EM530-EM540

COMMUNICATION PROTOCOL

Rev. 1.3

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Summary

1 Introduction

The RS485 serial interface supports the MODBUS (RTU) protocol. In this document only the information necessary to read/write from/to EM500 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 EM500 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:

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

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).

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 14h (1 to 20)	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
Function code	1 byte	83h	
Exception code	1 byte	01h, 02h, 03h, 04h (see note)	

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

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).

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 14h (1 to 20)	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		

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 :

Function code	1 byte	86h	01h: illegal function 02h: illegal data address 03h: illegal data value 04h: slave device failure
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.

Request frame

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

Response frame (correct action)

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

Response frame (incorrect action)

Description	Length	Value	Note
Physical Address	1 byte	1 to F7 (1 to 247)	Possible exception: 01h: illegal function 02h: illegal data address 03h: illegal data value 04h: slave device failure
Function code	1 byte	90h	
Exception code	1 byte	01h, 02h, 03h, 04h	
CRC	2 bytes		

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*

2.7 *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 (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 EM500 interface by connecting the terminal B+ with the terminal T in the last instrument.
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 EM500 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. If a shielded cable is used, connect the shield to GND.

5. The GND should 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.

2.8 *MODBUS timing*

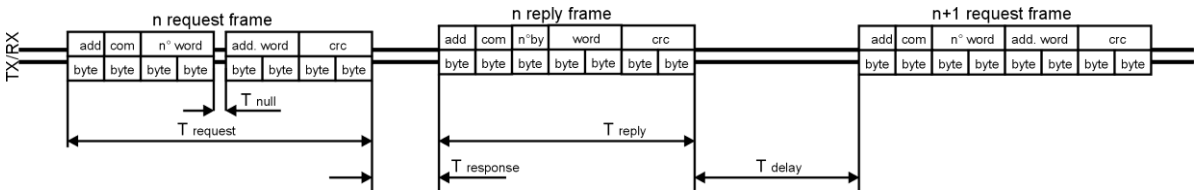


Fig. 1 : 2-wire timing diagram

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*

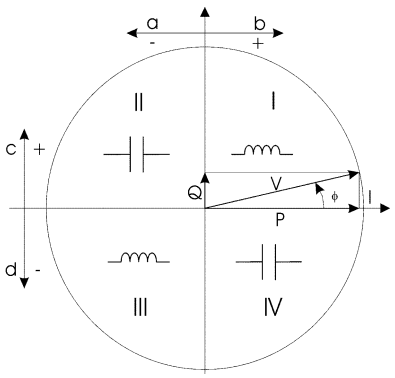
The variables are represented by integers or floating numbers, with 2’s complement notation in case of “signed” format, using the following:

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:



a = Exported active power

b = Imported active power

c = Imported reactive power

d = Exported reactive power

Fig. 2 : Geometric Representation

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".
The overflow indication "EEE" is displayed when the MSW value of the relevant variable is 7FFFh.

4 Part number available

Part Number	Family	SubFamily	Gavazzi Code		FW	Note
			Decimal Format	Hex16 format		
EM530DINAV53XS1X	EM530-IS	X	1744	06D0	X	EM530 with RS485, standard device
EM530DINAV53XS1PFA	EM530-IS	PFA	1745	06D1	PFx	EM530 with RS485, MID Absolute Counter
EM530DINAV53XS1PFB	EM530-IS	PFB	1746	06D2	PFx	EM530 with RS485, MID Counter according to phase sign
EM530DINAV53XS1PFC	EM530-IS	PFC	1747	06D3	PFx	EM530 with RS485, MID Bidirectional Counter
EM540DINAV23XS1X	EM540-IS	X	1760	06E0	X	EM540 with RS485, standard device
EM540DINAV23XS1PFA	EM540-IS	PFA	1761	06E1	PFx	EM540 with RS485, MID Absolute Counter
EM540DINAV23XS1PFB	EM540-IS	PFB	1762	06E2	PFx	EM540 with RS485, MID Counter according to phase sign
EM540DINAV23XS1PFC	EM540-IS	PFC	1763	06E3	PFx	EM540 with RS485, MID Bidirectional Counter

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 notes:

- reading values in addresses not specified in the below tables returns an illegal data address exception;
- writing is not inhibited while user interface is inside a menu, so the last command takes place (display save or serial communication).

