modbus function 0x03, 0x04, 0x06 and 0x10**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 304117 | 1014h | 1 | Alarm Enable | UINT 16 | Value 0 = Disabled<br>Value 1 = Enabled | 0 (Disabled) | ALL |
| 304118 | 1015h | 1 | Alarm linked | UINT 16 | Value 1 = Active Power [ kW ]<br>Value 2 = Apparent Power [ kVA ]<br>Value 3 = Reactive Power [ kVAR ]<br>Value 4 = Power Factor<br>Value 5 = Currents [A]<br>Value 6 = Voltages[V] | 1 (Active Power) | ALL |
| 304119 | 1016h | 2 | Alarm SetPoint1 (on) | INT 32 | Value min -100000 = -1000.00<br>Value max +100000 = +1000.00<br>Example: value 123 = 1.23 | 0 (0,00) | ALL |
| 304121 | 1018h | 2 | Alarm SetPoint2 (off) | INT 32 | Value min -100000 = -1000,00<br>Value max +100000 = +1000.00<br>Example: value 123 = 1.23 | 0 (0,00) | ALL |
| 304123 | 101Ah | 1 | Delay | UINT 16 | Value min 0 = 0 [s]<br>Value max 3600 = 3600 [s] | 0[s] | ALL |

### 4.4.4 *Tariff enabling*

**Table 4.10 - Modbus function 0x03, 0x04, 0x06 and 0x10**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 304354 | 1101h | 1 | Tariff management enabling only for Modbus command management | UINT 16 | Value 0 = OFF<br>Value 1 = ON | 1 (ON) | ALL |

***IMPORTANT***:

- Tariff configuration at "Active Tariff Selection".
- If 1200h register is set to 0, the value of configuration at register 1101h is ignored.

### 4.4.5 *Measure mode*

**Table 4.11 - Modbus function 0x03, 0x04, 0x06 and 0x10**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 304356 | 1103h | 1 | Measurement mode selection (*) | UINT 16 | Value 0 = A mode (Absolute)<br>Value 1 = B mode (Bidirectional) | 0 (A mode) (*) | X 1.0<br>PFx(*) 1.0 |

* = register is read-only and the default value matches the part number: 0 (A) for PFA, SFA, 1 (B) for PFB.

### 4.4.6 *Wizard display configuration*

**Table 4.12 - Modbus function 0x03, 0x04, 0x06 and 0x10**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 304362 | 1109h | 1 | Quick set up at next power on | UINT 16 | Value min = 0 (Disabled menu)<br>Value max = 1 (Enabled menu) | 1 (Enabled) | ALL |
| 304363 | 110Ah | 1 | *Reserved* | *UINT 16* | | | ALL |

### 4.4.7 *Hour counter configuration*

**Table 4.13 - Modbus function 0x03, 0x04, 0x06 and 0x10**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 304364 | 110Bh | 2 | Primary start-up current of run hour counter (I_st_Count H) | UINT 32 | Value weight: Ampere*1000<br>Value min = 20 -- [20mA]<br>Value max = 45000 [45A] | 20 (20mA) | ALL |

### 4.4.8 *Phase – Terminal Block configuration*

**Table 4.14 - Modbus function 0x03, 0x04, 0x06 and 0x10**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 304439 | 1156h | 1 | Input 1 Current direction | UINT 16 | Value 0 = Direct<br>Value 1 = Inverse | 0 (Direct) | X 1.0 |

***IMPORTANT***: Not Available for MID version.

### 4.4.9 *Digital input and Active Tariff selection*

**Table 4.15 - Modbus function 0x03, 0x04, 0x06 and 0x10**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 304609 | 1200h | 1 | Digital inputs selector | UINT 16 | Value 0 = tariff management via digital<br>Value 1 = only remote status input<br>Value 2 = Partial Meter enabled<br>Value 3 = Reset partial counter | 1 (Remote) | ALL |
| 304610 | 1201h | 1 | Tariff number selection via serial communication | UINT 16 | Value 1 = Tariff1 selected<br>Value 2 = Tariff2 selected | 1 (Tariff1) | ALL |

***IMPORTANT***:

- Remote status always available by protocol or display.
- If 1200h register is set to 0, the value of configuration at register 1201h is ignored.
- If 1200h register is set to 0, the value of configuration at register 1101h is ignored.

