EM580 Modbus

MODBUS COMMUNICATION PROTOCOL

Public version

Version 1.11

April 8th, 2025

Index

1. Introduction 3
2. Modbus functions 3
2.1 Function 03h (Read Holding Registers) 4
2.2 Function 04h (Read Input Registers) 5
2.3 Function 06h (Write Single Holding Register) 6
2.4 Function 10h (Write multiple registers) 7
2.5 Broadcast mode 8
2.6 Application notes, RS485 general considerations 8
2.7 Modbus timing 8
3. Data Format, Variables and Parameters 9
3.1 Data format representation in Carlo Gavazzi instruments 9
3.2 Geometric representation 9
3.3 Maximum electrical values 10
3.4 Part number available 10
4. Table 11
4.1 Instantaneous variables and meters (grouped by variable type) 11
4.1.1 Instantaneous variables and meters (grouped by variable type) 11
4.1.2 Instantaneous variables and meters (grouped by phase) 12
4.1.3 Other Instantaneous variables and meters (read only) 13
4.1.4 Signed map 14
4.1.5 256-bit signature (S2 model) 15
4.1.6 384-bit signature (S3 model) 15
4.2 Parameter and information 16
4.2.1 Firmware version and revision code 16
4.2.2 Internal Temperature 16
4.2.3 Carlo Gavazzi Controls identification code 16
4.2.4 Password 16
4.2.5 System configuration menu 16
4.2.6 Easy connection 16
4.2.7 Wizard display configuration 17
4.2.8 Backlight configuration 17
4.2.9 Serial port configuration menu 18
4.2.10 Update serial communication setting command 18
4.2.11 Signature type 18
4.2.12 Public key for 256-bit signature 19

4.2.13 Public key for 384-bit signature 19
4.2.14 Public key for 256-bit signature in DER format 20
4.2.15 Public key for 384-bit signature in DER format 21
4.2.16 Reset commands 21
4.2.17 Serial number 22
4.2.18 Device tag 22
4.3 Cable loss 23
4.3.1 Cable loss value 23
4.3.2 Cable loss occurrences used 23
4.3.3 Total Cable loss occurrences 23
4.3.4 Cable Loss Datalogger 23
4.3.5 Cable Loss Row Struct 23
4.3.6 Device state 24
4.3.7 Firmware CRC32 24
4.4 Charging session management 25
4.4.1 Charging session parameters 26
4.4.6 Charging session real time variable 31
4.5 Maintenance Mode: Cable Loss Set Procedure 31
4.5.1 Maintenance Mode Command 31
4.5.2 Timestamp Synchronization Command 31
4.5.3 Cable loss value 31
4.6 Maintenance Mode: Datalogger 32
4.6.1 Cable loss occurrences used 32
4.6.2 Total Cable loss occurrences 32
4.6.3 Cable Loss Datalogger 32
4.6.4 Cable Loss Row Struct 32
4.7 Maintenance Mode: Additional Information 33
4.7.1 Firmware version and revision code 33
4.7.2 Carlo Gavazzi Controls identification code 33
4.7.3 Serial port configuration menu 33
4.7.4 Serial number 34
4.7.5 Device tag 34
4.7.6 Cable loss value 34
4.7.7 Cable loss occurrences used 34
Appendix 35
5. Revisions 37

1. Introduction

The RS485 serial interface supports the Modbus (RTU) protocol. In this document only the information necessary to read/write from/to EM580 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 EM580 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".
  - "**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 2.1 - 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 2.2 - 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 2.3 - Response frame (incorrect action) Function 03h

Description	Length	Value	Note
Physical address	1 byte	1 to F7h (1 to 247)	Possible exception : 01h: illegal function 02h: illegal data address 03h: illegal data value 04h: slave device failure
Function code	1 byte	83h	
Exception code	1 byte	01h, 02h, 03h, 04h (see note)	
CRC	2 bytes	-	

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 2.4 - 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 2.5 - 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 2.6 - Response frame (incorrect action) Function 04h

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.

Table 2.7 - 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 2.8 - 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 2.9 - Response frame (incorrect action) Function 06h

Description	Length	Value	Note
Physical address	1 byte	1 to F7h (1 to 247)	Possible exception : 01h: illegal function 02h: illegal data address 03h: illegal data value 04h: slave device failure
Function code	1 byte	86h	
Exception code	1 byte	01h, 02h, 03h, 04h	
CRC	2 bytes	-	

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 2.10 - 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 2.11 - 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 2.12 - Response frame (Incorrect action) Function 10h

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, 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 ½ W 5% resistor between line B and A) and at the end (in EM580 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 EM580 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

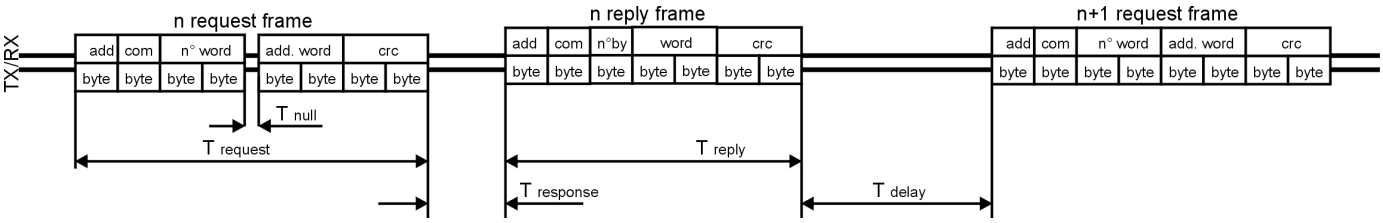


Fig. 1 *:* 2-wire timing diagram

Table 2.13 - 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 representation

