



EM24_E1

(Ethernet)

COMMUNICATION PROTOCOL

Version 0 Revision 1.2

Index

1	INTRODUCTION.....	3
1.1	Introduction	3
1.2	Modbus functions	3
1.2.1	Function 03h (Read Holding Registers) and 04h (Read Input Registers)	3
1.2.2	Functions 06h (Write Single Holding Register)	3
2	TABLES	4
2.1	Data format representation in Carlo Gavazzi instruments	4
2.1.1	Geometric representation	4
2.2	Maximum and minimum electrical values	4
2.3	Instantaneous variables	5
2.3.1	Instantaneous variables and meters grouped by variable type	5
2.3.2	Instantaneous variables and meters grouped by phase	6
2.4	Information, parameters and status	7
2.4.1	Carlo Gavazzi identification code	7
2.4.2	Firmware version and revision code	7
2.4.3	Serial number	7
2.4.4	Front selector status info	8
2.4.5	Programming parameters table	8
2.4.6	Tariff	10
2.4.7	Communication parameters	10
2.4.8	Current communication configuration	11
2.5	Commands	12
2.5.1	Reset commands	12
3	REVISIONS	13
3.1	Revision 1.0	13
3.2	Revision 1.1	13
3.3	Revision 1.2	13

1 INTRODUCTION

1.1 Introduction

The RJ45 interface supports the Modbus TCP/IP protocol. In this document only the information necessary to read/write from/to EM24-DIN_E1 has been reported (not all the parts of the protocol have been implemented).

For a complete description of the Modbus protocol please refer to www.modbus.org web site.

1.2 Modbus functions

These functions are available on EM24-DIN_E1:

- Reading of n “Holding Registers” (code 03h)
- Reading of n “Input Register” (code 04h)
- Writing of one “Holding Registers” (code 06h)

Notes

- 1) In this document the “Modbus address” field is indicated in two modes:
 - 1.1) “**Modicom address**”: it is the “6-digit Modicom” representation with Modbus function code 04 (Read Input Registers). It is possible to read the same values with function code 03 (Read Holding Registers) replacing the first digit (“3”) with the number “4”.
 - 1.2) “**Physical address**”: it is the “word address” value to be included in the communication frame.
- 2) The functions 03h and 04h have exactly the same effect and can be used indifferently.
- 3) The communication parameters are to be set according to the configuration of the instrument (refer to the instruction manual)

1.2.1 Function 03h (Read Holding Registers) and 04h (Read Input Registers)

These functions are 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) with a single request, when not differently specified.

The register data in the response message are packed as two bytes per register (word), with the binary contents right justified within each byte. For each register, the first byte contains the high order bits (MSB) and the second contains the low order bits (LSB).

1.2.2 Functions 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.

2 TABLES

2.1 Data format representation in Carlo Gavazzi instruments

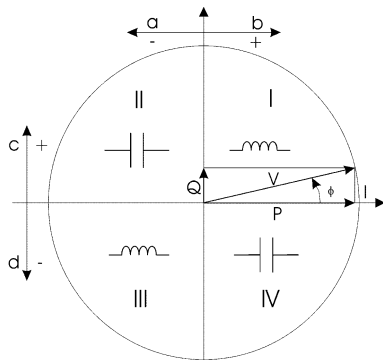
The variables are represented by integers or floating numbers, with 2's complement notation in case of "signed" format, using the following:

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

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

2.1.1 Geometric representation

According to the signs of the power factor, the active power P and the reactive power Q, it is possible to obtain a geometric representation of the power vector, as indicated in the drawing below, according to EN 60253-23:



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

Fig. 1 : Geometric Representation

2.2 Maximum and minimum electrical values

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

	AV2 input option		AV5 input option	
	Max value	Min value	Max value	Min value
VL-N	277V	0	277V	0
VL-L	480V	0	480V	0
A	65A	0	10A	0
VT ratio			See details in 1003h 1005h	1.0
CT ratio				1.0