### 4.4.10 *Pages filter, Screen Saver and Home Page*

**Table 4.16 - Modbus function 0x03, 0x04, 0x06 and 0x10**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 305633 | 1600h | 1 | Pages filter Enable | UINT 16 | Value 0 = Disabled<br>Value 1 = Enabled | 0 (Disabled) | X1.0<br>PFx(0) 1.0 |
| 305634 | 1601h | 1 | Inactivity time enable | UINT 16 | Value 0 = Disabled<br>Value 1 = Home (goes to home page after timeout and stays there)<br>Value 2 = Slide (goes to home page after timeout and scrolls pages) | 1 (Home) | X1.0<br>PFx(1) 1.0 |
| 305635 | 1602h | 1 | Screen Saver time | UINT 16 | Value min = 0 (Disabled)<br>Value max = 20 (Seconds) | 5 | X1.0<br>PFx(2) 1.0 |
| 305636 | 1603h | 1 | Home page | UINT 16 | Value min = 1 (Page 1)<br>Value max = 25 (Page 25) | 1 (Page 1) | X1.0<br>PFx(3) 1.0 |
| 305637 | 1604h | 1 | Backlight Time | UINT 16 | Value 0 = Always ON<br>Value 1 = 1 min<br>Value 2 = 2 min<br>Value 3 = 5 min<br>Value 4 = 10 min<br>Value 5 = 15 min<br>Value 6 = 30 min<br>Value 7 = 60 min<br>Restart timing on button press | 0 (Always ON) | ALL |
| … | … | … | … | … | … | … | … |
| 305649 | 1610h | 1 | Page 1 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 2 (Screensaver) | X1.0<br>PFx(4) 1.0 |
| 305650 | 1611h | 1 | Page 2 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 1 (Filter) | X1.0<br>PFx(4) 1.0 |
| 305651 | 1612h | 1 | Page 3 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 2 (Screensaver) | X1.0<br>PFx(4) 1.0 |
| 305652 | 1613h | 1 | Page 4 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 2 (Screensaver) | X1.0<br>PFx(4) 1.0 |
| 305653 | 1614h | 1 | Page 5 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 2 (Screensaver) | X1.0<br>PFx(4) 1.0 |
| 305654 | 1615h | 1 | Page 6 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |
| 305655 | 1616h | 1 | Page 7 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 1 (Filter) | X1.0<br>PFx(4) 1.0 |
| 305656 | 1617h | 1 | Page 8 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |
| 305657 | 1618h | 1 | Page 9 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 305658 | 1619h | 1 | Page 10 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 1 (Filter) | X1.0<br>PFx(4) 1.0 |
| 305659 | 161Ah | 1 | Page 11 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 1 (Filter) | X1.0<br>PFx(4) 1.0 |
| 305660 | 161Bh | 1 | Page 12 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 1 (Filter) | X1.0<br>PFx(4) 1.0 |
| 305661 | 161Ch | 1 | Page 13 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |
| 305662 | 161Dh | 1 | Page 14 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |
| 305663 | 161Eh | 1 | Page 15 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |
| 305664 | 161Fh | 1 | Page 16 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |
| 305665 | 1620h | 1 | Page 17 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |
| 305666 | 1621h | 1 | Page 18 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |
| 305667 | 1622h | 1 | Page 19 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |
| 305668 | 1623h | 1 | Page 20 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |
| 305669 | 1624h | 1 | Page 21 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |
| 305670 | 1625h | 1 | Page 22 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |
| 305671 | 1626h | 1 | Page 23 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |
| 305672 | 1627h | 1 | Page 24 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |
| 305673 | 1628h | 1 | Page 25 | UINT 16 | 0 = no filter<br>1 = Filter<br>2 = Screen Saver | 0 (no Filter) | X1.0<br>PFx(4) 1.0 |

***IMPORTANT***:

- PFx(0) : in MID version is Read Only, always 1 (Enabled).
- PFx(1) : in MID version is Read Only, always 1 (Home).
- PFx (2) : in MID version is Read Only, always disabled.
- PFx (3) : in MID version is possible to edit between 1 and 2 for PFB and is fixed to 1 for PFA and SFA.
- PFx (4) : in MID version only value 0 and 1 available (no screen saver).