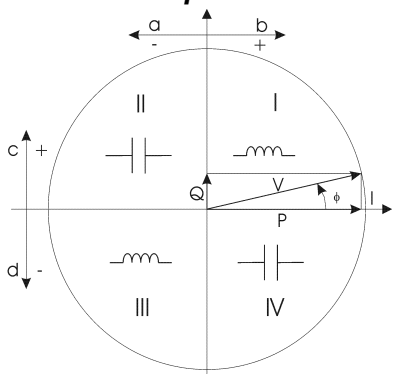
Format	IEC data type	Description	Bits	Range
INT16	INT	Integer	16	- 32768 ... 32767
UINT16	UINT	Unsigned integer	16	0 ... 65535
INT32	DINT	Double integer	32	-2^{31} ... 2^{31}
UINT32	UDINT	Unsigned double integer	32	0 ... 2^{32-1}
UINT64	ULINT	Unsigned long integer	64	0 ... 2^{64-1}
IEEE754 SP		Single-precision floating-point	32	$-(1+[1-2^{-23}])\times 2^{127}$ ... 2^{128}

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

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

3.4 Part number available

Part Number	Family	SubFamily	Gavazzi Code		Note
			Decimal Format	Hex16 format	
EM580DINAV23XS2DEB	EM580-IS	DEB	1840	0730	MID Bidirectional, Bottom connection, 256 bits
EM580DINAV23XS3DEB	EM580-IS	DEB	1841	0731	MID Bidirectional, Bottom connection, 384 bits
EM580DINAV23XS2DET	EM580-IS	DET	1842	0732	MID Bidirectional, Top connection, 256 bits
EM580DINAV23XS3DET	EM580-IS	DET	1843	0733	MID Bidirectional, Top connection, 384 bits
EM580DINAV23XS2DEA	EM580-IS	DEA	1844	0734	MID Absolute, Bottom connection, 256 bits
EM580DINAV23XS3DEA	EM580-IS	DEA	1845	0735	MID Absolute, Bottom connection, 384 bits

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 not inhibited while user interface is inside a menu, so the last command takes place (display save or serial communication).

4. Table

4.1 Instantaneous variables and meters (grouped by variable type)

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 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
…	…	…	…	…	…
300079	004Eh	2	kWh (-) TOT	INT32	Value weight: kWh*10
300081	0050h	2	kvarh (-) TOT	INT32	Value weight: kvarh*10
…	…	…	…	…	…
300087	0056h	2	kVAh TOT	INT32	Value weight: kVAh*10
…	…	…	…	…	…
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

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					
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
…	…	…	…	…	…
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

4.1.3 Other Instantaneous variables and meters (read only)

Table 4.3 - Modbus: read only mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
301281	0500h	4	kWh (+) TOT	INT64	Value weight: Wh
301285	0504h	4	Kvarh (+) TOT	INT64	Value weight: VARh
…	…	…	…	…	…
301309	051Ch	4	kWh (-) TOT	INT64	Value weight: Wh
…	…	…	…	…	…
301317	0524h	4	kvarh (-) TOT	INT64	Value weight: varh
…	…	…	…	…	…
301325	052Ch	4	kVAh TOT	INT64	Value weight: VAh
…	…	…	…	…	…
301341	053Ch	2	Hz	INT32	Value weight: Hz*1000

IMPORTANT:

- 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.

4.1.4 Signed map

Table 4.4 - Modbus: read only mode with functions code 03 and 04 (Mandatory to read whole block)

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
302049	0800h	4	kWh (+) TOT OBIS code	CHAR[8]	Fixed value 0100010800FF0000h which is the representation in byte of OBIS code “1-0:1.8.0*255”.
302053	0804h	1	kWh (+) TOT engineering unit	UINT16	Engineering unit 30 (Wh)
302054	0805h	1	kWh (+) TOT multiplier	INT16	Multiplier = 0 (10^0 = 1 Wh)
302055	0806h	4	kWh (+) TOT	INT64	Value
302059	080Ah	4	kWh (-) TOT OBIS code	CHAR[8]	Fixed value 0100020800FF0000h which is the representation in byte of OBIS code “1-0:2.8.0*255”.
302063	080Eh	1	kWh (-) TOT engineering unit	UINT16	Engineering unit 30 (Wh)
302064	080Fh	1	kWh (-) TOT multiplier	INT16	Multiplier = 0 (10^0 = 1 Wh)
302065	0810h	4	kWh (-) TOT	INT64	Value
302069	0814h	4	Power OBIS code	CHAR[8]	Fixed value 0100010700FF0000h which is the representation in byte of OBIS code “1-0:1.7.0*255”.
302073	0818h	1	Power engineering unit	UINT16	Engineering unit 27 (W)
302074	0819h	1	Power multiplier	INT16	Multiplier = -1 (10^{-1} = 0.1 W)
302075	081Ah	2	Power	INT32	Value
302077	081Ch	4	Cable loss OBIS code	CHAR[8]	Fixed value 0100000A02FF0000h which is the representation in byte of OBIS code “1-0:0.10.2*255”.
302081	0820h	1	Cable loss engineering unit	UINT16	Engineering unit 38 (Ω)
302082	0821h	1	Cable loss multiplier	INT16	Multiplier = -3 (10^{-3} = 0.001 Ω)
302083	0822h	2	Cable loss	INT32	Value
302085	0824h	10	Model	CHAR[20]	Device Model
302095	082Eh	7	Device Serial Number	CHAR[14]	Device Serial Number with the formatting shown in the relevant table.
302102	0835h	8	Device Tag	CHAR[16]	Defined by customer during configuration with the formatting shown in the relevant table.
302110	083Dh	(*)	Signature	CHAR[(*)]	Signature of data starting from kWh (+) TOT Obis code to end of Device Tag.

(*) depend on the signature type, 256 or 384 bits, see following tables.

4.1.5 256-bit signature (S2 model)

Table 4.5 - Modbus: read only mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
302110	083Dh	1	-	UINT16	MSB: most significative byte of signature LSB: 2nd byte of signature
302111	083Eh	1	-	UINT16	MSB: 3rd byte of signature LSB: 4th byte of signature
…	…	…	…	…	…
302141	085Ch	1	-	UINT16	MSB: 31st byte of signature LSB: 32nd byte of signature

IMPORTANT: 256-bit signature is 32 word long, therefore CHAR[64].

4.1.6 384-bit signature (S3 model)

Table 4.6 - Modbus: read only mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
302110	083Dh	1	-	UINT16	MSB: most significative byte of signature LSB: 2nd byte of signature
302111	083Eh	1	-	UINT16	MSB: 3rd byte of signature LSB: 4th byte of signature
…	…	…	…	…	…
302141	086Ch	1	-	UINT16	MSB: 47th byte of signature LSB: 48th byte of signature

IMPORTANT: 384-bit signature is 48 word long, therefore CHAR[96].