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

2.3 Instantaneous variables

2.3.1 Instantaneous variables and meters grouped by variable type

MODBUS: read only mode with functions code 03 and 04

Modicon address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
300001	0000h	2	V L1-N	INT32	Value weight: Volt*10	N/A	1.0
300003	0002h	2	V L2-N	INT32		N/A	1.0
300005	0004h	2	V L3-N	INT32		N/A	1.0
300007	0006h	2	V L1-L2	INT32		N/A	1.0
300009	0008h	2	V L2-L3	INT32		N/A	1.0
300011	000Ah	2	V L3-L1	INT32	Value weight: Ampere*1000	N/A	1.0
300013	000Ch	2	A L1	INT32		N/A	1.0
300015	000Eh	2	A L2	INT32		N/A	1.0
300017	0010h	2	A L3	INT32		N/A	1.0
300019	0012h	2	W L1	INT32		N/A	1.0
300021	0014h	2	W L2	INT32	Value weight: Watt*10	N/A	1.0
300023	0016h	2	W L3	INT32		N/A	1.0
300025	0018h	2	VA L1	INT32		N/A	1.0
300027	001Ah	2	VA L2	INT32	Value weight: VA*10	N/A	1.0
300029	001Ch	2	VA L3	INT32		N/A	1.0
300031	001Eh	2	VAR L1	INT32		N/A	1.0
300033	0020h	2	VAR L2	INT32	Value weight: var*10	N/A	1.0
300035	0022h	2	VAR L3	INT32		N/A	1.0
300037	0024h	2	V L-N Σ	INT32		N/A	1.0
300039	0026h	2	V L-L Σ	INT32	Value weight: Volt*10	N/A	1.0
300041	0028h	2	W Σ	INT32		N/A	1.0
300043	002Ah	2	VA Σ	INT32		N/A	1.0
300045	002Ch	2	VAR Σ	INT32	Value weight: var*10	N/A	1.0
300047	002Eh	1	PF L1	INT16		N/A	1.0
300048	002Fh	1	PF L2	INT16		N/A	1.0
300049	0030h	1	PF L3	INT16	Negative values correspond to lead(C), positive value correspond to lag(L) Value weight: PF*1000	N/A	1.0
300050	0031h	1	PF Σ	INT16		N/A	1.0
300051	0032h	1	Phase sequence	INT16		N/A	1.0
300052	0033h	1	Hz	UINT16	Value weight: Hz*10	N/A	1.0
300053	0034h	2	KWh(+) TOT	INT32		N/A	1.0
300055	0036h	2	Kvarh(+) TOT	INT32		N/A	1.0
300057	0038h	2	DMD W Σ	INT32	Value weight: Watt*10	N/A	1.0
300059	003Ah	2	DMD W Σ max	INT32		N/A	1.0
300061	003Ch	2	KWh(+) PAR	INT32		N/A	1.0
300063	003Eh	2	Kvarh(+) PAR	INT32	Value weight: kvarh*10	N/A	1.0
300065	0040h	2	KWh(+) L1	INT32		N/A	1.0
300067	0042h	2	KWh(+) L2	INT32		N/A	1.0
300069	0044h	2	KWh(+) L3	INT32	Value weight: kWh*10	N/A	1.0
300071	0046h	2	KWh(+) T1	INT32		N/A	1.0
300073	0048h	2	KWh(+) T2	INT32		N/A	1.0
300075	004Ah	2	KWh(+) T3	INT32		N/A	1.0
300077	004Ch	2	KWh(+) T4	INT32		N/A	1.0
300079	004Eh	2	KWh(-) TOT	INT32	Value weight: kWh*10	N/A	1.0
300081	0050h	2	Kvarh(-) TOT	INT32		N/A	1.0
300091	005Ah	2	Hour	INT32		N/A	1.0
300111	006Eh	2	Kvarh(+) T1	INT32	Value weight: kvarh*10	N/A	1.0
300113	0070h	2	Kvarh(+) T2	INT32		N/A	1.0
300115	0072h	2	Kvarh(+) T3	INT32		N/A	1.0
300117	0074h	2	Kvarh(+) T4	INT32		N/A	1.0
300119	0076h	2	DMD VA Σ	INT32		N/A	1.0
300121	0078h	2	DMD VA Σ max	INT32	Value weight: VA*10	N/A	1.0
300123	007Ah	2	DMD A max	INT32		N/A	1.0