4.1 *Instantaneous variables and meters (grouped by variable type)*

***MODBUS**: read only mode with functions code 03 and 04* *Table 4.1-1*

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 sys	INT32	Value weight: Volt*10
300039	0026h	2	V L-L sys	INT32	
300041	0028h	2	W sys	INT32	Value weight: Watt*10
300043	002Ah	2	VA sys	INT32	Value weight: VA*10
300045	002Ch	2	var sys	INT32	Value weight: var*10
300047	002Eh	1	PF L1	INT16	Negative values correspond to exported active power, positive values correspond to imported active power. For L (inductive)/C (capacitive) load indications, see 76h to 79h registers) Value weight: PF*1000
300048	002Fh	1	PF L2	INT16	
300049	0030h	1	PF L3	INT16	
300050	0031h	1	PF sys	INT16	
300051	0032h	1	Phase sequence	INT16	The value –1 corresponds to L1-L3-L2 sequence, the value 1 corresponds to L1-L2-L3 sequence. The phase sequence value is meaningful only in a 3-phase system
300052	0033h	1	Hz	INT16	Value weight: Hz*10
300053	0034h	2	kWh (+) TOT	INT32	Value weight: kWh*10
300055	0036h	2	Kvarh (+) TOT	INT32	Value weight: kvarh*10
300057	0038h	2	W sys DMD	INT32	Value weight: Watt*10
300059	003Ah	2	W sys DMD MAX	INT32	Value weight: Watt*10
300061	003Ch	2	kWh (+) PARTIAL	INT32	Value weight: kWh*10
300063	003Eh	2	Kvarh (+) PARTIAL	INT32	Value weight: kvarh*10
300065	0040h	2	kWh (+) L1	INT32	Value weight: kWh*10
300067	0042h	2	kWh (+) L2	INT32	Value weight: kWh*10
300069	0044h	2	kWh (+) L3	INT32	Value weight: kWh*10
300071	0046h	2	kWh (+) t1.	INT32	Value weight: kWh*10
300073	0048h	2	kWh (+) t2.	INT32	Value weight: kWh*10
300075	004Ah	2	n.a.	INT32	Not available, value =0
300077	004Ch	2	n.a.	INT32	Not available, value =0
300079	004Eh	2	kWh (-) TOT	INT32	Value weight: kWh*10
300081	0050h	2	kvarh (-) TOT	INT32	Value weight: kvarh*10
300083	0052h	2	kWh (-) PARTIAL	INT32	Value weight: kWh*10
300085	0054h	2	Kvarh (-) PARTIAL	INT32	Value weight: kvarh*10
300087	0056h	2	kVAh TOT	INT32	Value weight: kVAh*10
300089	0058h	2	kVAh PARTIAL	INT32	Value weight: kVAh*10
300091	005Ah	2	Run hour meter	INT32	Value weight: hours*100
300093	005Ch	2	Run hour meter kWh (-)	INT32	Value weight: hours*100
300095	005Eh	2	n.a.	INT32	Not available, value =0
300097	0060h	2	n.a.	INT32	Not available, value =0
300099	0062h	2	n.a.	INT32	Not available, value =0
300101	0064h	2	n.a.	INT32	Not available, value =0
300103	0066h	2	n.a.	INT32	Not available, value =0
300105	0068h	2	n.a.	INT32	Not available, value =0
300107	006Ah	2	n.a.	INT32	Not available, value =0
300109	006Ch	2	n.a.	INT32	Not available, value =0
300111	006Eh	2	Run hour meter PARTIAL	INT32	Value weight: hours*100
300113	0070h	2	Run hour meter kWh (-) PARTIAL	INT32	Value weight: hours*100
300115	0072h	1	PF L1**	INT16	** Negative values correspond to lead (C), positive values correspond to lag (L). Value weight: PF*1000
300116	0073h	1	PF L2**	INT16	
300117	0074h	1	PF L3**	INT16	