4.2 Parameter and information

4.2.1 Firmware version and revision code

Table 4.7 - Modbus: read only mode with functions code 03 and 04 limited to a word at a time

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
300771	0302h	1	Major, Minor and Revision Measure Module	UINT16	MSB: Bit 0..3=Minor Bit 4..7=Major LSB: Revision
300772	0303h	1	Major, Minor and Revision Communication Module	UINT16	MSB: Bit 0..3=Minor Bit 4..7=Major LSB: Revisionì

4.2.2 Internal Temperature

Table 4.8 - Modbus: read only mode with functions code 03 and 04 limited to a word at a time

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
300776	0307h	1	Internal Temperature	INT16	Value weight: Temperarature*10

4.2.3 Carlo Gavazzi Controls identification code

Table 4.9 - Modbus: read only mode with functions code 03 and 04 limited to a word at a time

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
300012	000Bh	1	Carlo Gavazzi Controls identification code	UINT16	-

4.2.4 Password

Table 4.10 - 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	UINT16	Min value: 0d (no password) Max valid value: 9999d	0	

4.2.5 System configuration menu

Table 4.11 - 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	UINT16	Value 0 = “3Pn” (3-phase with neutral) Value 1 = “1P” (1-phase with neutral)	0 (3Pn)	

4.2.6 Easy connection

Table 4.12 - Modbus: functions 0x03, 0x04

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
304356	1103h	1	Easy connection	UINT16	Value 0 = disabled Value 1 = enabled	0	

IMPORTANT: fixed value for each product.

4.2.7 Wizard display configuration

Table 4.13 - 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	UINT16	Value min = 0 (Disabled menu) Value max = 1 (Enabled menu)	1 (Enabled)	ALL

4.2.8 Backlight configuration

Table 4.14 - Modbus: read and write mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
305633	1600h	1	Page Filter	UINT16	Value 0 = Disabled Value 1 = Enabled	0	
305636	1603h	1	Home page	UINT16	Value min = 1 (Page 1) Value max = 2 (Page 2)	1	
305637	1604h	1	Backlight Time	UINT16	Value 0 = Always ON Value 1 = Always OFF Value 2 = 1 min Value 3 = 2 min Value 4 = 3 min Value 5 = 5 min Value 6 = 10 min Value 7 = 20 min Value 8 = 30 min Value 9 = 60 min	ON	
305649	1610h	1	Page 1(*)	UINT16	0 = no filter 1 = Filter	1	
305650	1611h	1	Page 2(*)	UINT16	0 = no filter 1 = Filter	1	
305651	1612h	1	Page 3	UINT16	0 = no filter 1 = Filter	1	
305652	1613h	1	Page 4	UINT16	0 = no filter 1 = Filter	1	
305653	1614h	1	Page 5	UINT16	0 = no filter 1 = Filter	1	
305654	1615h	1	Page 6	UINT16	0 = no filter 1 = Filter	1	
305655	1616h	1	Page 7	UINT16	0 = no filter 1 = Filter	1	
305656	1617h	1	Page 8	UINT16	0 = no filter 1 = Filter	1	
305657	1618h	1	Page 9	UINT16	0 = no filter 1 = Filter	1	
305658	1619h	1	Page 10	UINT16	0 = no filter 1 = Filter	1	
305659	161Ah	1	Page 11	UINT16	0 = no filter 1 = Filter	1	
305660	161Bh	1	Page 12	UINT16	0 = no filter 1 = Filter	1	
305661	161Ch	1	Page 13	UINT16	0 = no filter 1 = Filter	1	
305662	161Dh	1	Page 14	UINT16	0 = no filter 1 = Filter	1	
305663	161Eh	1	Page 15	UINT16	0 = no filter 1 = Filter	1	
305664	161Fh	1	Page 16	UINT16	0 = no filter 1 = Filter	1	

(*) = These pages cannot be filtered, registers are Read Only.

4.2.9 Serial port configuration menu

Table 4.15 - Modbus: read and write mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
308193	2000h	1	RS485 instrument address	UINT16	Value min = 1 Value max = 247	1	
308194	2001h	1	RS485 baud rate	UINT16	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	
308195	2002h	1	RS485 parity	UINT16	Value 1= no parity Value 2 = even parity	1	
308196	2003h	1	Stop bit	UINT16	Value 1= 1 Value 2 = 2	1	
308197	2004h	1	RS485 Delay on replay (ms)	UINT16	Value min = 0 Value max =1000	0	

IMPORTANT: the values are updated only after sending the “update serial communication setting” command or switching off and on the instrument.

4.2.10 Update serial communication setting command

Table 4.16 - Modbus: read and write mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
308209	2010h	1	Update serial communication settings	UINT16	Value = 1: command executed Value ≠ 1: no effect

IMPORTANT: for this register the write operation triggers the relative function but the register value does not change. Read value is always 0.

4.2.11 Signature type

Table 4.17 - Modbus: read only mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
309472	24FFh	1	Signature type	UINT16	0: 256-bit signature 1: 384-bit signature 2: no signature

4.2.12 Public key for 256-bit signature

Table 4.18 - Modbus: read only mode (Mandatory to read whole block with starting address 2500h)

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
309473	2500h	1	-	UINT16	MSB: 04h (constant prefix) LSB: most significative byte of public key
309474	2501h	1	-	UINT16	MSB: 2nd byte of public key LSB: 3rd byte of public key
309475	2502h	1	-	UINT16	MSB: 4th byte of public key LSB: 5th byte of public key
…	…	…	…	…	…
309504	251Fh	1	-	UINT16	MSB: 30th byte of public key LSB: 31st byte of public key
309505	2520h	1	-	UINT16	MSB: 32nd byte of public key LSB: not used (always read as 00h)

4.2.13 Public key for 384-bit signature

Table 4.19 - Modbus: read only mode (Mandatory to read whole block with starting address 2500h)