## 4.5 *Serial port configuration*

**Table 4.17 - Modbus function 0x03, 0x04, 0x06 and 0x10**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 308193 | 2000h | 1 | RS485 instrument address | UINT 16 | Value min = 1<br>Value max = 247 | 1 | ALL |
| 308194 | 2001h | 1 | RS485 baud rate | UINT 16 | Value 1 = 9.6 kbps<br>Value 2 = 19.2 kbps<br>Value 3 = 38.4 kbps<br>Value 4 = 57.6 kbps<br>Value 5 = 115.2 kbps | 1 (9.6 kbps) | ALL |
| 308195 | 2002h | 1 | RS485 parity | UINT 16 | Value 1= no parity<br>Value 2 = even parity | 1 (None) | ALL |
| 308196 | 2003h | 1 | RS485 Stop bit | UINT 16 | Value 0 = 1 stop bit (default)<br>Value 1 = 2 stop bit | 0 ( 1 stop bit) | ALL |
| 308197 | 2004h | 1 | RS485 Delay on replay | UINT 16 | Value min = 0<br>Value max = 1000 [ms] | 0 | ALL |

***IMPORTANT***: The number of stop bits is fixed to “1” if parity is EVEN.

## 4.6 *Reset commands*

**Table 4.18 - Modbus function 0x03, 0x04, 0x06 and 0x10**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 316388 | 4003h | 1 | Reset of total energy counters, total run hour counters (lifetime hour counter excluded) and counters offset (no MID) | UINT 16 | Value = 1: command executed<br>Value ≠ 1: no effect | 0 (fixed) | X1.0 |
| 316389 | 4004h | 1 | Reset of partial energy counters and partial run hour counters | UINT 16 | Value = 1: command executed<br>Value ≠ 1: no effect | 0 (fixed) | ALL |
| 316390 | 4005h | 1 | Reset of DMD, and DMD max values | UINT 16 | Value = 1: command executed<br>Value ≠ 1: no effect | 0 (fixed) | ALL |
| 316391 | 4006h | 1 | Reset Tariff Counters | UINT16 | Value = 1: command executed<br>Value ≠ 1: no effect | 0 (fixed) | ALL |
| 316417 | 4020h | 1 | Factory setting (Restore default) | UINT 16 | Write 0x0A0A; after this, there is one second to write 0xC1A0 (into this register) to trigger a “Restore Default”. Restores all parameters to their default and restores wizard (no counter) | | X 1.0<br>PFx(1) 1.0 |

***IMPORTANT***:

- PFx(1) = MID parameters are not reset with this command.
- For these registers the write operation triggers the relative function but the register value does not change. Read value is always 0.
- Reset total is not available for MID versions.

| | Reset total | Reset partial | Reset Tariff | Reset DMDs |
|---|---|---|---|---|
| kWh (+) TOT | X* | | | |
| Kvarh (+) TOT | X* | | | |
| kWh (+) PARTIAL | X* | X | | |
| Kvarh (+) PARTIAL | X* | X | | |
| kWh (-) TOT | X* | | | |
| kvarh (-) TOT | X* | | | |
| kWh (-) PARTIAL | X* | X | | |
| Kvarh (-) PARTIAL | X* | X | | |
| kVAh TOT | X* | | | |
| kVAh PARTIAL | X* | X | | |
| kWh (+) t1 | | | X | |
| kWh (+) t2 | | | X | |
| Run hour meter | X* | | | |
| Run hour meter kWh (-) | X* | | | |
| Run hour meter PARTIAL | X* | X | | |
| Run hour meter kWh (-) PARTIAL | X* | X | | |
| W DMD | | | | X |
| VA DMD | | | | X |
| A DMD | | | | X |
| W DMD MAX | | | | X |
| VA DMD MAX | | | | X |
| A DMD MAX | | | | X |

* = only for non-MID models.