300118	0075h	1	PF sys**	INT16	
300119	0076h	1	Inductive/Capacitive Load phase 1	INT16	L=+1, C = -1
300120	0077h	1	Inductive/Capacitive Load phase 2	INT16	L=+1, C = -1
300121	0078h	1	Inductive/Capacitive Load phase 3	INT16	L=+1, C = -1
300122	0079h	1	Inductive/Capacitive Load sys	INT16	L=+1, C = -1
300123	007Ah	2	n.a.	INT32	Not available, value =0
300125	007Ch	2	n.a.	INT32	Not available, value =0
300127	007Eh	2	n.a.	INT32	Not available, value =0
300129	0080h	2	n.a.	INT32	Not available, value =0
300131	0082h	2	THD A L1	INT32	Value weight: %*100
300133	0084h	2	THD A L2	INT32	Value weight: %*100
300135	0086h	2	THD A L3	INT32	Value weight: %*100
300137	0088h	2	n.a.	INT32	Not available, value =0
300139	008Ah	2	THD V L1-N	INT32	Value weight: %*100
300141	008Ch	2	THD V L2-N	INT32	Value weight: %*100
300143	008Eh	2	THD V L3-N	INT32	Value weight: %*100
300145	0090h	2	n.a.	INT32	Not available, value =0
300147	0092h	2	THD V L1-L2	INT32	Value weight: %*100
300149	0094h	2	THD V L2-L3	INT32	Value weight: %*100
300151	0096h	2	THD V L3-L1	INT32	Value weight: %*100
300153	0098h	2	An	INT32	Value weight: Ampere*1000
300155	009Ah	2	I1 DMD	INT32	Value weight: Ampere*1000
300157	009Ch	2	I2 DMD	INT32	Value weight: Ampere*1000
300159	009Eh	2	I3 DMD	INT32	Value weight: Ampere*1000
300161	00A0h	2	I1 DMDMAX	INT32	Value weight: Ampere*1000
300163	00A2h	2	I2 DMDMAX	INT32	Value weight: Ampere*1000
300165	00A4h	2	I3 DMDMAX	INT32	Value weight: Ampere*1000
300167	00A6h	2	n.a.	INT32	Not available, value =0
300169	00A8h	2	n.a.	INT32	Not available, value =0
300171	00AAh	2	n.a.	INT32	Not available, value =0
300173	00ACh	2	W1 DMD	INT32	Value weight: Watt*10
300175	00AEh	2	W2 DMD	INT32	Value weight: Watt*10
300177	00B0h	2	W3 DMD	INT32	Value weight: Watt*10
300179	00B2h	2	W1 DMDMAX	INT32	Value weight: Watt*10
300181	00B4h	2	W2 DMDMAX	INT32	Value weight: Watt*10
300183	00B6h	2	W3 DMDMAX	INT32	Value weight: Watt*10
300185	00B8h	2	n.a.	INT32	Not available, value =0
300187	00BAh	2	n.a.	INT32	Not available, value =0
300189	00BCh	2	n.a.	INT32	Not available, value =0
300191	00BEh	2	W sys DMD	INT32	Value weight: Watt*10
300193	00C0h	2	W sys DMD MAX	INT32	Value weight: Watt*10
300195	00C2h	2	n.a.	INT32	Not available, value =0
300197	00C4h	2	n.a.	INT32	Not available, value =0
300199	00C6h	2	n.a.	INT32	Not available, value =0
300201	00C8h	2	n.a.	INT32	Not available, value =0
300203	00CAh	2	n.a.	INT32	Not available, value =0
300205	00CCh	2	n.a.	INT32	Not available, value =0
300207	00CEh	2	n.a.	INT32	Not available, value =0
300209	00D0h	2	n.a.	INT32	Not available, value =0
300211	00D2h	2	n.a.	INT32	Not available, value =0
300213	00D4h	2	n.a.	INT32	Not available, value =0
300215	00D6h	2	VA DMD	INT32	Value weight: VA*10
300217	00D8h	2	VA DMD MAX	INT32	Value weight: VA*10
300219	00DAh	2	n.a.	INT32	Not available, value =0

4.2 *Instantaneous variables and meters (grouped by phase)*

***MODBUS**: read only mode with functions code 03 and 04* *Table 4.2-1*

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
			System variables		
300247	00F6h	2	Run hour meter kWh (-)	INT32	Value weight: hours*100
300249	00F8h	2	An	INT32	Value weight: Ampere*1000
300251	00FAh	2	n.a.	INT32	Not available, value =0
300253	00FCh	2	n.a.	INT32	Not available, value =0
300255	00FEh	2	Run hour meter	INT32	Value weight: hours*100
300257	0100h	2	n.a.	INT32	Not available, value =0
300259	0102h	2	V L-N sys	INT32	Value weight: Volt*10
300261	0104h	2	V L-L sys	INT32	Value weight: Volt*10
300263	0106h	2	W sys	INT32	Value weight: Watt*10
300265	0108h	2	VA sys	INT32	Value weight: VA*10
300267	010Ah	2	var sys	INT32	Value weight: var*10