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
309473	2500h	1	-	UINT16	MSB: 04h (constant prefix) LSB: most significative byte of public key
309474	2501h	1	-	UINT16	MSB: 2nd byte of public key LSB: 3rd byte of public key
309475	2502h	1	-	UINT16	MSB: 4th byte of public key LSB: 5th byte of public key
…	…	…	…	…	…
309520	252Fh	1	-	UINT16	MSB: 46th byte of public key LSB: 47th byte of public key
309521	2530h	1	-	UINT16	MSB: 48th byte of public key LSB: not used (always read as 00h)

4.2.14 Public key for 256-bit signature in DER format

Table 4.20 - Modbus: read only mode (Mandatory to read whole block with starting address 2600h)

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
309729	2600h	1	-	UINT16	MSB: 30h (constant) LSB: 5Ah (number of bytes in DER object)
309730	2601h	1	-	UINT16	MSB: 30h (constant) LSB: 14h (header bytes from this point)
309731	2602h	1	-	UINT16	MSB: 06h (constant) LSB: 07h (sub-header bytes representing ECC standard code)
309732	2603h	1	-	UINT16	2A86h (ECC standard code)
309733	2604h	1	-	UINT16	48CEh (ECC standard code)
309734	2605h	1	-	UINT16	3D02h (ECC standard code)
309735	2606h	1	-	UINT16	MSB: 01h (ECC standard code) LSB: 06h (constant)
309736	2607h	1	-	UINT16	MSB: 09h (sub-header bytes representing curve algorithm code, brainpoolP256r1) LSB: 2Bh (curve standard code)
309737	2608h	1	-	UINT16	2403h (curve standard code)
309738	2609h	1	-	UINT16	0302h (curve standard code)
309739	260Ah	1	-	UINT16	0801h (curve standard code)
309740	260Bh	1	-	UINT16	0107h (curve standard code)
309741	260Ch	1	-	UINT16	MSB: 03h (constant) LSB: 42h (number of bytes from this point)
309742	260Dh	1	-	UINT16	0004h (uncompressed key code)
309743	260Eh	1	-	UINT16	MSB: 1st byte of public key LSB: 2nd byte of public key
309744	260Fh	1	-	UINT16	MSB: 3rt byte of public key LSB: 4th byte of public key
…	…	…	…	…	…
309773	262Ch	1	-	UINT16	MSB: 61st byte of public key LSB: 62nd byte of public key
309774	262Dh	1	-	UINT16	MSB: 63rd byte of public key LSB: 64th byte of public key

4.2.15 Public key for 384-bit signature in DER format

Table 4.21 - Modbus: read only mode (Mandatory to read whole block with starting address 2600)

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
309729	2600h	1	-	UINT16	MSB: 30h (constant) LSB: 7Ah (number of bytes in DER object)
309730	2601h	1	-	UINT16	MSB: 30h (constant) LSB: 14h (header bytes from this point)
309731	2602h	1	-	UINT16	MSB: 06h (constant) LSB: 07h (sub-header bytes representing ECC standard code)
309732	2603h	1	-	UINT16	2A86h (ECC standard code)
309733	2604h	1	-	UINT16	48CEh (ECC standard code)
309734	2605h	1	-	UINT16	3D02h (ECC standard code)
309735	2606h	1	-	UINT16	MSB: 01h (ECC standard code) LSB: 06h (constant)
309736	2607h	1	-	UINT16	MSB: 09h (sub-header bytes representing curve algorithm code, brainpoolP384r1) LSB: 2Bh (curve standard code)
309737	2608h	1	-	UINT16	2403h (curve standard code)
309738	2609h	1	-	UINT16	0302h (curve standard code)
309739	260Ah	1	-	UINT16	0801h (curve standard code)
309740	260Bh	1	-	UINT16	010Bh (curve standard code)
309741	260Ch	1	-	UINT16	MSB: 03h (constant) LSB: 62h (number of bytes from this point)
309742	260Dh	1	-	UINT16	0004h (uncompressed key code)
309743	260Eh	1	-	UINT16	MSB: 1st byte of public key LSB: 2nd byte of public key
309744	260Fh	1	-	UINT16	MSB: 3rt byte of public key LSB: 4th byte of public key
…	…	…	…	…	…
309789	263Ch	1	-	UINT16	MSB: 93th byte of public key LSB: 94th byte of public key
309790	263Dh	1	-	UINT16	MSB: 95th byte of public key LSB: 96th byte of public key

4.2.16 Reset commands

Table 4.22 - Modbus: read and write mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
316417	4020h	1	Factory setting (Restore default)	UINT16	Write 0x0A0A; after this, there are 5 seconds to write 0xC1A0 (into this register) to trigger a “Restore Default”. Restores all parameters to their default and restores wizard (no counter).

IMPORTANT: for these registers the write operation triggers the relative function but the register value does not change. Read value is always 0.

4.2.17 Serial number

Table 4.23 - Modbus: read only mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
320481	5000h	1	Letter 1 (from SX) Letter 2 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320482	5001h	1	Letter 3 (from SX) Letter 4 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320483	5002h	1	Letter 5 (from SX) Letter 6 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320484	5003h	1	Letter 7 (from SX) Letter 8 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320485	5004h	1	Letter 9 (from SX) Letter 10 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320486	5005h	1	Letter 11 (from SX) Letter 12 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320487	5006h	1	Letter 13 (from SX)	UINT16	MSB: ASCII code LSB: not used
320488	5007h	1	Production year	UINT16	4 digits

4.2.18 Device tag

Table 4.24 - Modbus: read and write mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
320489	5008h	1	Letter 1 (from SX) Letter 2 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320490	5009h	1	Letter 3 (from SX) Letter 4 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320491	500Ah	1	Letter 5 (from SX) Letter 6 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320492	500Bh	1	Letter 7 (from SX) Letter 8 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320493	500Ch	1	Letter 9 (from SX) Letter 10 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320494	500Dh	1	Letter 11 (from SX) Letter 12 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320495	500Eh	1	Letter 13 (from SX) Letter 14 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320496	500Fh	1	Letter 15 (from SX) Letter 16 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code

4.3 Cable loss

4.3.1 Cable loss value

Table 4.25 - Modbus: read only mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
320737	5100h	2	Cable loss value	INT32	Cable Loss value in [mΩ], Max value 500 mΩ.