2.3.2 Instantaneous variables and meters grouped by phase

MODBUS: read only mode with functions code 03 and 04

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
300255	00FEh	2	Hour	INT32	Value weight: hour*100	N/A	1.0
300259	0102h	2	V L-N Σ	INT32	Value weight: Volt*10	N/A	1.0
300261	0104h	2	V L-L Σ	INT32	Value weight: Volt*10	N/A	1.0
300263	0106h	2	W Σ	INT32	Value weight: Watt*10	N/A	1.0
300265	0108h	2	VA Σ	INT32	Value weight: VA*10	N/A	1.0
300267	010Ah	2	VAR Σ	INT32	Value weight: var*10	N/A	1.0
300269	010Ch	1	PF Σ	INT16	Negative values correspond to lead(C), positive value correspond to lag(L) Value weight: PF*1000	N/A	1.0
300271	010Eh	1	Phase sequence	INT16	Value -1 correspond to L1-L3-L2 sequence, value 0 correspond to L1-L2-L3 sequence (this value is meaningful only in case of 3-phase systems)	N/A	1.0
300273	0110h	1	Hz	INT16	Value weight: Hz*10	N/A	1.0
300275	0112h	2	KWh(+) TOT	INT32	Value weight: kWh*10	N/A	1.0
300277	0114h	2	Kvarh(+) TOT	INT32	Value weight: kvarh*10	N/A	1.0
300279	0116h	2	KWh(-) TOT	INT32	Value weight: kWh*10	N/A	1.0
300281	0118h	2	Kvarh(-) TOT	INT32	Value weight: kvarh*10	N/A	1.0
300283	011Ah	2	DMD W Σ	INT32	Value weight: Watt*10	N/A	1.0
300285	011Ch	2	DMD W Σ max	INT32	Value weight: Watt*10	N/A	1.0
300287	011Eh	2	V L1-L2	INT32	Value weight: Volt*10	N/A	1.0
300289	0120h	2	V L1-N	INT32	Value weight: Volt*10	N/A	1.0
300291	0122h	2	A L1	INT32	Value weight: Ampere*1000	N/A	1.0
300293	0124h	2	W L1	INT32	Value weight: Watt*10	N/A	1.0
300295	0126h	2	VA L1	INT32	Value weight: VA*10	N/A	1.0
300297	0128h	2	VAR L1	INT32	Value weight: var*10	N/A	1.0
300299	012Ah	1	PF L1	INT16	Negative values correspond to lead(C), positive value correspond to lag(L) Value weight: PF*1000	N/A	1.0
300301	012Ch	2	V L2-L3	INT32	Value weight: Volt*10	N/A	1.0
300303	012Eh	2	V L2-N	INT32	Value weight: Volt*10	N/A	1.0
300305	0130h	2	A L2	INT32	Value weight: Ampere*1000	N/A	1.0
300307	0132h	2	W L2	INT32	Value weight: Watt*10	N/A	1.0
300309	0134h	2	VA L2	INT32	Value weight: VA*10	N/A	1.0
300311	0136h	2	VAR L2	INT32	Value weight: var*10	N/A	1.0
300313	0138h	1	PF L2	INT16	Negative values correspond to lead(C), positive value correspond to lag(L) Value weight: PF*1000	N/A	1.0
300315	013Ah	2	V L3-L1	INT32	Value weight: Volt*10	N/A	1.0
300317	013Ch	2	V L3-N	INT32	Value weight: Volt*10	N/A	1.0
300319	013Eh	2	A L3	INT32	Value weight: Ampere*1000	N/A	1.0
300321	0140h	2	W L3	INT32	Value weight: Watt*10	N/A	1.0
300323	0142h	2	VA L3	INT32	Value weight: VA*10	N/A	1.0
300325	0144h	2	VAR L3	INT32	Value weight: var*10	N/A	1.0
300327	0146h	1	PF L3	INT16	Negative values correspond to lead(C), positive value correspond to lag(L) Value weight: PF*1000	N/A	1.0
300329	0148h	2	KWh(+) PAR	INT32	Value weight: kWh*10	N/A	1.0
300331	014Ah	2	Kvarh(+) PAR	INT32	Value weight: kvarh*10	N/A	1.0
300333	014Ch	2	KWh(+) L1	INT32	Value weight: kWh*10	N/A	1.0
300335	014Eh	2	KWh(+) L2	INT32	Value weight: kWh*10	N/A	1.0
300337	0150h	2	KWh(+) L3	INT32	Value weight: kWh*10	N/A	1.0
300339	0152h	2	KWh(+) T1	INT32	Value weight: kWh*10	N/A	1.0
300341	0154h	2	KWh(+) T2	INT32	Value weight: kWh*10	N/A	1.0
300343	0156h	2	KWh(+) T3	INT32	Value weight: kWh*10	N/A	1.0
300345	0158h	2	KWh(+) T4	INT32	Value weight: kWh*10	N/A	1.0
300355	0162h	2	Kvarh(+) T1	INT32	Value weight: kvarh*10	N/A	1.0
300357	0164h	2	Kvarh(+) T2	INT32	Value weight: kvarh*10	N/A	1.0
300359	0166h	2	Kvarh(+) T3	INT32	Value weight: kvarh*10	N/A	1.0
300361	0168h	2	Kvarh(+) T4	INT32	Value weight: kvarh*10	N/A	1.0
300379	017Ah	2	DMD VA Σ	INT32	Value weight: VA*10	N/A	1.0
300381	017Ch	2	DMD VA Σ max	INT32	Value weight: VA*10	N/A	1.0
300383	017Eh	2	DMD A max	INT32	Value weight: Ampere*1000	N/A	1.0