300269	010Ch	2	PF sys	INT32	(See 31h register note). Value weight: PF*1000
300271	010Eh	2	Phase sequence	INT32	The value –1 corresponds to L1-L3-L2 sequence, the value 1 corresponds to L1-L2-L3 sequence. The phase sequence value is meaningful only in a 3-phase system
300273	0110h	2	Hz	INT32	Value weight: Hz*10
Total energies and DMD power					
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
300282	0119h	1	n.a.	INT32	Not available, value =0
300283	011Ah	2	W sys DMD	INT32	Value weight: Watt*10
300285	011Ch	2	W sys DMD MAX	INT32	Value weight: Watt*10
Phase 1 variables					
300287	011Eh	2	V L1-L2	INT32	Value weight: Volt*10
300289	0120h	2	V L1-N	INT32	Value weight: Volt*10
300291	0122h	2	A L1	INT32	Value weight: Ampere*1000
300293	0124h	2	W L1	INT32	Value weight: Watt*10
300295	0126h	2	VA L1	INT32	Value weight: VA*10
300297	0128h	2	var L1	INT32	Value weight: var*10
300299	012Ah	2	PF L1	INT32	(See 2Eh register note). Value weight: PF*1000
Phase 2 variables					
300301	012Ch	2	V L2-L3	INT32	Value weight: Volt*10
300303	012Eh	2	V L2-N	INT32	Value weight: Volt*10
300305	0130h	2	A L2	INT32	Value weight: Ampere*1000
300307	0132h	2	W L2	INT32	Value weight: Watt*10
300309	0134h	2	VA L2	INT32	Value weight: VA*10
300311	0136h	2	var L2	INT32	Value weight: var*10
300313	0138h	2	PF L2	INT32	(See 2Fh register note). Value weight: PF*1000
Phase 3 variables					
300315	013Ah	2	V L3-L1	INT32	Value weight: Volt*10
300317	013Ch	2	V L3-N	INT32	Value weight: Volt*10
300319	013Eh	2	A L3	INT32	Value weight: Ampere*1000
300321	0140h	2	W L3	INT32	Value weight: Watt*10
300323	0142h	2	VA L3	INT32	Value weight: VA*10
300325	0144h	2	var L3	INT32	Value weight: var*10
300327	0146h	2	PF L3	INT32	(See 30h register note). Value weight: PF*1000
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	kWh (+) L1	INT32	Value weight: kWh*10
300335	014Eh	2	kWh (+) L2	INT32	Value weight: kWh*10
300337	0150h	2	kWh (+) L3	INT32	Value weight: kWh*10
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
300345	0158h	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
300355	0162h	2	n.a.	INT32	Not available, value =0
300357	0164h	2	n.a.	INT32	Not available, value =0
300359	0166h	2	n.a.	INT32	Not available, value =0
300361	0168h	2	n.a.	INT32	Not available, value =0
300363	016Ah	2	n.a.	INT32	Not available, value =0
300365	016Ch	2	n.a.	INT32	Not available, value =0
300367	016Eh	2	n.a.	INT32	Not available, value =0
300369	0170h	2	n.a.	INT32	Not available, value =0
300371	0172h	2	n.a.	INT32	Not available, value =0
300373	0174h	2	n.a.	INT32	Not available, value =0
300375	0176h	2	n.a.	INT32	Not available, value =0
300377	0178h	2	n.a.	INT32	Not available, value =0
300379	017Ah	2	n.a.	INT32	Not available, value =0
300381	017Ch	2	n.a.	INT32	Not available, value =0
300383	017Eh	2	n.a.	INT32	Not available, value =0
Other Phase 1 variables					
300385	0180h	2	THD A L1	INT32	Value weight: %*100
300387	0182h	2	THD V L1-N	INT32	Value weight: %*100
300389	0184h	2	THD V L1-L2	INT32	Value weight: %*100

300391	0186h	2	I1 DMD	INT32	Value weight: Ampere*1000
300393	0188h	2	I1 DMDMAX	INT32	Value weight: Ampere*1000
300395	018Ah	2	n.a.	INT32	Not available, value =0
300397	018Ch	2	W1 DMD	INT32	Value weight: Watt*10
300399	018Eh	2	W1 DMDMAX	INT32	Value weight: Watt*10
300401	0190h	2	n.a.	INT32	Not available, value =0
Other Phase 2 variables					
300403	0192h	2	THD A L2	INT32	Value weight: %*100
300405	0194h	2	THD V L2-N	INT32	Value weight: %*100
300407	0196h	2	THD V L2-L3	INT32	Value weight: %*100
300409	0198h	2	I2 DMD	INT32	Value weight: Ampere*1000
300411	019Ah	2	I2 DMDMAX	INT32	Value weight: Ampere*1000
300413	019Ch	2	n.a.	INT32	Not available, value =0
300415	019Eh	2	W2 DMD	INT32	Value weight: Watt*10
300417	01A0h	2	W2 DMDMAX	INT32	Value weight: Watt*10
300419	01A2h	2	n.a.	INT32	Not available, value =0
Other Phase 3 variables					
300421	01A4h	2	THD A L3	INT32	Value weight: %*100
300423	01A6h	2	THD V L3-N	INT32	Value weight: %*100
300425	01A8h	2	THD V L3-L1	INT32	Value weight: %*100
300427	01AAh	2	I3 DMD	INT32	Value weight: Ampere*1000
300429	01ACh	2	I3 DMDMAX	INT32	Value weight: Ampere*1000
300431	01AEh	2	n.a.	INT32	Not available, value =0
300433	01B0h	2	W3 DMD	INT32	Value weight: Watt*10
300435	01B2h	2	W3 DMDMAX	INT32	Value weight: Watt*10
300437	01B4h	2	n.a.	INT32	Not available, value =0