4.3.2 Cable loss occurrences used

Table 4.26 - Modbus: read only mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
324561	5FF0h	1	Number of row already used	INT16	Number of rows of cable Loss datalogger already used.

IMPORTANT: valid only for certified devices.

4.3.3 Total Cable loss occurrences

Table 4.27 - Modbus: read only mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
324562	5FF1h	1	Max entry of cable loss datalogger	UINT16	Max entry of cable loss datalogger for whole device life.

IMPORTANT:

- valid only for certified devices,
- once “Cable loss occurrences used” = “Total Cable loss occurrences” the cable loss procedure is inhibited.

4.3.4 Cable Loss Datalogger

Table 4.28 - Modbus: read only mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
324577	6000h	18	Datalogger row 1	Cable Loss Row Struct	First row of cable loss datalogger struct.
324595	6012h	18	Datalogger row 2	Cable Loss Row Struct	Second row of cable loss datalogger struct.
..	…	…	…	…	…
325459	6372h	18	Datalogger row 49	Cable Loss Row Struct	Last row of cable loss datalogger struct.

IMPORTANT: valid only for certified devices.

4.3.5 Cable Loss Row Struct

Table 4.29 - Modbus: read only mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
	Base +0	1	Record id	UINT16	From 0 to 49
	Base +1	1	Datalogger field	UNIT16	Cable Loss = 99
	Base + 2	4	Timestamp	UINT64	Timestamp, 32 bit and 64bit format
	Base +6	4	Wh positive	UINT64	Wh positive stored still now with the cable loss in this Datalogger row.
	Base + 10	4	Wh negative	UINT64	Wh negative stored still now with the cable loss in this Datalogger row.
	Base + 14	2	Cable loss value	INT32	Cable loss Value used to calculate the energy value staring from previous datalogger row timestamp to current row timestamp.
	Base +16	2	CRC value	UIN32	CRC value of current datalogger row.

4.3.6 Device state

Table 4.30 - Modbus: read only mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
320499	5012h	1	Device state	UINT16	Bit field(*)

(*)Device state bitfield.

Bit of Word	INFO
Bit 0	0 = Below absolute maximum voltage value (V1N) 1 = Over maximum range
Bit 1	0 = Below absolute maximum voltage value (V2N) 1 = Over maximum range
Bit 2	0 = Below absolute maximum voltage value (V3N) 1 = Over maximum range
Bit 3	0 = Below absolute maximum voltage value (V12) 1 = Over maximum range
Bit 4	0 = Below absolute maximum voltage value (V23) 1 = Over maximum range
Bit 5	0 = Below absolute maximum voltage value (V31) 1 = Over maximum range
Bit 6	0 = Below absolute maximum current value (I1) 1 = Over maximum range
Bit 7	0 = Below absolute maximum current value (I2) 1 = Over maximum range
Bit 8	0 = Below absolute maximum current value (I3) 1 = Over maximum range
Bit 9	0 = Frequency within the validity range 1 = Frequency outside the validity range
Bit 10	Reserved
Bit 11	Reserved
Bit 12	0 = EVCS module OK 1 = EVCS module internal fault
Bit 13	0 = Measure module OK 1 = Measure module internal fault
Bit 14	Reserved
Bit 15	Reserved

4.3.7 Firmware CRC32

Table 4.31 - Modbus: read only mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
320513	5020h	2	Firmware CRC32 value Measure	UINT 32	-
320515	5022h	2	Firmware CRC32 value communiction	UINT 32	-

IMPORTANT: valid only for certified devices.

4.4 Charging session management

The following tables report the sequence of commands to manage the charging session.

Before the charging session		
Step	**Command**	**Registers**
1	Send clock synchronization and timezone command (at least every 24h, suggested every 1h)	7031h and 7032h
2	Write tariff (TT field)** (EXAMPLE: "**0,232 EUR/kWh**")	6900h to 697Dh
3	Write long string for visualization on the screen (EXAMPLE: "**Charger ID F1123654**")	697Eh to 699Eh
4	Send confirmation to update visualization on the screen of tariff and long string	69CCh (tariff) 69CDh (long string)
5	Update the 3 short strings to be shown in the idle page, in the charging session page and in the charging session end pages. (EXAMPLES: "**Status: READY**", "**Max 22 kW**")	699Fh to 69B9
6	Select scrolling time and enable visualization of TT field and custom strings in the different pages	69BAh to 69CBh
7	Select transaction ID method (automatically defined by EM580, written by controller)	6F00h

Charging session start		
Step	**Command**	**Registers**
1	Write transaction ID (if not automatically defined by EM580)**	6F01h
2	Write charging session parameters for OCMF file**	From 7000h to 701Ch
3	Send clock synchronization and timezone command (if not already synchronized)	7031h and 7032h
4	Write charging session modality (charging only, vehicle to grid or bidirectional)	7036h
5	Write beginning command "B" (ASCII format)	7040h (As a result 7045h = "1")

Charging session in progress		
Step	**Command**	**Registers**
1	Read kWh+, kWh-, or Duration	7A00h, 7A04h or 7A08h
2	Read real time variables and temperature for diagnostic	See section 4.1 and 4.2.2
3	Update additional strings (EXAMPLES: "**Status: CHARGING**", "**BATTERY: 25%")**	699Fh to 69B9

Charging session end		
Step	**Command**	**Registers**
1	Write "E" (ASCII format)	7040h (As a result 7045h = "2")
2	Read OCMF state to check it's ready	7100h
3	Read OCMF length	7101h
4	Read the OCMF file	From 7110h to 7xxxh (depending on length)
5	Write "0" in OCMF state to confirm the reading of the OCMF file, allow a new charging session and to ensure that no important information is lost.	7100h

****Note**: All and only the standard ASCII (0-127) characters allowed to get OCMF file correctly formatted. See APPENDIX for details on ASCII management.

