USER'S MANUAL

Gateway DLMS-MODBUS for LANDIS & GYR E650 with RS485

P/N: GW-DLMS-485-LG

Edition 2.0

MarCom

MARCOM SRL
Tel.: +390458204747
Email: info@marcomweb.it
Via della Metallurgia 11
37139 – Verona (VR)
https://shop.marcomweb.it

Revision Sheet

Release No.	Date	Revision Description
Rev. 0	10/05/14	User's Manual Template and Checklist
Rev. 1	10/06/16	Conversion to new format
Rev. 2	30/01/17	New HomeDLMS page
Rev. 3	28/02/18	New modbus map from version 3.126
Rev. 4	20/05/18	New hardware configuration pages.
Rev. 5	04/06/19	New user login
Rev. 6	03/07/19	Unit of Measure table

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1.0 GENERAL INFORMATION

1.1 System Overview

DLMS (Device Language Message Specification) Protocol is used in meters field and specifically in electric Energy meter to readout consumption and other values. The reference standard is EC 62056.

This standard defines services which permit to read objects, OBIS defined. Inside these objects are mapped running meter values using standard profiles.

By Gateway DLMS-MODBUS is possible to read DLMS energy meter's data using MODBUS RTU or MODBUS TCP protocol. The gateway is completely transparent to DLMS protocol, so user must know only Modbus protocol.

This Gateway version reads data from up to four counters through the RS485 port and provides value to two RS232 port MODBUS RTU slave and on an Ethernet port Modbus TCP Server (up to 3 client connections).

1.2 Features

1.2.1 Connections

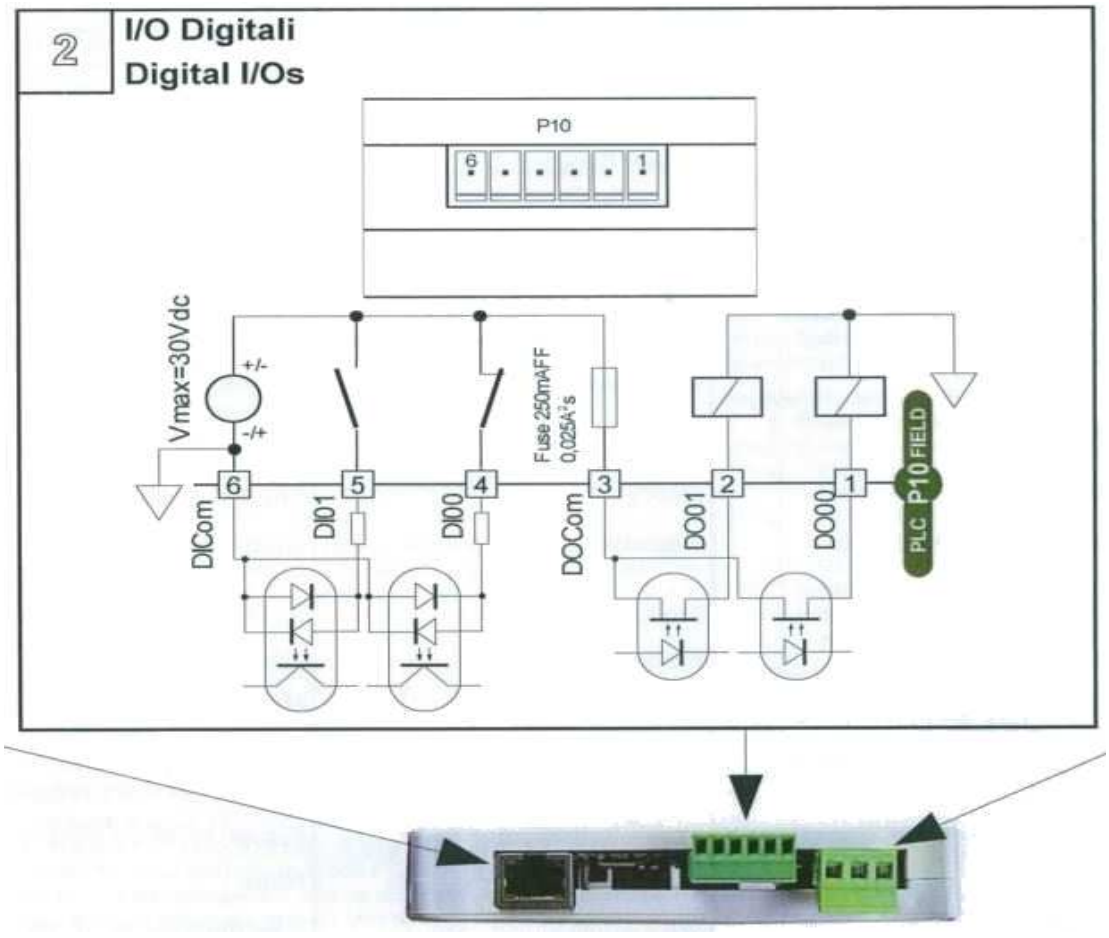
Gateway has following communication ports:

- 2 x Serial RS232 port to read energy meter's data by master Modbus RTU
- 1 x Serial RS485 port to connect up to four energy meters
- 1 x Ethernet port to read Energy meter's data by client Modbus TCP
- 1 screw connector to supply gateway 10-30 VDC (min. 2 W)
- Front Signal LED for communication diagnostic
- 2 x Digital Input (*)
- 2 x Digital Output (*)

(*) Their status is mapped in Modbus registers.