4.3 *Other Instantaneous variables and meters (read only)*

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
300769	0300h	1	Digital input status	INT16	0 = input open 1 = input closed
300770	0301h	1	Active tariff	INT16	0 = no-one 1 = tariff 1 2 = tariff 2
300774	0305h	1	Reserved	UINT 16	
300775	0306h	1	Alarm status	INT16	0 = not active (including waiting for delay to elapse) 1 = active
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
301297	0510h	4	kWh (+) L1	INT64	Value weight: Wh
301301	0514h	4	kWh (+) L2	INT64	
301305	0518h	4	kWh (+) L3	INT64	
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

Important notes:

- Tables above are equivalent and includes a copy of the same variable values.
- For meters that support also 1-phase and 2-phase systems, the values relevant to phase 2 and 3 can still be read with a valid value, equal to 0

4.4 *Firmware version and revision code*

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 Bit 4..7 = Major (e.g. 01000011b / 43h / 67d = 4.3) LSB: Revision	N/A	ALL
300772	0303h	1	Reserved	UINT 16		N/A	ALL

4.5 *Carlo Gavazzi Controls identification code*

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

4.6 *Programming parameter tables*

4.6.1 *Password configuration menu*

Modbus functions: 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) Max valid value: 9999d	0	ALL

4.6.2 *System configuration menu*

Modbus functions: 0x03, 0x04, 0x06 and 0x10

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
304099	1002h	1	Measuring system	UINT 16	Value 0 = “3Pn” (3-phase with neutral) Value 1 = “3P” (3-phase without neutral) Value 2 = “2P” (2-phase with neutral)	0 (3Pn)	X 1.0 PFx(1) 1.0

Important notes:

- PFx (1) = for MID models, only values 0 and 1 available; other values cause an exception

4.6.3 *CT configuration menu*

Modbus functions: 0x03, 0x04, 0x06 and 0x10

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
304100	1003h	2	Current transformer ratio	UINT 32	Value min = 10 (CT=1,0) Value max = 20000 (CT=2000.0)	10 (CT = 1.0)	X(1) 1.0 PFx(1)(2) 1.0

Important notes:

(1) = for AV2 models, register is not available

(2) = register is read-only

4.6.4 *DMD time calculation*

Modbus functions: 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 Value 1 = 5 min Value 2 = 10 min Value 3 = 15 min Value 4 = 20 min Value 5 = 30 min Value 6 = 60 min	3 (15 min)	ALL

4.6.5 *Output, Alarm and Pulse Output configuration*

Modbus functions: 0x03, 0x04, 0x06 and 0x10

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
304115	*1012h*	*1*	*Reserved*	*UINT 16*			*ALL*
304116	*1013h*	*1*	*Reserved*	*UINT 16*			ALL
304117	1014h	1	Alarm Enable	UINT 16	Value 0 = Disabled Value 1 = Enabled	0 (Disabled)	ALL
304118	1015h	1	Alarm linked	UINT 16	Value 1 = System active power [kW] Value 2 = System apparent power [kVA] Value 3 = System reactive power [kvar] Value 4 = System power factor Value 5 = Phase currents [A] Value 6 = Phase voltages [V] Value 7 = Concatenated voltages [V]	1 (Active power)	ALL
304119	1016h	2	Alarm SetPoint1 (on)	INT 32	Value min -1500000 = -15000,00 Value max +1500000 = +15000.00 Example: value 123 = 1.23	0 (0,00)	ALL
304121	1018h	2	Alarm SetPoint2 (off)	INT 32	Value min -1500000 = -15000,00 Value max +1500000 = +15000.00 Example: value 123 = 1.23	0 (0,00)	ALL
304123	101Ah	1	Delay	UINT 16	Value min 0 = 0 [s] Value max 3600 = 3600 [s]	0[s]	ALL
304124	*101Bh*	*1*	*Reserved*	*UINT 16*			ALL
304125	*101Ch*	*1*	*Reserved*	*UINT 16*			ALL
304126	*101Dh*	*1*	*Reserved*	*UINT 16*			ALL
304127	*101Eh*	*1*	*Reserved*	*UINT 16*			*ALL*
304128	*101Fh*	*1*	*Reserved*	*UINT 16*			*ALL*
304129	*1020h*	*2*	*Reserved*	*UINT 16*			*ALL*

4.6.6 *Tariff enabling*

Modbus functions: 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 Value 1 = ON	1 (ON)	ALL

Notes:

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

4.6.7 *Measure mode*

Modbus functions: 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 ([1])	UINT 16	Value 0 = A mode (Absolute) Value 1 = B mode (Counters accumulation by phase) Value 2 = C mode (Bidirectional)	0 (A mode) ([1])	X 1.0 PFx[1] 1.0

[1] = register is read-only and the default value matches the part number: 0 (A) for PFA, 1 (B) for PFB and 2 (C) for PFC.