4.4.1 Charging session parameters

Table 4.32 - Modbus: read and write mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
326881	6900h	126	TT field	ASCII	The first byte after the string shall be put to 0 to identify the EOL (end of line). Writable only outside the charging session	-	1.5.3 onward
327007	697Eh	33	Long custom string	ASCII	The first byte after the string shall be put to 0 to identify the EOL (end of line). Writable only outside the charging session	-	1.5.3 onward
327040	699Fh	9	Custom string 1	ASCII	The first byte after the string shall be put to 0 to identify the EOL (end of line).	-	1.5.3 onward
327049	69A8h	9	Custom string 2	ASCII	The first byte after the string shall be put to 0 to identify the EOL (end of line).	-	1.5.3 onward
327058	69B1h	9	Custom string 3	ASCII	The first byte after the string shall be put to 0 to identify the EOL (end of line).	-	1.5.3 onward
327067	69BAh	1	Time between rotating pages	UINT16	Min. 2, Max. 10 seconds	5 seconds	1.5.3 onward
327068	69BBh	1	Enable long custom string in IDLE	UINT16	0 = Disabled 1 = Enabled	0	1.5.3 onward
327069	69BCh	1	Enable custom string 1 in IDLE	UINT16	0 = Disabled 1 = Enabled	0	1.5.3 onward
327070	69BDh	1	Enable custom string 2 in IDLE	UINT16	0 = Disabled 1 = Enabled	0	1.5.3 onward
327071	69BEh	1	Enable custom string 3 in IDLE	UINT16	0 = Disabled 1 = Enabled	0	1.5.3 onward
327072	69BFh	1	Enable OCMF TT field in IDLE	UINT16	0 = Disabled 1 = Enabled	0	1.5.3 onward
327073	69C0h	1	Enable power page in IDLE	UINT16	0 = Disabled 1 = Enabled	1	1.5.3 onward
327074	69C1h	1	Enable long custom string in CHARGING	UINT16	0 = Disabled 1 = Enabled	0	1.5.3 onward
327075	69C2h	1	Enable custom string 1 in CHARGING	UINT16	0 = Disabled 1 = Enabled	0	1.5.3 onward
327076	69C3h	1	Enable custom string 2 in CHARGING	UINT16	0 = Disabled 1 = Enabled	0	1.5.3 onward
327077	69C4h	1	Enable custom string 3 in CHARGING	UINT16	0 = Disabled 1 = Enabled	0	1.5.3 onward
327078	69C5h	1	Enable OCMF TT field in CHARGING	UINT16	0 = Disabled 1 = Enabled	0	1.5.3 onward
327079	69C6h	1	Enable power page in CHARGING	UINT16	0 = Disabled 1 = Enabled	1	1.5.3 onward
327080	69C7h	1	Enable long custom string in END	UINT16	0 = Disabled 1 = Enabled	0	1.5.3 onward
327081	69C8h	1	Enable custom string 1 in END	UINT16	0 = Disabled 1 = Enabled	0	1.5.3 onward
327082	69C9h	1	Enable custom string 2 in END	UINT16	0 = Disabled 1 = Enabled	0	1.5.3 onward
327083	69CAh	1	Enable custom string 3 in END	UINT16	0 = Disabled 1 = Enabled	0	1.5.3 onward

327084	69CBh	1	Enable OCMF TT field in END	UINT16	0 = Disabled 1 = Enabled	0	1.5.3 onward
3228417	6F00h	1	Transaction ID definition: automatically written by EM580 (0), written by controller (1)	UINT16	The first byte after the string shall be put to 0 to identify the EOL (end of line).	0	1.5.3 onward
3228418	6F01h	7	External transaction ID, in case 6F00h=1 (writable)	ASCII	The first byte after the string shall be put to 0 to identify the EOL (end of line).	0	1.5.3 onward

Table 4.33 Modbus: read and write mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
327085	69CCh	1	TT field update command	UNIT 16	1=Update 0= last update command completed Note: the value automatically return to 0 when update is completed. Writable only outside the charging session	0	1.5.3 onward
327086	69CDh	1	Long string update command	UINT16	1=Update 0= last update command completed Note: the value automatically return to 0 when update is completed. Writable only outside the charging session	0	1.5.3 onward

Table 4.34 - Modbus: read and write mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
328673	7000h	1	OCMF Identification Status	UNIT 16	0 = False 1 = True	-	
328674	7001h	1	OCMF Identification Level(*)	UINT16	See table 10 OCMF spec, values: 0 = “NONE” 1 = ”HEARSAY” 2 = “TRUSTED” 3 = “VERIFIED” 4 = “CERTIFIED” 5 = “SECURE 6 = ”MISMATCH” 7 = “INVALID” 8 = “OUTDATED” 9= “UNKNOWN”	0	
328675	7002h	1	OCMF Identification Flags 1(*)	UINT16	See table12 OCMF spec, values: 0 = RFID_NONE 1 = RFID_PLAIN 2 = RFID_RELATED 3 = RFID_PSK	0	
328676	7003h	1	OCMF Identification Flags 2(*)	UINT16	See table13 OCMF spec, values: 0 = OCPP_NONE 1 = OCPP_RS 2 = OCPP_AUTH 3 = OCPP_RS_TLS 4 = OCPP_AUTH_TLS 5 = OCPP_CACHE 6 = OCPP_WHITELIST 7 = OCPP_CERTIFIED	0	
328677	7004h	1	OCMF Identification Flags 3(*)	UINT16	See table14 OCMF spec, values: 0 = ISO15118_NONE 1 = ISO15118_PNC	0	
328678	7005h	1	OCMF Identification Flags 4(*)	UINT16	See table15 OCMF spec, values: 0 = PLMN_NONE 1 = PLMN_RING 2 = PLMN_SMS	0	