2.4 Information, parameters and status

2.4.1 Carlo Gavazzi identification code

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	Default	FW
300012	000Bh	1	Carlo Gavazzi identification code	UINT 16	For a valid request, length must be 1, otherwise the request is forwarded to instantaneous variables	Model dependant (see following table)	1.0

Complete item number	CG identification code
EM24DINAV23XE1X	1648 (0x670)
EM24DINAV23XE1PFA	1649 (0x671)
EM24DINAV23XE1PFB	1650 (0x672)
EM24DINAV53XE1X	1651 (0x673)
EM24DINAV53XE1PFA	1652 (0x674)
EM24DINAV53XE1PFB	1653 (0x675)

2.4.2 Firmware version and revision code

MODBUS: read only mode with functions code 03 and 04

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
300771	0302h	1	Version and revision code of measurement module	UINT 16	Data format: MSB: Bit 0..3 = Minor Bit 4..7 = Major (e.g. 01000011b / 43h / 67d = 4.3) LSB: Revision Example: 101E is 1.0.30	Model dependant	1.0
300772	0303h	1	RESERVED	UINT 16		N/A	1.0
300773	0304h	1	Version and revision code of communication module	UINT 16	Data format: MSB: Bit 0..3 = Minor Bit 4..7 = Major (e.g. 01000011b / 43h / 67d = 4.3) LSB: Revision Example: 101E is 1.0.30	Model dependant	1.0
300774	0305h	1	RESERVED	UINT 16		N/A	1.0
300849	0350h	1	Measurement module firmware CRC	UINT 16		Model dependant	1.0

2.4.3 Serial number

MODBUS: read mode with functions code 03 and 04

Modicom address	Physical address	Length (words)	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	Piece dependant	1.0
320482	5001h	1	Letter 3 (from SX) Letter 4 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	Piece dependant	1.0
320483	5002h	1	Letter 5 (from SX) Letter 6 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	Piece dependant	1.0
320484	5003h	1	Letter 7 (from SX) Letter 8 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	Piece dependant	1.0
320485	5004h	1	Letter 9 (from SX) Letter 10 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	Piece dependant	1.0
320486	5005h	1	Letter 11 (from SX) Letter 12 (from SX)	UINT 16	MSB: ASCII code LSB: ASCII code	Piece dependant	1.0
320487	5006h	1	Letter 13 (from SX)	UINT 16	MSB: ASCII code	Piece dependant	1.0