1.2.2 Digital Input connection

The schema of two digital input/output connection is:

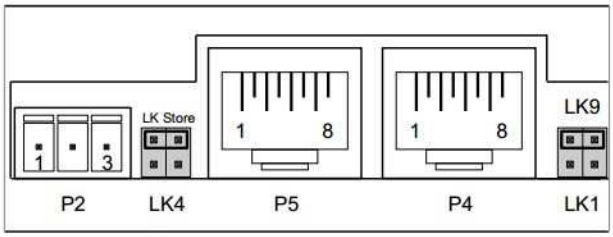


1.2.3 Serial port connections

The schema of serial port connection is:

Porte RS232 e bus di campo

RS232 Ports and Field bus

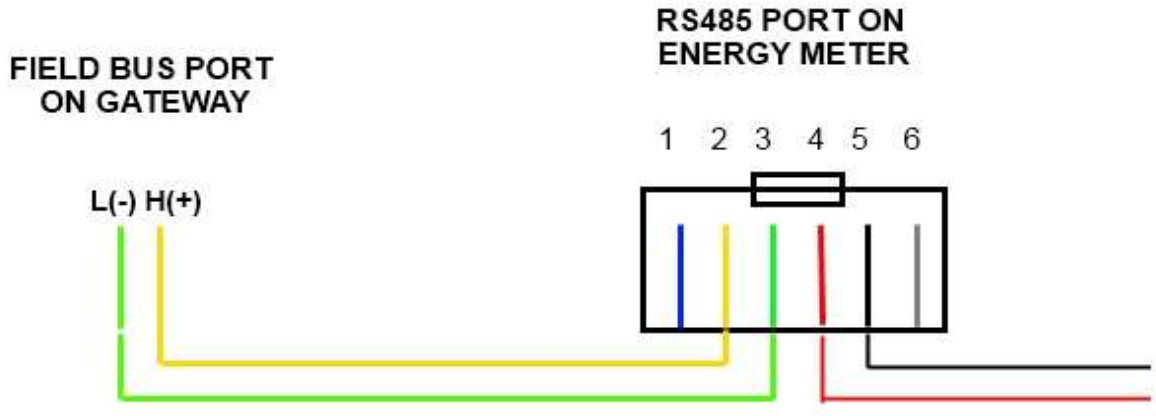


Mode	LK9/LK1
Normal operation	LK9 LK1
Firmware upgrade	LK9 LK1
⚠ **Not allowed!**	LK9 LK1

Field Bus (P2)			RS232 (COM0 P4, COM1 P5)			
	RS485		Pin	Signal	Pin	Signal
	Pin	Signal	1	Not connected	6	TX
	1	D+	2	Not connected	7	CTS
	2	D-	3	DTR	8	RTS
	3	Field GND	4	GND		
LK4	ON= Line Terminated (120 Ohm)		5	RX		

1.2.4 RS485 connection to energy meter

The schema of RS485 serial port connection to energy meter's port:



The energy meters must be connected to L- and H+ screw port. Due to RS485 topology up to 4 meters can be connected on the line.

2.0 CONFIGURATION AND MODBUS MAP

2.1 Web Visualization

To view the web pages containing the data read from the counter you need to connect to the network using the Ethernet RJ45 port available on the gateway. By a web browser, just type the default address **192.168.0.122.**

In case of connection failure ensure that you have on your network card address on a subnet 192.168.0.X.

This brings us to the main screen of the Gateway with the values common to all Meter

From this page, through the links at the top of the page, you can browse web pages that contain the data for the single Meter or go on the configuration pages of the Gateway (*Home PLC*).

2.2 Communication with energy meter

In order to activate communication with energy meter user must insert in proper field **Serial code Meter x** the serial numbers of connected meters.

It's possible to change baud rate of the port connected to meter from **Serial port baud rate selection** in case meter works with speed different from 9600 that usually is standard.
Time between readouts can be set from 10 to 3600 seconds.
String debug is useful to understand the communication with meters.
With **GATEWAY REBOOT** button you can force the gateway to reboot.
The confirmation of the changes is recorded using the *Submit* button.