328679	7006h	1	OCMF Identification Type(*)	UINT16	See table16 OCMF spec, values: 0 = NONE 1 = DENIED 2 = UNDEFINED 10 = ISO14443 11 = ISO15693 20 = EMAID 21 = EVCCID 30 = EVCOID 40 = ISO7812 50 = CARD_TXN_NR 60 = CENTRAL 61 = CENTRAL_1 62 = CENTRAL_2 70 = LOCAL 71 = LOCAL_1 72 = LOCAL_2 80 = PHONE_NUMBER 90 = KEY_CODE	0	
328680	7007h	20	OCMF Identification Data(*)	CHAR[40]	The first byte after the string shall be put to 0 to identify the EOL (end of line).	All byte set with 0x00	
328700	701Bh	1	OCMF Charging point identifier type(*)	UINT16	See table17 OCMF spec, values: 0 = EVSEID 1 = CBIDC	0	
328701	701Ch	1	OCMF Charging point identifier	CHAR[40]	The first byte after the string shall be put to 0 to identify the EOL (end of line).	All byte set with 0x00	
…	…	…	…	…	…	…	…
328722	7031h	1	Local time delta in minutes	INT16	Min value: -1440 [minutes] Max value: 1440 [minutes]	-	
328723	7032h	4	UTC Timestamp for synchronization(**)	INT64	Timestamp INT64 format	0	
328727	7036h	1	Display Charging Direction information	UINT16	0 = Charging Vehicle 1 = Vehicle to Grid 2 = Bidirectional	-	

(*) if not set the default value is a correct value and allows to start the charging session.
(**) once a new timestamp is written in this register, the device clock is synchronized.

4.4.2 Charging session command

Table 4.35 - Modbus: read and write mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
328737	7040h	1	OCMF Command	UINT16	See table6 @ field TX of OCMF spec, values: “B” = start transaction “E” = End of transaction “A” = Abort of transaction

This is a command register (read/write), it contains last command received.

4.4.3 Charging session status

Table 4.36 - Modbus: read and write mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
328742	7045h	1	Charging status	UINT16	0 = no charging 1 = charging 2 = end last transaction 3 = end last transaction with error

Table 4.37 - Modbus: read only mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
328753	7050h	1	“Charging session end” duration (s)	UINT16	Value min = 60 Value max =300	300	
328723	7059h	7	Last transaction ID (read only)	ASCII	-	0	1.5.3 onward

4.4.4 Time synchronization status

Table 4.38 - Modbus: read only mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
328769	7060h	1	Time synchronization status	UINT16	0 = Time not synchronized 1 = Time synchronized

4.4.5 OCMF last transaction

Table 4.39 - Modbus: read only mode with functions code 03 and 04

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
328929	7100h	1	OCMF state	UINT16	0 = not ready 1 = running 2 = ready 3 = saved file corrupted
328930	7101h	1	OCMF file length	UINT16	Number of word to read
328931	7102h	2	OCMF last transition id	UINT32	Last transition id finalized
328945	7110h	1	OCMF buff[0] and buff[1]	UINT16	First available word of OCMF file
	…	…	…	….	…
330976	78FFh	1	OCMF buf[3548] and buff[3549]	UINT16	Last available word of OCMF file

4.4.6 Charging session real time variable

Table 4.40 - Modbus: read only mode with functions code 03 and 04

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
331233	7A00h	4	Delta kWh+	UINT64	Value weight: Wh
331237	7A04h	4	Delta kWh-	UINT64	Value weight: Wh
331241	7A08h	4	Duration	UINT64	Value weight: s

4.5 Maintenance Mode: Cable Loss Set Procedure

During the maintenance mode the following maps are the ones active:

- Maintenance Mode: Cable Loss Set Procedure,
- Maintenance Mode: Datalogger,
- Maintenance Mode: Additional Information.

During the 5 seconds after power on is possible sent a Modbus command to put device in maintenance mode. The following three registers are necessary to set the cable loss.

4.5.1 Maintenance Mode Command

Table 4.41 - Modbus: write only mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
312545	3100h	1	Active maintenance mode	UIN16	Every value permitted. After this command the “Maintenance mode” is maintained up to 10 seconds.

4.5.2 Timestamp Synchronization Command

Table 4.42 - Modbus: read and write mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
312546	3101h	4	Timestamp value	UINT64	After this command the “Maintenance mode” is refreshed and maintained up to other 10 seconds.

4.5.3 Cable loss value

Table 4.43 - Modbus: read and write mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
312550	3105h	2	New cable Loss value	UINT32	After this command the “Maintenance mode” is considered complete and the device shall move in “Runtime mode”.

4.6 Maintenance Mode: Datalogger

These registers are always available, from power on of instrument until the end of maintenance mode.

4.6.1 Cable loss occurrences used

Table 4.44 - Modbus: read only mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
312561	3110h	1	Number of row already used	INT16	Number of row of cable Loss datalogger already used.

IMPORTANT: valid only for certified devices.

4.6.2 Total Cable loss occurrences

Table 4.45 - Modbus: read only mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
312562	3111h	1	Max entry of cable lose datalogger	UINT16	Max entry of cable loss datalogger for whole device life.

IMPORTANT:

- valid only for certified devices,
- once “Cable loss occurrences used” = “Total Cable loss occurrences” the cable loss procedure is inhibited.

4.6.3 Cable Loss Datalogger

Table 4.46 - Modbus: read only mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
324577	6000h	18	Datalogger row 0	Cable Loss Row Struct	First row of cable loss datalogger struct.
324595	6012h	18	Datalogger row 1	Cable Loss Row Struct	Second row of cable loss datalogger struct.
..	…	…	…	…	…
325459	6372h	18	Datalogger row 49	Cable Loss Row Struct	Last row of cable loss datalogger struct.

IMPORTANT: valid only for certified devices.

4.6.4 Cable Loss Row Struct

Table 4.47 - Modbus: read only mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
	Base +0	1	Record id	UINT16	From 0 to 49
	Base +1	1	Datalogger field	UNIT16	Cable Loss = 99
	Base + 2	4	Timestamp	UINT64	Timestamp, 32 bit and 64 bit format .
	Base +6	4	Wh positive	UINT64	Last value of Wh (+) TOT counter calculated using the cable loss value that appears in this Datalogger row.
	Base + 10	4	Wh negative	UINT64	Last value of Wh (-) TOT counter calculated using the cable loss value that appears in this Datalogger row.
	Base + 14	2	Cable loss value	INT32	Cable loss value used to calculate the energy values staring from previous datalogger row timestamp up to current datalogger row timestamp.
	Base +16	2	CRC value	UIN32	CRC value of current datalogger row.

4.7 Maintenance Mode: Additional Information

These registers are always available, from power on of instrument until the end of maintenance mode.