4.6.8 *Wrong Connection*

Modbus functions: depends on the register

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
304357	1104h	1	Wrong selection enable	UINT 16	Value 0 = Disabled Value 1 = Enabled Modbus functions: 0x03, 0x04, 0x06 and 0x10	1 (Enabled)	ALL
304357	1105h	1	Wrong selection status	UINT16	Value 0 = Correct Value 1 = Connection error Modbus functions: 0x03, 0x04	N/A (real time calculation)	ALL

4.6.9 *Wizard display configuration*

Modbus functions: 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) Value max = 1 (Enabled menu)	1 (Enabled)	ALL
304363	110Ah	1	*Reserved*	*UINT 16*			ALL

4.6.10 *Hour counter configuration*

Modbus functions: 0x03, 0x04, 0x06 and 0x10

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
304360	110Bh	2	Primary start-up current of run hour counter (I_st_CountH)	UINT 32	Value weight: Ampere*1000 Value min = 10 -- [10mA] Value max = 12000000 [12000A]	10 (10mA)	ALL

4.6.11 *Phase – Terminal Block configuration*

Modbus functions: 0x03, 0x04, 0x06 and 0x10

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
304433	1150h	1	Input 1 Voltage configuration	UINT 16	Value 0 = Terminal Block 1 (default) Value 1 = Terminal Block 1 Value 2 = Terminal Block 2 Value 3 = Terminal Block 3	0 (TB 1)	X 1.0
304434	1151h	1	Input 2 Voltage configuration	UINT 16	Value 0 = Terminal Block 2 (default) Value 1 = Terminal Block 1 Value 2 = Terminal Block 2 Value 3 = Terminal Block 3	0 (TB 2)	X 1.0
304435	1152h	1	Input 3 Voltage configuration	UINT 16	Value 0 = Terminal Block 3 (default) Value 1 = Terminal Block 1 Value 2 = Terminal Block 2 Value 3 = Terminal Block 3	0 (TB 3)	X 1.0
304436	1153h	1	Input 1 Current configuration	UINT 16	Value 0 = Terminal Blocks 1-4 (AV2) or 13-14 (AV5) (default)	0 (TBs 1-4 (AV2) or 13-14 (AV5))	X 1.0

					Value 1 = Terminal Blocks 1-4 (AV2) or 13-14 (AV5) Value 2 = Terminal Blocks 2-5 (AV2) or 15-16 (AV5) Value 3 = Terminal Blocks 3-6 (AV2) or 17-18 (AV5)		
304437	1154h	1	Input 2 Current configuration	UINT 16	Value 0 = Terminal Blocks 2-5 (AV2) or 15-16 (AV5) (default) Value 1 = Terminal Blocks 1-4 (AV2) or 13-14 (AV5) Value 2 = Terminal Blocks 2-5 (AV2) or 15-16 (AV5) Value 3 = Terminal Blocks 3-6 (AV2) or 17-18 (AV5)	0 (TBs 2-5 (AV2) or 15-16 (AV5))	X 1.0
304438	1155h	1	Input 3 Current configuration	UINT 16	Value 0 = Terminal Blocks 3-6 (AV2) or 17-18 (AV5) (default) Value 1 = Terminal Blocks 1-4 (AV2) or 13-14 (AV5) Value 2 = Terminal Blocks 2-5 (AV2) or 15-16 (AV5) Value 3 = Terminal Blocks 3-6 (AV2) or 17-18 (AV5)	0 (TBs 3-6 (AV2) or 17-18 (AV5))	X 1.0
304439	1156h	1	Input 1 Current direction	UINT 16	Value 0 = Direct Value 1 = Inverse	0 (Direct)	X 1.0
304440	1157h	1	Input 2 Current direction	UINT 16	Value 0 = Direct Value 1 = Inverse	0 (Direct)	X 1.0
304441	1158h	1	Input 3 Current direction	UINT 16	Value 0 = Direct Value 1 = Inverse	0 (Direct)	X 1.0

Note: Not Available for MID version

4.6.12 *Digital input and Active Tariff selection*

Modbus functions: 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 Value 1 = only remote status input Value 2 = Partial Meter enabled Value 3 = Reset partial counter	0 (Dig. input)	ALL
304610	1201h	1	Tariff number selection via serial communication	UINT 16	Value 1 = Tariff1 selected Value 2 = Tariff2 selected	1 (Tariff1)	ALL