## 4.7 *Offset*

**Table 4.19 - Modbus functions: 0x03, 0x04, 0x06 and 0x10**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 316641 | 4100h | 1 | Enable Offset KWh + tot | UINT16 | Reads as 0, can be written as 0 or 1. (See procedure below) | 0 | X 1.0 |
| 316642 | 4101h | 1 | Enable Offset KWh – tot | UINT16 | Reads as 0, can be written as 0 or 1. (See procedure below) | 0 | X 1.0 |
| 316643 | 4102h | 1 | Enable Offset Kvarh + tot | UINT16 | Reads as 0, can be written as 0 or 1. (See procedure below) | 0 | X 1.0 |
| 316644 | 4103h | 1 | Enable Offset Kvarh - tot | UINT16 | Reads as 0, can be written as 0 or 1. (See procedure below) | 0 | X 1.0 |
| 316645 | 4104h | 1 | Enable Offset KVAh + tot | UINT16 | Reads as 0, can be written as 0 or 1. (See procedure below) | 0 | X 1.0 |

***IMPORTANT***: Registers not available for MID versions versions.

**Table 4.20 - Modbus functions: 0x03, 0x04 and 0x10**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 316897 | 4200h | 4 | Offset KWh + tot | UINT64 | Value min = 0, Value max = 99999999999 (Wh)<br>See procedure below | 0 | X 1.0 |
| 316901 | 4204h | 4 | Offset KWh - tot | UINT64 | Value min = 0, Value max = 99999999999 (Wh)<br>See procedure below | 0 | X 1.0 |
| 316905 | 4208h | 4 | Offset Kvarh + tot | UINT64 | Value min = 0, Value max = 99999999999 (Wh)<br>See procedure below | 0 | X 1.0 |
| 316909 | 420Ch | 4 | Offset Kvarh - tot | UINT64 | Value min = 0, Value max = 99999999999 (Wh)<br>See procedure below | 0 | X 1.0 |
| 316913 | 4210h | 4 | Offset KVAh + tot | UINT64 | Value min = 0, Value max = 99999999999 (Wh)<br>See procedure below | 0 | X 1.0 |

***IMPORTANT***:

- Registers not available for MID versions versions.
- Writing offset procedure: write 1 into Enable Offset register and then, within 3 s, write the relative offset register. The counter is updated and then the offset is written. Time window closes after 3 s.

## 4.8 *Serial number*

**Table 4.21 - Modbus functions: 0x03, 0x04**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 320481 | 5000h | 1 | Letter 1 (from SX)<br>Letter 2 (from SX) | UINT 16 | MSB: ASCII code<br>LSB: ASCII code | | ALL |
| 320482 | 5001h | 1 | Letter 3 (from SX)<br>Letter 4 (from SX) | UINT 16 | MSB: ASCII code<br>LSB: ASCII code | | ALL |
| 320483 | 5002h | 1 | Letter 5 (from SX)<br>Letter 6 (from SX) | UINT 16 | MSB: ASCII code<br>LSB: ASCII code | | ALL |
| 320484 | 5003h | 1 | Letter 7 (from SX)<br>Letter 8 (from SX) | UINT 16 | MSB: ASCII code<br>LSB: ASCII code | | ALL |
| 320485 | 5004h | 1 | Letter 9 (from SX)<br>Letter 10 (from SX) | UINT 16 | MSB: ASCII code<br>LSB: ASCII code | | ALL |
| 320486 | 5005h | 1 | Letter 11 (from SX)<br>Letter 12 (from SX) | UINT 16 | MSB: ASCII code<br>LSB: ASCII code | | ALL |
| 320487 | 5006h | 1 | Letter 13 (from SX) | UINT 16 | MSB: ASCII code<br>LSB: not to be used | | ALL |
| 320488 | 5007h | 1 | Production year | UINT 16 | 4 digits (e.g.: “2020”) | | ALL |