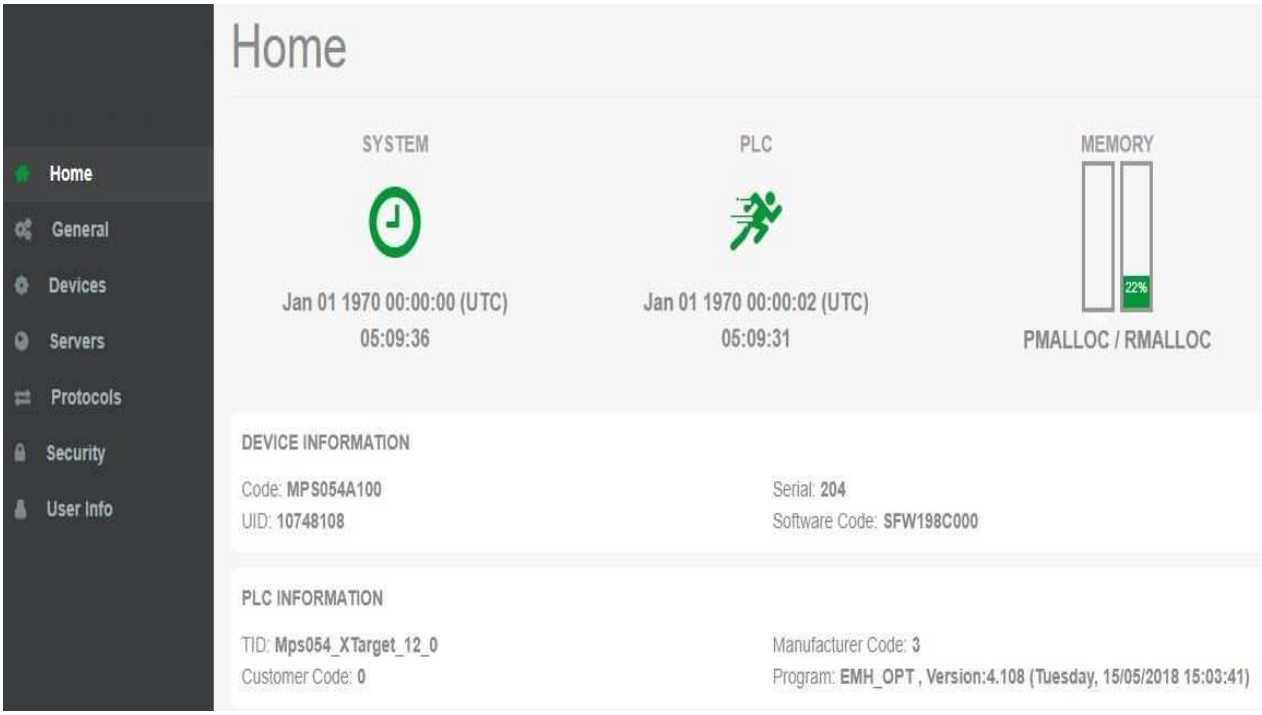
2.3 Gateway Settings

To change the gateway settings, such as IP address, you need access to the configuration pages through the link *HomePLC* in the header of web pages that contain the data read from the counters.

The *Home* page summarizes the main information concerning the gateway as the serial and with the navigation bar on the left you can move between the pages.

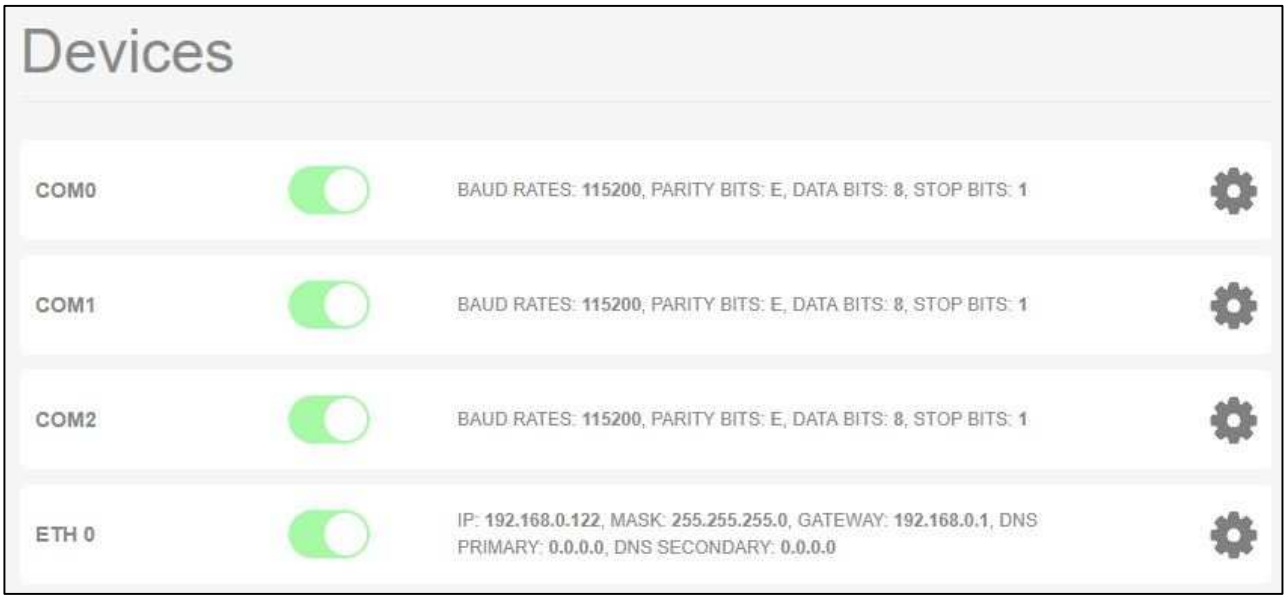
Credentials to login and modify parameters are: Username = **User**, Password = **UserDlms**.