Notes:

- 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

4.6.13 *Pages filter, Screen Saver and Home Page*

Modbus functions: 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 Value 1 = Enabled	0 (Disabled)	ALL
305634	1601h	1	Inactivity time enable	UINT 16	Value 0 = Disabled Value 1 = Home (goes to home page after timeout and stays there) Value 2 = Slide (goes to home page after timeout and scrolls pages)	1 (Home)	X 1.0 PFx[1] 1.0
305635	1602h	1	Screen Saver time	UINT 16	Value min = 0 (Disabled) Value max = 20 (Seconds)	0 (Disabled)	X 1.0 PFx[2] 1.0
305636	1603h	1	Home page	UINT 16	Value min = 1 (Page 1) Value max = 27 (Page 27)	1 (Page 1)	X 1.0 PFx[3] 1.0
305637	1604h	1	Backlight Time	UINT 16	Value 0 = always ON Value 1 = 1 min Value 2 = 2 min Value 3 = 5 min Value 4 = 10 min Value 5 = 20 min Value 6 = 30 min	0 (Always ON)	ALL

					Value 7 = 60 min Value 8 = always off Restart timing on button press		
	...		*Reserved*	*UINT 16*			
305649	1610h	1	Page 1	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	2 (Screensaver)	X 1.0 PFx[4] 1.0
305650	1611h	1	Page 2	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	1 (filter)	X 1.0 PFx[4] 1.0
305651	1612h	1	Page 3	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no filter)	X 1.0 PFx[4] 1.0
305652	1613h	1	Page 4	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no filter)	X 1.0 PFx[4] 1.0
305653	1614h	1	Page 5	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	2 (screensaver)	X 1.0 PFx[4] 1.0
305654	1615h	1	Page 6	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no filter)	X 1.0 PFx[4] 1.0
305655	1616h	1	Page 7	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	1 (filter)	X 1.0 PFx[4] 1.0
305656	1617h	1	Page 8	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	1 (filter)	X 1.0 PFx[4] 1.0
305657	1618h	1	Page 9	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no filter)	X 1.0 PFx[4] 1.0
305658	1619h	1	Page 10	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no Filter)	X 1.0 PFx[4] 1.0
305659	161Ah	1	Page 11	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no filter)	X 1.0 PFx[4] 1.0
305660	161Bh	1	Page 12	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no filter)	X 1.0 PFx[4] 1.0
305661	161Ch	1	Page 13	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no Filter)	X 1.0 PFx[4] 1.0
305662	161Dh	1	Page 14	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no filter)	X 1.0 PFx[4] 1.0
305663	161Eh	1	Page 15	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no filter)	X 1.0 PFx[4] 1.0
305664	161Fh	1	Page 16	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no Filter)	X 1.0 PFx[4] 1.0
305665	1620h	1	Page 17	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no Filter)	X 1.0 PFx[4] 1.0
305666	1621h	1	Page 18	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no filter)	X 1.0 PFx[4] 1.0
305667	1622h	1	Page 19	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no filter)	X 1.0 PFx[4] 1.0
305668	1623h	1	Page 20	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no filter)	X 1.0 PFx[4] 1.0
305669	1624h	1	Page 21	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no Filter)	X 1.0 PFx[4] 1.0
305670	1625h	1	Page 22	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no Filter)	X 1.0 PFx[4] 1.0

305671	1626h	1	Page 23	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no filter)	X 1.0 PFx(4) 1.0
305672	1627h	1	Page 24	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no filter)	X 1.0 PFx(4) 1.0
305673	1628h	1	Page 25	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	2 (screensaver)	X 1.0 PFx(4) 1.0
305674	1629h	1	Page 26	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no Filter)	X 1.0 PFx(4) 1.0
305675	162Ah	1	Page 27	UINT 16	0 = no filter 1 = Filter 2 = Screen Saver	0 (no Filter)	X 1.0 PFx(4) 1.0

Notes:

- 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 Read Only, always 1
- PFx (4) : in MID version only value 0 and 1 available (no screen saver)

4.7 *Serial port configuration*

Modbus functions: 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 Value max = 247	1	ALL
308194	2001h	1	RS485 baud rate	UINT 16	Value 1 = 9.6 kbps Value 2 = 19.2 kbps Value 3 = 38.4 kbps Value 4 = 57.6 kbps Value 5 = 115.2 kbps	1 (9.6 kbps)	ALL
308195	2002h	1	RS485 parity	UINT 16	Value 1= no parity Value 2 = even parity	1 (None)	ALL
308196	2003h	1	RS485 Stop bit	UINT 16	Value 0 = 1 stop bit (default) Value 1 = 2 stop bit	0 (1 stop bit)	ALL
308197	2004h	1	RS485 Delay on replay	UINT 16	Value min = 0 Value max = 1000 [ms]	0	ALL

Note:

- The number of stop bits is fixed to “1” if parity is EVEN.