## 4.9 *Device Name*

**Table 4.22 - Modbus functions: 0x03, 0x04, 0x06 and 0x10**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 320489 | 5008h | 1 | Name Configurable | UINT 16 | MSB: ASCII code LSB: ASCII code | 0000h (empty) | ALL |
| 320490 | 5009h | 1 | Name Configurable | UINT 16 | MSB: ASCII code LSB: ASCII code | 0000h (empty) | ALL |
| 320491 | 500Ah | 1 | Name Configurable | UINT 16 | MSB: ASCII code LSB: ASCII code | 0000h (empty) | ALL |
| 320492 | 500Bh | 1 | Name Configurable | UINT 16 | MSB: ASCII code LSB: ASCII code | 0000h (empty) | ALL |
| 320493 | 500Ch | 1 | Name Configurable | UINT 16 | MSB: ASCII code LSB: ASCII code | 0000h (empty) | ALL |
| 320494 | 500Dh | 1 | Name Configurable | UINT 16 | MSB: ASCII code LSB: ASCII code | 0000h (empty) | ALL |
| 320495 | 500Eh | 1 | Name Configurable | UINT 16 | MSB: ASCII code LSB: ASCII code | 0000h (empty) | ALL |
| 320496 | 500Fh | 1 | Name Configurable | UINT 16 | MSB: ASCII code LSB: ASCII code | 0000h (empty) | ALL |

## 4.10 *Device state*

**Table 4.23 - Modbus functions: 0x03, 0x04**

| Modicom address | Physical address | Length [word] | VARIABLE ENG. UNIT | Data Format | Notes | Default | FW |
|---|---|---|---|---|---|---|---|
| 320499 | 5012h | 1 | Device state | UINT 16 | Value 0 = RUN<br>Value 1 = FAULT (prevails on value “2”) | N/A | ALL |
| 320500 | 5013h | 2 | Reserved | UINT32 | Internal use | N/A | N/A |
| 320502 | 5015h | 2 | Reserved | UINT32 | Internal use | N/A | N/A |
| 320504 | 5017h | 2 | Reserved | UINT32 | Internal use | N/A | N/A |
| 320506 | 5019h | 1 | Reserved | UINT16 | Internal use | N/A | N/A |
| 320521 | 5028h | 2 | Reserved | UINT 32 | Internal use | N/A | N/A |
| 320523 | 502Ah | 2 | Reserved | UINT 32 | Internal use | N/A | N/A |
| 320525 | 502Ch | 2 | Reserved | UINT 32 | Internal use | N/A | N/A |
| 320527 | 502Eh | 2 | Reserved | UINT 32 | Internal use | N/A | N/A |
| 320529 | 5030h | 2 | Reserved | UINT 32 | Internal use | N/A | N/A |

# 5 Revisions

| Revisions | Date | Note |
|---|---|---|
| Rev. 1.8 | 23/05/2023 | First released. |
| Rev. 1.9 | 21/06/2023 | Added clearer indication about which parameters are not available / limited on MID versions. |
| Rev. 1.10 | 25/08/2023 | Added new PFA70 and PFB70 models identified by firmware “PFx70”<br>Added register 307h for internal MCU temperature measurement available only on PFx70 models. |
| Rev. 1.11 | 25/09/2023 | Added some details regarding the register 0307h “Internal MCU temperature” and relevant error condition (chapter 3.5). |
| Rev. 1.12 | 17/05/2024 | Added registers 600h and 604h for kWh energy counters with 0.1Wh resolution. |
| Rev. 1.13 | 21/05/2024 | Correction of the table 4.1. |
| Rev. 1.14 | 07/04/2025 | Correction of Modicom address in Tab. 4.13 and 4.20. |