2.4.4 Front selector status info

MODBUS: read only mode with functions code 03 and 04

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
341217	A100h	1	Front selector status	UINT 16	Value=3: selector locked ("LOCK" position) Value=2: selector unlocked ("1" position) Value=1: selector unlocked ("2" position) Value=0: selector unlocked ("kVARh" position)	N/A	1.0

2.4.5 Programming parameters table

MODBUS: read mode with functions code 03 and 04, write mode with function 0x06

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
304097	1000h	1	PASSWORD	UINT 16	Minimum valid value: 0d Maximum valid value: 9999d	0	1.0
304099	1002h	1	Measuring system	UINT 16	Value=0: "3P.n" Value=1: "3P.1" Value=2: "2P" Value=3: "1P" Value=4: "3P" This register can only be written when selector is NOT in "LOCK" position. Note: PFA and PFB models support 3P.n system only. Writing into these registers generates an illegal data address exception.	0	1.0
304100	1003h	2	Current transformer ratio	UINT 32	Value min = 10 (CT=1.0) Value max = 26150 (CT=2615.0) for MID version, 69750 (CT=6975.0) for non-MID version. These registers can only be written when selector is NOT in "LOCK" position. If CT * VT exceeds limit (2615.0 for MID or 6975.0 for non-MID, an exception is returned even if CT value is inside limits. In case, decrease VT before increasing CT. LSW:MSW Note: for AV2 models, registers are read-only.	10	1.0
304102	1005h	2	Voltage transformer ratio	UINT 32	Value min = 10 (VT=1.0) Value max = 10 (CT=1.0) for MID version, 69750 (CT=6975.0) for non-MID version These registers can only be written when selector is NOT in "LOCK" position. If CT * VT exceeds limit (2615.0 for MID or 6975.0 for non-MID, an exception is returned even if VT value is inside limits. In case, decrease CT before increasing VT. LSW:MSW Note: for AV2 models and MID devices, registers are read-only.	10	1.0
304113	1010h	1	Interval time	UINT 16	Value min = 1 Value max = 30 Note: time is expressed in minutes	15	1.0
304361	1108h	1	Filter span parameter	UINT 16	Value min = 0 Value max = 100	2	1.0
304362	1109h	1	Filter coefficient	UINT 16	Value min = 1 Value max = 32	2 (*2)	1.0
340961	A000h	1	Type of application	UINT 16	Value=0: "A" application Value=1: "B" application Value=2: "C" application Value=3: "D" application Value=4: "E" application Value=5: "F" application Value=6: "G" application Value=7: "H" application Note: • in PFA models, only "A", "B", "C"	1	1.0

					and "G" applications are available; when writing other applications, no exception is returned but "A" application is internally selected; - in PFB models, only "E", "F" and "H" applications are available; when writing other applications, no exception is returned but "E" application is internally selected; - in X models, all applications are available. Note: it is allowed to write this register even in LOCK position (differently from EM24 IS)		
340962	A001h	1	Default page for selector position "LOCK"	UINT 16	See following table for ranges ("MODBUS" column) and details.	3	1.0
340963	A002h	1	Default page for selector position "1"	UINT 16	If selected value is not available for current application, the next valid one in the table (or the first one in case of roll-over) will be used. (*3) (*4)	1	
340964	A003h	1	Default page for selector position "2"	UINT 16		3	
340965	A004h	1	Default page for selector position "kvarh"	UINT 16		3	
340966	A005h	1	ID code of user 1	UINT 16		1	1.0
340967	A006h	1	ID code of user 2	UINT 16	Value min = 1 Value max = 9999	2	
340968	A007h	1	ID code of user 3	UINT 16		3	

(*2) = for applications in which filter cannot be set, the value "4" is used;

(*3) = when application is A or D, exiting the programming menu the parameters are overwritten by the default ones;

(*4) = register 0xA001 is read-only for MID certified devices.