4.7.1 Firmware version and revision code

Table 4.48 - Modbus: read only mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
300771	0302h	1	Major, Minor and Revision Measure module	UINT16	MSB: Bit 0..3=Minor Bit 4..7=Major LSB: Revision
300772	0303h	1	Major, Minor and Revision Communication module	UINT16	MSB: Bit 0..3=Minor Bit 4..7=Major LSB: Revision

4.7.2 Carlo Gavazzi Controls identification code

Table 4.49 - Modbus: read only mode with functions code 03 and 04 limited to a word at a time

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
300012	000Bh	1	Carlo Gavazzi Controls identification code	UINT16	-

4.7.3 Serial port configuration menu

Table 4.50 - Modbus: read and write mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
308193	2000h	1	RS485 instrument address	UINT16	Value min = 1 Value max = 247	1	
308194	2001h	1	RS485 baud rate	UINT16	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	
308195	2002h	1	RS485 parity	UINT16	Value 1= no parity Value 2 = even parity	1	
308196	2003h	1	Stop bit	UINT16	Value 1= 1 Value 2 =2	1	

IMPORTANT: the values are automatically updated after exiting maintenance mode.

4.7.4 Serial number

Table 4.51 - Modbus: read only mode

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes
320481	5000h	1	Letter 1 (from SX) Letter 2 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320482	5001h	1	Letter 3 (from SX) Letter 4 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320483	5002h	1	Letter 5 (from SX) Letter 6 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320484	5003h	1	Letter 7 (from SX) Letter 8 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320485	5004h	1	Letter 9 (from SX) Letter 10 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320486	5005h	1	Letter 11 (from SX) Letter 12 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320487	5006h	1	Letter 13 (from SX)	UINT16	MSB: ASCII code LSB: not used
320488	5007h	1	Production year	UINT16	4 digits

4.7.5 Device tag

Table 4.52 - Modbus: read and write mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
320489	5008h	1	Letter 1 (from SX) Letter 2 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320490	5009h	1	Letter 3 (from SX) Letter 4 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320491	500Ah	1	Letter 5 (from SX) Letter 6 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320492	500Bh	1	Letter 7 (from SX) Letter 8 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320493	500Ch	1	Letter 9 (from SX) Letter 10 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320494	500Dh	1	Letter 11 (from SX) Letter 12 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320495	500Eh	1	Letter 13 (from SX) Letter 14 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code
320496	500Fh	1	Letter 15 (from SX) Letter 16 (from SX)	UINT16	MSB: ASCII code LSB: ASCII code

4.7.6 Cable loss value

Table 4.53 - Modbus: read only mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
320737	5100h	2	Cable loss value	INT32	Cable Loss value in [mΩ], Max value 500 mΩ.

4.7.7 Cable loss occurrences used

Table 4.54 - Modbus: read only mode

Modicom address	Physical address	Length [word]	VARIABLE ENG. UNIT	Data Format	Notes
324561	5FF0h	1	Number of row already used	INT16	Number of rows of cable Loss datalogger already used.

Appendix

The following table reports all the ASCII characters, along with their decimal and hexadecimal value, that are available on the screen.

DEC	HEX	Symbol
33	21	!
36	24	$
37	25	%
39	27	'
40	28	(
41	29	)
42	2A	*
43	2B	+
44	2C	,
45	2D	-
46	2E	.
47	2F	/
48	30	0
49	31	1
50	32	2
51	33	3
52	34	4
53	35	5
54	36	6
55	37	7
56	38	8
57	39	9
58	3A	:
60	3C	<
61	3D	=
62	3E	>
63	3F	?
65	41	A
66	42	B
67	43	C
68	44	D
69	45	E
70	46	F
71	47	G
72	48	H
73	49	I
74	4A	J
75	4B	K
76	4C	L
77	4D	M
78	4E	N
79	4F	O
80	50	P

81	51	Q
82	52	R
83	53	S
84	54	T
85	55	U
86	56	V
87	57	W
88	58	X
89	59	Y
90	5A	Z
97	61	a
98	62	b
99	63	c
100	64	d
101	65	e
102	66	f
103	67	g
104	68	h
105	69	i
106	6A	j
107	6B	k
108	6C	l
109	6D	m
110	6E	n
111	6F	o
112	70	p
113	71	q
114	72	r
115	73	s
116	74	t
117	75	u
118	76	v
119	77	w
120	78	x
121	79	y
122	7A	z
128	80	€
156	7D	**£**
157	7E	¥

5. Revisions

Revision	Date	Author	Revision description
1.3	-		Draft
1.4	28/05/2024		First release
1.5	17/09/2024		Pag. 18, par. 4.2.8, tab. 4.14: the values of the backlight time (Mod. Address=305637) in the column “notes” have been corrected.
1.6	23/10/2024		Correction of Modicom addresses at: pag. 24, par. 4.3.4, tab. 4.28; pag. 29, par 4.5.1, tab. 4.39; par. 4.5.2, tab. 4.40; par. 4.5.3, tab. 4.41. Some important information has been added at: pag. 15, par. 4.1.4, tab. 4.4; pag. 26, par. 4.4.
1.7	28/10/2024		Correction of some Modicom addresses
1.8	05/12/2024		New Information about charging session procedure: pag. 26, added information in tables; pag. 27, par. 4.4.1, added new tables, named Table 4.31 and Table 4.33. From those tables on, the numeration has changed, arriving up to Table 4.54. Added APPENDIX section.
1.9	07/01/2025		Pag. 27-28, par 4.4.1, tab. 4.32: Inserted the string “The first byte after the string shall be put to 0 to identify the EOL (end of line)” in column “Notes”. Added Modicom address 6F00h and 6F01h. Corrections in “Default” and “Length (words)” columns. Pag. 29, par 4.4.1, tab. 4.34: Inserted the string “The first byte after the string shall be put to 0 to identify the EOL (end of line)” in “Notes” column. Pag. 31, par. 4.4.3, tab. 4.37: added Modicom address 7059h.
1.10	06/02/2025		Correction of table pag. 37.
1.11	08/04/2025		Correction of table header pag. 20-21, tab. 4.20-4.21.