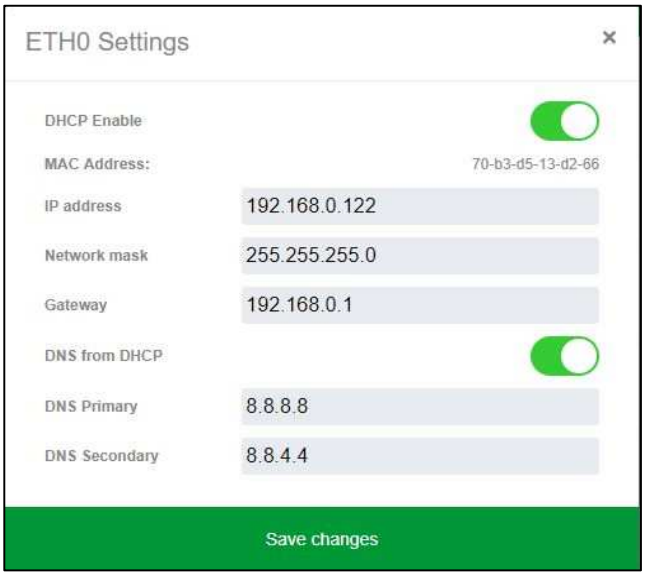
Changes in gateway settings are applied to the gateway after a power reboot.

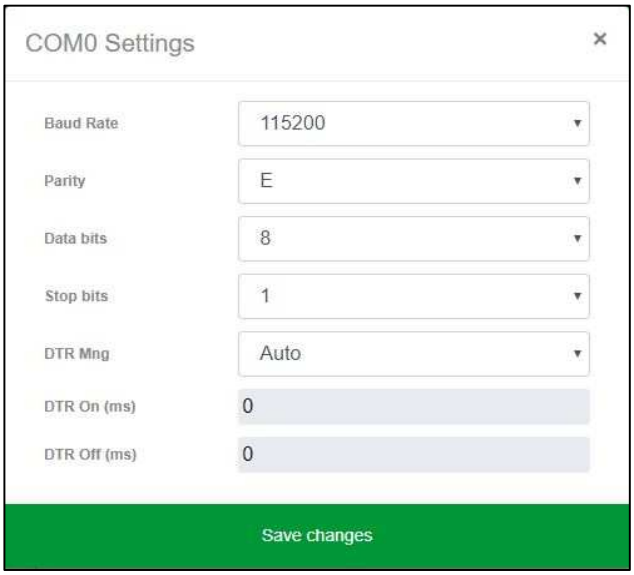


To change the parameters of the serial connections (baud rate, parity) and ethernet, such as the IP address, just go to the *Devices* page and, by clicking on the gear icon for the selected port, a popup will open with the settings.

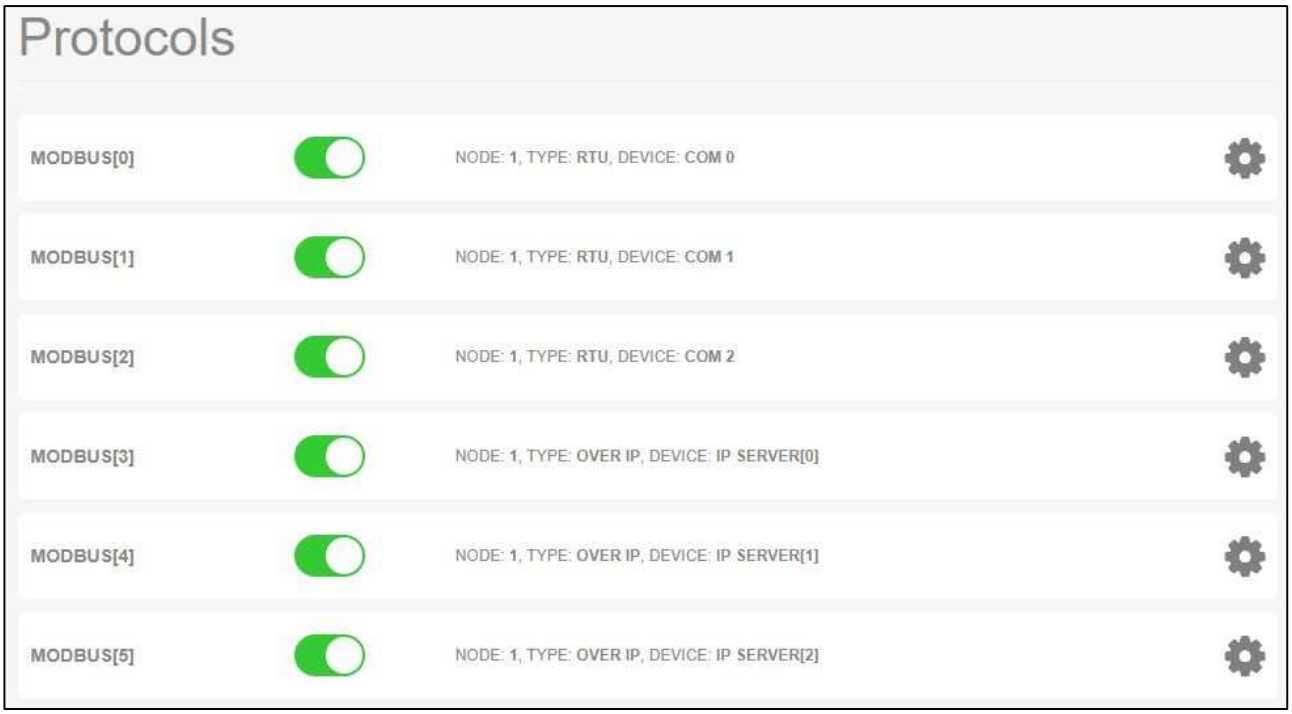
The two RS232 ports are **COM0** and **COM1** while the RS485 port is **COM2**.
Modifications to the **COM2** port are not necessary as the parameters are forced by the software.