Page number	Line 1	Line 2	Line 3	Application							
				A	B	C	D	E	F	G	H
1	Phase seq.	VLn sys	Hz	#	#	#		#	#	#	#
2	Phase seq.	VLL sys	Hz						x	o	o
3	Tot kWh (+)	W sys dmd	W sys dmd max	x	x	x		x	x	x	x
4	kWh	A dmd max	PAr						x	x	x
5	Tot kvarh (+)	VA sys dmd	VA sys dmd max		#				#	#	#
6	kvarh	VA sys	PAr						x	x	x
7	kWh (+)	t1	W sys dmd			@			@	@	@
8	kWh (+)	t2	W sys dmd			@			@	@	@
9	kWh (+)	t3	W sys dmd			@			@	@	@
10	kWh (+)	t4	W sys dmd			@			@	@	@
11	kvarh (+)	t1	W sys dmd			#, @			#, @	#, @	#, @
12	kvarh (+)	t2	W sys dmd			#, @			#, @	#, @	#, @
13	kvarh (+)	t3	W sys dmd			#, @			#, @	#, @	#, @
14	kvarh (+)	t4	W sys dmd			#, @			#, @	#, @	#, @
15	kWh (+) X	W X	User X				x				
16	kWh (+) Y	W Y	User Y				x				
17	kWh (+) Z	W Z	User Z				x				
18	Total kvarh (-)	VA sys dmd	VA sys dmd max						#		#
19	Total kWh (-)	W sys dmd	W sys dmd max					x	x		x
20	Hours	W sys	PF sys					x	x	x	x
21	Hours	var sys	PF sys					x	x	x	x
22	var L1	var L2	var L3							#	#
23	VA L1	VA L2	VA L3							#	#

24	PF L1	PF L2	PF L3						#	#
25	W L1	W L2	W L3					#	#	#
26	A L1	A L2	A L3			x		x	x	x
27	V L1-2	V L2-3	V L3-1			o			o	o
28	V L1	V L2	V L3		#		x	#	#	#

x = pages available for given application.

= pages not available in case of 3-phase unbalanced system (3P selection).

o = pages not available in case of 1-phase system (1P selection).

@ = the measurement pages relative to tariff (7 to 14) are not displayed when current tariff is 0 (disabled).

2.4.6 Tariff

MODBUS: read mode with functions code 03 and 04, write mode with function 0x06

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
304610	1201h	1	Current tariff	UINT 16	READ: Value=0: tariff disabled Value=1: tariff 1 Value=2: tariff 2 Value=3: tariff 3 Value=4: tariff 4 WRITE: To set a tariff, the value field has to be like following. MSB: 5Ah always; LSB: tariff (value from 0 to 4). When writing a tariff different from current one, all DMD counters are reset. Example: write 5A03h to set the tariff to 3.	0	1.0

2.4.7 Communication parameters

MODBUS: read mode with functions code 03 and 04, write mode with function 0x06

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
308449	2100h	1	Stored IP address (A.B.C.D)	UINT 16	Min. value = 0, max. value = 255.	192	1.0
308450	2101h	1	Stored IP address (A.B.C.D)	UINT 16		168	1.0
308451	2102h	1	Stored IP address (A.B.C.D)	UINT 16	TCP/IP parameters that apply when DHCP is OFF.	1	1.0
308452	2103h	1	Stored IP address (A.B.C.D)	UINT 16		10	1.0
308453	2104h	1	Stored subnet mask (A.B.C.D)	UINT 16	Notes 1 and 2 apply.	255	1.0
308454	2105h	1	Stored subnet mask (A.B.C.D)	UINT 16		255	1.0
308455	2106h	1	Stored subnet mask (A.B.C.D)	UINT 16		255	1.0
308456	2107h	1	Stored subnet mask (A.B.C.D)	UINT 16		0	1.0
308457	2108h	1	Stored default gateway (A.B.C.D)	UINT 16		192	1.0
308458	2109h	1	Stored default gateway (A.B.C.D)	UINT 16		168	1.0
308459	210Ah	1	Stored default gateway (A.B.C.D)	UINT 16		1	1.0
308460	210Bh	1	Stored default gateway (A.B.C.D)	UINT 16		1	1.0
308461	210Ch	1	Modbus TCP/IP port	UINT 16	Min. value = 1, max. value = 9999. Note 2 applies.	502	1.0
308462	210Dh	1	DHCP enabled	UINT 16	Value = 0 (OFF), Value = 1 (ON). Any other value has no effect. Notes 1 and 2 apply.	0	1.0
308463	210Eh	1	Apply TCP/IP changes command	UINT 16	Value = 1 (ON). Any other value has no effect	0	1.0

Note 1: when the DHCP service is enabled, the programmed (stored) IP-Subnet-Gateway parameters are not used to establish the Ethernet communication. These parameters take effect only after that the DHCP service has been disabled.