4.8 *Reset commands*

Modbus functions: 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 Value ≠ 1: no effect	0 (fixed)	X 1.0
316389	4004h	1	Reset of partial energy counters and partial run hour counters	UINT 16	Value = 1: command executed Value ≠ 1: no effect	0 (fixed)	ALL
316390	4005h	1	Reset of DMD, and DMD max values	UINT 16	Value = 1: command executed Value ≠ 1: no effect	0 (fixed)	ALL
316391	4006h	1	Reset Tariff Counters	UINT16	Value = 1: command executed 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 PFx(1) 1.0

Notes:

- PFx(1) = MID parameters not reset (CT and TOT counters)
- For these registers the write operation triggers the relative function but the register value does not change. Read value is always 0.

	Reset total	Reset partial	Reset DMDs
kWh (+) TOT	X*		
Kvarh (+) TOT	X*		
W sys DMD MAX			X
kWh (+) PARTIAL	X*	X	
Kvarh (+) PARTIAL	X*	X	
kWh (+) L1	X*		
kWh (+) L2	X*		
kWh (+) L3	X*		
kWh (-) TOT	X*		
kvarh (-) TOT	X*		
kWh (-) PARTIAL	X*	X	
Kvarh (-) PARTIAL	X*	X	
kVAh TOT	X*		
kVAh PARTIAL	X*	X	
Run hour meter	X*		
Run hour meter kWh (-)	X*		
Run hour meter PARTIAL	X*	X	
Run hour meter kWh (-) PARTIAL	X*	X	
I1 DMD MAX Value			X
I2 DMD MAX Value			X
I3 DMD MAX Value			X
I1 DMD Value			X
I2 DMD Value			X
I3 DMD Value			X
W1 DMD MAX Value			X
W2 DMD MAX Value			X
W3 DMD MAX Value			X
W1 DMD Value			X
W2 DMD Value			X
W3 DMD Value			X
W sys DMD			X
VA sys DMD			X
var sys DMD			X
W DMD MAX			X
VA DMD MAX			X
var DMD MAX			X

X = available, empty cell = not available

* = only for non-MID models

4.9 *Offset*

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

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) See procedure below	0	X 1.0
316901	4204h	4	Offset KWh - tot	UINT64	Value min = 0, Value max = 99999999999 (Wh) See procedure below	0	X 1.0
316905	4208h	4	Offset Kvarh + tot	UINT64	Value min = 0, Value max = 99999999999 (Wh)	0	X 1.0

					See procedure below			
316909	420Ch	4	Offset Kvarh - tot	UINT64	Value min = 0, Value max = 99999999999 (Wh) See procedure below	0	X	1.0
316657	4210h	4	Offset KVAh + tot	UINT64	Value min = 0, Value max = 99999999999 (Wh) See procedure below	0	X	1.0

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.

4.10 *Serial number*

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) Letter 2 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code		ALL
320482	5001h	1	Letter 3 (from SX) Letter 4 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code		ALL
320483	5002h	1	Letter 5 (from SX) Letter 6 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code		ALL
320484	5003h	1	Letter 7 (from SX) Letter 8 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code		ALL
320485	5004h	1	Letter 9 (from SX) Letter 10 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code		ALL
320486	5005h	1	Letter 11 (from SX) Letter 12 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code		ALL
320487	5006h	1	Letter 13 (from SX)	UINT 16	MSB: ASCII code LSB: not to be used		ALL
320488	5007h	1	Production year	UINT 16	4 digits (e.g.: “2020”)		ALL

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

4.11 *Device state*

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 Value 1 = FAULT (prevails on value “2”) Value 2 = CONFIGURATION ERROR (See Phase – Terminal Block configuration)	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 Changelog

Revisions	Date	Authors	Note
Rev. 1.0	17/Jul/2020	L. Meneguz	First release
Rev. 1.0	20/Jul/2020	L. Meneguz	Added note to register 0x1103
Rev. 1.0	23/Jul/2020	L. Meneguz	Notes formatting
Rev. 1.1	09/Sep/2020	L. Meneguz	Changed phase sequence values
Rev. 1.2	23/Nov/2020	L. Meneguz	Corrected Modicom addresses and document formatting
Rev. 1.3	03/Jun/2021	L. Meneguz	Corrected backlight time (added “always off”)