To change the modbus node of the RTU or TCP server, open the *Protocols* page and modify the parameters of the desired interface.



2.4 Modbus Mapping Area

The data read from the meters are placed in the Holding Register area.
A copy of the values is also present in the 4x20000 holding register area.
Refresh time of the values is approximately: **Time between readouts** * **N**, where N is the number of energy meters connected to gateway and configured with a serial number different from zero in *HomeDLMS*.
Modbus addresses in the table are base 1; depending on used Modbus master, sometimes is required to swap words to read data correctly.

OBIS INDEX	MODBUS ADDRESS METER 1	MODBUS ADDRESS METER 2	MODBUS ADDRESS METER 3	MODBUS ADDRESS METER 4	DATA TYPE	OBIS NAME	DESCRIPTION
-	4x40000				UINT	DI_00	Digital Input 00
-	4x40001				UINT	DI_01	Digital Input 01
-	4x40002				UINT	DO_00	Digital Output 00
-	4x40003				UINT	DO_01	Digital Output 01
-	4x40004				UDINT	SERIAL 1	Serial Number Meter 1
-	4x40006				UDINT	SERIAL 2	Serial Number Meter 2
-	4x40008				UDINT	SERIAL 3	Serial Number Meter 3
-	4x40010				UDINT	SERIAL 4	Serial Number Meter 4
-	4x40012				FLOAT	INDEX	Index reading meter
-	4x40014				FLOAT	ERROR	Error Number
0	4x40016	4x40216	4x40416	4x40616	DINT	0.9.1	Time: format HHMMSS
1	4x40018	4X40218	4x40418	4x40618	DINT	0.9.2	Date: format YYMMDD
2	4x40020	4x40220	4x40420	4x40620	DINT	0.0.0	Meter Serial Number (read by DLMS)
3	4x40022	4x40222	4x40422	4x40622	FLOAT	0.1.0	Reset Meter Count