Note 2: in order that the programmed (stored) parameters take effect, a specific writing command to the physical address 210Eh must be sent.

2.4.8 Current communication configuration

MODBUS: read mode with functions code 03 and 04

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
308465	2110h	1	MAC address (a:b:c:d:e:f)	UINT 16	Min. value = 0, max. value = 255.	Piece dependant	1.0
308466	2111h	1	MAC address (a:b:c:d:e:f)	UINT 16		Piece dependant	1.0
308467	2112h	1	MAC address (a:b:c:d:e:f)	UINT 16		Piece dependant	1.0
308468	2113h	1	MAC address (a:b:c:d:e:f)	UINT 16		Piece dependant	1.0
308469	2114h	1	MAC address (a:b:c:d:e:f)	UINT 16		Piece dependant	1.0
308470	2115h	1	MAC address (a:b:c:d:e:f)	UINT 16		Piece dependant	1.0
308481	2120h	1	Actual IP address (A.B.C.D)	UINT 16	Min. value = 0, max. value = 255. Each value is managed in real-time by DHCP when it is on.	N/A	1.0
308482	2121h	1	Actual IP address (A.B.C.D)	UINT 16		N/A	1.0
308483	2122h	1	Actual IP address (A.B.C.D)	UINT 16		N/A	1.0
308484	2123h	1	Actual IP address (A.B.C.D)	UINT 16		N/A	1.0
308485	2124h	1	Actual subnet mask (A.B.C.D)	UINT 16		N/A	1.0
308486	2125h	1	Actual subnet mask (A.B.C.D)	UINT 16		N/A	1.0
308487	2126h	1	Actual subnet mask (A.B.C.D)	UINT 16		N/A	1.0
308488	2127h	1	Actual subnet mask (A.B.C.D)	UINT 16		N/A	1.0
308489	2128h	1	Actual default gateway (A.B.C.D)	UINT 16		N/A	1.0
308490	2129h	1	Actual default gateway (A.B.C.D)	UINT 16		N/A	1.0
308491	212Ah	1	Actual default gateway (A.B.C.D)	UINT 16		N/A	1.0
308492	212Bh	1	Actual default gateway (A.B.C.D)	UINT 16		N/A	1.0

Note: parameters from 0x2120 to 0x212B are the actual TCP/IP parameters, whether DHCP is off or on.

2.5 Commands

2.5.1 Reset commands

MODBUS: read mode with functions code 03 and 04, write with function 06

Modicom address	Physical address	Length (words)	VARIABLE ENG. UNIT	Data Format	Notes	Default	FW
316386	4001h	1	Reset of total meters (hour counter excluded)	UINT 16	Value=1: Command is executed	0	1.0
316387	4002h	1	Reset of hour counter	UINT 16	Writing other values produce no effects Reading these registers returns 0x00 Total (0x4001) and all (0x4003) meters can only be written when selector is NOT in "LOCK" position.	0	1.0
316388	4003h	1	Reset of all meters (hour counter excluded)	UINT 16		0	1.0
316389	4004h	1	Reset of partial meters	UINT 16		0	1.0
316390	4005h	1	Reset dmd max	UINT 16		0	1.0

Note: the read value of these register is always 0

3 REVISIONS

3.1 Revision 1.0

- First release of the EM24 Ethernet communication protocol

3.2 Revision 1.1

- Added note (*4) for 0xA001 register in paragraph 2.4.5
- Corrected SYS, CT and VT notes in paragraph 2.4.5

3.3 Revision 1.2

- Updated FW revision
- Modify register “A100” note