4	4x40024	4x40224	4x40424	4x40624	FLOAT	1.8.0	Total Active Energy A+
5	4x40026	4x40226	4x40426	4x40626	FLOAT	1.8.0*	Total Active Energy previous month A +
6	4x40028	4x40228	4x40428	4x40628	FLOAT	1.8.1	Total Active Energy slot 1 A+
7	4x40030	4x40230	4x40430	4x40630	FLOAT	1.8.1*	Total Active Energy slot 1 previous month A +
8	4x40032	4x40232	4x40432	4x40632	FLOAT	1.8.2	Total Active Energy slot 2 A+
9	4x40034	4x40234	4x40434	4x40634	FLOAT	1.8.2*	Total Active Energy slot 2 previous month A +
10	4x40036	4x40236	4x40436	4x40636	FLOAT	1.8.3	Total Active Energy slot 3 A+
11	4x40038	4x40238	4x40438	4x40638	FLOAT	1.8.3*	Total Active Energy slot 3 previous month A +
12	4x40040	4x40240	4x40440	4x40640	FLOAT	1.8.4	Total Active Energy slot 4 A+
13	4x40042	4x40242	4x40442	4x40642	FLOAT	1.8.4*	Total Active Energy slot 4 previous month A +
14	4x40044	4x40244	4x40444	4x40644	FLOAT	2.8.0	Total Active Energy A -
15	4x40046	4x40246	4x40446	4x40646	FLOAT	2.8.0*	Total Active Energy previous month A -
16	4x40048	4x40248	4x40448	4x40648	FLOAT	2.8.1	Total Active Energy slot 1 A -
17	4x40050	4x40250	4x40450	4x40650	FLOAT	2.8.1*	Total Active Energy slot 1 previous month A -
18	4x40052	4x40252	4x40452	4x40652	FLOAT	2.8.2	Total Active Energy slot 2 A -
19	4x40054	4x40254	4x40454	4x40654	FLOAT	2.8.2*	Total Active Energy slot 2 previous month A -
20	4x40056	4x40256	4x40456	4x40656	FLOAT	2.8.3	Total Active Energy slot 3 A -
21	4x40058	4x40258	4x40458	4x40658	FLOAT	2.8.3*	Total Active Energy slot 3 previous month A -
22	4x40060	4x40260	4x40460	4x40660	FLOAT	2.8.4	Total Active Energy slot 4 A -
23	4x40062	4x40262	4x40462	4x40662	FLOAT	2.8.4*	Total Active Energy slot 4 previous month A -
24	4x40064	4x40264	4x40464	4x40664	FLOAT	5.8.0	Reactive total energy QI
25	4x40066	4x40266	4x40466	4x40666	FLOAT	5.8.0*	Reactive total energy previous month QI
26	4x40068	4x40268	4x40468	4x40668	FLOAT	5.8.1	Reactive total energy slot 1 QI
27	4x40070	4x40270	4x40470	4x40670	FLOAT	5.8.1*	Reactive total energy slot 1 previous month QI
28	4x40072	4x40272	4x40472	4x40672	FLOAT	5.8.2	Reactive total energy slot 2 QI
29	4x40074	4x40274	4x40474	4x40674	FLOAT	5.8.2*	Reactive total energy slot 2 previous month QI
30	4x40076	4x40276	4x40476	4x40676	FLOAT	5.8.3	Reactive total energy slot 3 QI
31	4x40078	4x40278	4x40478	4x40678	FLOAT	5.8.3*	Reactive total energy slot 3 previous month QI
32	4x40080	4x40280	4x40480	4x40680	FLOAT	5.8.4	Reactive total energy slot 4 QI
33	4x40082	4x40282	4x40482	4x40682	FLOAT	5.8.4*	Reactive total energy slot 4 previous month QI
34	4x40084	4x40284	4x40484	4x40684	FLOAT	6.8.0	Reactive total energy QII
35	4x40086	4x40286	4x40486	4x40686	FLOAT	6.8.0*	Reactive total energy previous month QII
36	4x40088	4x40288	4x40488	4x40688	FLOAT	6.8.1	Reactive total energy slot 1 QII
37	4x40090	4x40290	4x40490	4x40690	FLOAT	6.8.1*	Reactive total energy slot 1 previous month QII
38	4x40092	4x40292	4x40492	4x40692	FLOAT	6.8.2	Reactive total energy slot 2 QII
39	4x40094	4x40294	4x40494	4x40694	FLOAT	6.8.2*	Reactive total energy slot 2 previous month QII
40	4x40096	4x40296	4x40496	4x40696	FLOAT	6.8.3	Reactive total energy slot 3 QII
41	4x40098	4x40298	4x40498	4x40698	FLOAT	6.8.3*	Reactive total energy slot 3 previous month QII
42	4x40100	4x40300	4x40500	4x40700	FLOAT	6.8.4	Reactive total energy slot 4 QII
43	4x40102	4x40302	4x40502	4x40702	FLOAT	6.8.4*	Reactive total energy slot 4 previous month QII
44	4x40104	4x40304	4x40504	4x40704	FLOAT	7.8.0	Reactive total energy QIII
45	4x40106	4x40306	4x40506	4x40706	FLOAT	7.8.0*	Reactive total energy previous month QIII
46	4x40108	4x40308	4x40508	4x40708	FLOAT	7.8.1	Reactive total energy slot 1 QIII
47	4x40110	4x40310	4x40510	4x40710	FLOAT	7.8.1*	Reactive total energy slot 1 previous month QIII
48	4x40112	4x40312	4x40512	4x40712	FLOAT	7.8.2	Reactive total energy slot 2 QIII
49	4x40114	4x40314	4x40514	4x40714	FLOAT	7.8.2*	Reactive total energy slot 2 previous month QIII
50	4x40116	4x40316	4x40516	4x40716	FLOAT	7.8.3	Reactive total energy slot 3 QIII
51	4x40118	4x40318	4x40518	4x40718	FLOAT	7.8.3*	Reactive total energy slot 3 previous month QIII

52	4x40120	4x40320	4x40520	4x40720	FLOAT	7.8.4	Reactive total energy slot 4 QIII
53	4x40122	4x40322	4x40522	4x40722	FLOAT	7.8.4*	Reactive total energy slot 4 previous month QIII
54	4x40124	4x40324	4x40524	4x40724	FLOAT	8.8.0	Reactive total energy QIV
55	4x40126	4x40326	4x40526	4x40726	FLOAT	8.8.0*	Reactive total energy previous month QIV
56	4x40128	4x40328	4x40528	4x40728	FLOAT	8.8.1	Reactive total energy slot 1 QIV
57	4x40130	4x40330	4x40530	4x40730	FLOAT	8.8.1*	Reactive total energy slot 1 previous month QIV
58	4x40132	4x40332	4x40532	4x40732	FLOAT	8.8.2	Reactive total energy slot 2 QIV
59	4x40134	4x40334	4x40534	4x40734	FLOAT	8.8.2*	Reactive total energy slot 2 previous month QIV
60	4x40136	4x40336	4x40536	4x40736	FLOAT	8.8.3	Reactive total energy slot 3 QIV
61	4x40138	4x40338	4x40538	4x40738	FLOAT	8.8.3*	Reactive total energy slot 3 previous month QIV
62	4x40140	4x40340	4x40540	4x40740	FLOAT	8.8.4	Reactive total energy slot 4 QIV
63	4x40142	4x40342	4x40542	4x40742	FLOAT	8.8.4*	Reactive total energy slot 4 previous month QIV
64	4x40144	4x40344	4x40544	4x40744	FLOAT	1.6.1	Power max slot 1 A +
65	4x40146	4x40346	4x40546	4x40746	FLOAT	1.6.1*	Power max slot 1 previous month A +
66	4x40148	4x40348	4x40548	4x40748	FLOAT	1.6.2	Power max slot 2 A +
67	4x40150	4x40350	4x40550	4x40750	FLOAT	1.6.2*	Power max slot 2 previous month A +
68	4x40152	4x40352	4x40552	4x40752	FLOAT	1.6.3	Power max slot 3 A +
69	4x40154	4x40354	4x40554	4x40754	FLOAT	1.6.3*	Power max slot 3 previous month A +
70	4x40156	4x40356	4x40556	4x40756	FLOAT	1.6.4	Power max slot 4 A +
71	4x40158	4x40358	4x40558	4x40758	FLOAT	1.6.4*	Power max slot 4 previous month A +
72	4x40160	4x40360	4x40560	4x40760	FLOAT	2.6.1	Power max slot 1 A -
73	4x40162	4x40362	4x40562	4x40762	FLOAT	2.6.1*	Power max slot 1 previous month A -
74	4x40164	4x40364	4x40564	4x40764	FLOAT	2.6.2	Power max slot 2 A -
75	4x40166	4x40366	4x40566	4x40766	FLOAT	2.6.2*	Power max slot 2 previous month A -
76	4x40168	4x40368	4x40568	4x40768	FLOAT	2.6.3	Power max slot 3 A -
77	4x40170	4x40370	4x40570	4x40770	FLOAT	2.6.3*	Power max slot 3 previous month A -
78	4x40172	4x40372	4x40572	4x40772	FLOAT	2.6.4	Power max slot 4 A -
79	4x40174	4x40374	4x40574	4x40774	FLOAT	2.6.4*	Power max slot 4 previous month A -
80	4x40176	4x40376	4x40576	4x40776	FLOAT	3.8.0	Reactive imported energy
81	4x40178	4x40378	4x40578	4x40778	FLOAT	3.8.0*	Reactive imported energy previous month
82	4x40180	4x40380	4x40580	4x40780	FLOAT	4.8.0	Reactive exported energy
83	4x40182	4x40382	4x40582	4x40782	FLOAT	4.8.0*	Reactive exported energy previous month
84	4x40184	4x40384	4x40584	4x40784	FLOAT	32.7.1	Overvoltage event number phase1
85	4x40186	4x40386	4x40586	4x40786	FLOAT	52.7.1	Overvoltage event number phase2
86	4x40188	4x40388	4x40588	4x40788	FLOAT	72.7.1	Overvoltage event number phase3
87	4x40190	4x40390	4x40590	4x40790	FLOAT	31.7.0	Current L1
88	4x40192	4x40392	4x40592	4x40792	FLOAT	51.7.0	Current L2
89	4x40194	4x40394	4x40594	4x40794	FLOAT	71.7.0	Current L3
90	4x40196	4x40396	4x40596	4x40796	FLOAT	32.7.0	Voltage phase 1
91	4x40198	4x40398	4x40598	4x40798	FLOAT	52.7.0	Voltage phase 2
92	4x40200	4x40400	4x40600	4x40800	FLOAT	72.7.0	Voltage phase 3
93	4x40202	4x40402	4x40602	4x40802	FLOAT	33.7.0	Power factor phase 1
94	4x40204	4x40404	4x40604	4x40804	FLOAT	53.7.0	Power factor phase 2
95	4x40206	4x40406	4x40606	4x40806	FLOAT	73.7.0	Power factor phase 3
96	4x40208	4x40408	4x40608	4x40808	FLOAT	13.7.0	Total Power factor
97	4x40210	4x40410	4x40610	4x40810	FLOAT	14.7.0	Frequency
98	4x40212	4x40412	4x40612	4x40812	FLOAT	16.7.0	Toatal Active Power
99	4x40214	4x40414	4x40614	4x40814	FLOAT		

Some systems have problem with float number, so we have created a copy of total energy counter in UNSIGNED LONG format in the following different MODBUS area:

UNSIGNED LONG COPY OF TOTAL ENERGY COUNTER							
	METER 1	METER 2	METER 3	METER 4			
0	4x41046	4x41086	4x41126	4x41166	UDINT	1.8.0	Total Active Energy A+
1	4x41048	4x41088	4x41128	4x41168	UDINT	1.8.0*	Total Active Energy previous month A +
2	4x41050	4x41090	4x41130	4x41170	UDINT	2.8.0	Total Active Energy A -
3	4x41052	4x41092	4x41132	4x41172	UDINT	2.8.0*	Total Active Energy previous month A -
4	4x41054	4x41094	4x41134	4x41174	UDINT	5.8.0	Reactive total energy QI
5	4x41056	4x41096	4x41136	4x41176	UDINT	5.8.0*	Reactive total energy previous month QI
6	4x41058	4x41098	4x41138	4x41178	UDINT	6.8.0	Reactive total energy QII
7	4x41060	4x41100	4x41140	4x41180	UDINT	6.8.0*	Reactive total energy previous month QII
8	4x41062	4x41102	4x41142	4x41182	UDINT	7.8.0	Reactive total energy QIII
9	4x41064	4x41104	4x41144	4x41184	UDINT	7.8.0*	Reactive total energy previous month QIII
10	4x41066	4x41106	4x41146	4x41186	UDINT	8.8.0	Reactive total energy QIV
11	4x41068	4x41108	4x41148	4x41188	UDINT	8.8.0*	Reactive total energy previous month QIV
12	4x41070	4x41110	4x41150	4x41190	UDINT	3.8.0	Reactive imported energy
13	4x41072	4x41112	4x41152	4x41192	UDINT	3.8.0*	Reactive imported energy previous month
14	4x41074	4x41114	4x41154	4x41194	UDINT	4.8.0	Reactive exported energy
15	4x41076	4x41116	4x41156	4x41196	UDINT	4.8.0*	Reactive exported energy previous month

The order of magnitude of the units of measurement of the values read by the meter can change during the life of an electric meter, therefore the following table shows the modbus addresses of the multiplicative factor of the energy torches: 0 = Kilo, 1 = Mega, 2 = Giga.

Unit of Measure 0 = Kilo 1 = Mega 2 = Giga							
	METER 1	METER 2	METER 3	METER 4			
0	4x41300	4x41320	4x41340	4x41360	UINT	1.8.0	Total Active Energy A+
1	4x41301	4x41321	4x41341	4x41361	UINT	1.8.0*	Total Active Energy previous month A +
2	4x41302	4x41322	4x41342	4x41362	UINT	2.8.0	Total Active Energy A -
3	4x41303	4x41323	4x41343	4x41363	UINT	2.8.0*	Total Active Energy previous month A -
4	4x41304	4x41324	4x41344	4x41364	UINT	5.8.0	Reactive total energy QI
5	4x41305	4x41325	4x41345	4x41365	UINT	5.8.0*	Reactive total energy previous month QI
6	4x41306	4x41326	4x41346	4x41366	UINT	6.8.0	Reactive total energy QII
7	4x41307	4x41327	4x41347	4x41367	UINT	6.8.0*	Reactive total energy previous month QII
8	4x41308	4x41328	4x41348	4x41368	UINT	7.8.0	Reactive total energy QIII
9	4x41309	4x41329	4x41349	4x41369	UINT	7.8.0*	Reactive total energy previous month QIII
10	4x41310	4x41330	4x41350	4x41370	UINT	8.8.0	Reactive total energy QIV
11	4x41311	4x41331	4x41351	4x41371	UINT	8.8.0*	Reactive total energy previous month QIV
12	4x41312	4x41332	4x41352	4x41372	UINT	3.8.0	Reactive imported energy
13	4x41313	4x41333	4x41353	4x41373	UINT	3.8.0*	Reactive imported energy previous month
14	4x41314	4x41334	4x41354	4x41374	UINT	4.8.0	Reactive exported energy
15	4x41315	4x41335	4x41355	4x41375	UINT	4.8.0*	Reactive exported energy previous month

3.0 COMMUNICATION ERRORS

3.1 Type of error

Errors in modbus address 4x40014 are formed by 2 digits: **AB**.

- **A** : this indicates which energy meter is reported
- **B** : this indicates the type of error
  - 5 : serial port is not correctly opened
  - 6 : communication timeout error
  - 1 : energy meter doesn't answer to gateway -> please check cable connection and if energy meter's serial number is correct and written in the right modbus address
  - 2 : error in extracting ID code from meter's message -> please check cable connection
  - 7 : message from energy meter is too big for gateway's buffer; this error does not compromise gateway's normal functionality, but last part of obis list will be lost
  - 8 : message from energy meter is empty -> please check cable connection

There are also :

- 888 : global timeout error (this happens if there aren't meter's serial number in modbus area)
- 999 : hardware/software authenticity error

4.0 MECHANICAL FEATURES

The dimensions of the gateway are the following: