

USER'S MANUAL

**Gateway DLMS-MODBUS for ISKRA
with RS232 OPTICAL PROBES**

P/N: GW-DLMS-OPT-ISK

Edition 2.0

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Revision Sheet

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Rev. 0	10/05/14	User's Manual Template and Checklist
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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 two counters through the RS232 optical probes and provides value to RS485 port MODBUS RTU slave and on an Ethernet port Modbus TCP Server (up to 3 client connections).

1.2 Features

1.2.1 Connections

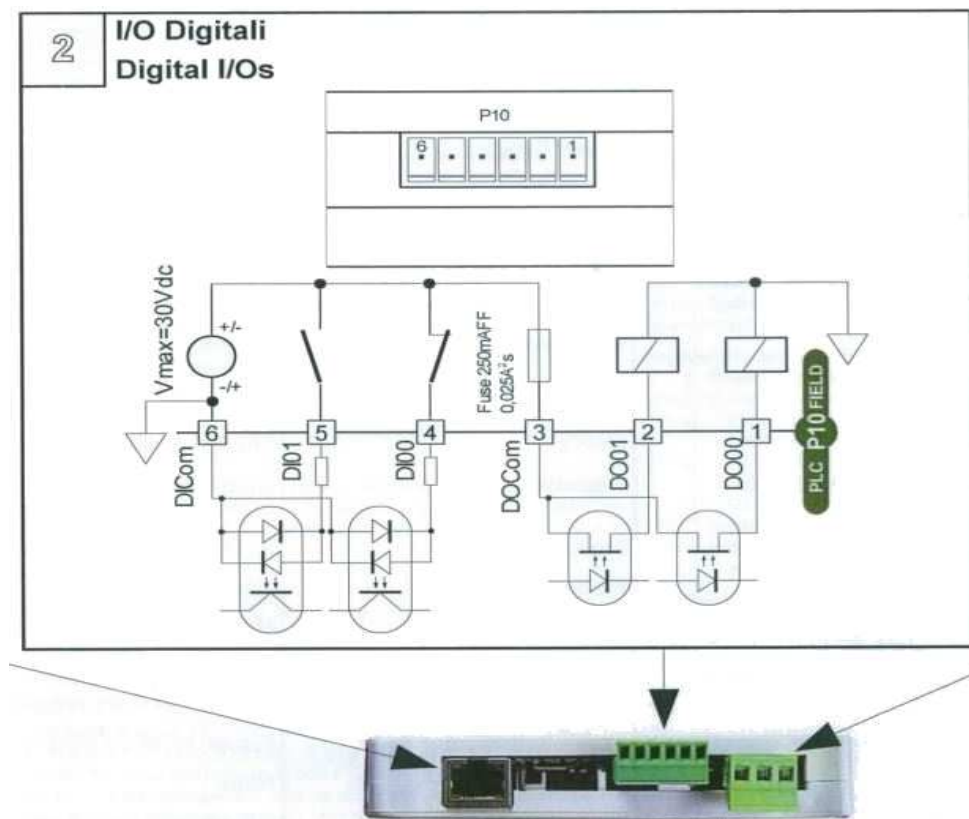
Gateway has following communication ports:

- 2 x Serial RS232 port to connect up to two energy meter
- 1 x Serial RS485 port to read energy meter's data by master Modbus RTU
- 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:



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

[Home PLC](#) | [Home DLMS](#) | [Meter COM0](#) | [Meter COM1](#)

Home DLMS		
Serial port BAUDRATE selection		
9600 ▼		<input type="button" value="Submit"/>
MODBUS ADDRESS	DESCRIPTION	VALUE
4x40000	Digital Input 00	0
4x40001	Digital Input 01	0
4x40002	Digital Output 00	0
4x40003	Digital Output 01	0
4x40004	Serial code Meter COM 0	<input type="text" value="0"/> <input type="button" value="Submit"/>
4x40006	Serial code Meter COM 1	<input type="text" value="0"/> <input type="button" value="Submit"/>
4x41038	Waiting time between readouts (sec)	<input type="text" value="25"/> <input type="button" value="Submit"/>
4x40012	Index currently reading meter	0
4x40014	Error Number	0
4x41034	Elapsed Time Cycle	20
4x41032	Software version	5.270
String Debug		
Offset debug string		<input type="text" value="0"/> <input type="button" value="Submit"/>
Force gateway reboot		
<input type="button" value="GATEWAY REBOOT"/>		

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*).

It's possible to change baudrate of the port connected to meter from **Serial port baudrate selection** in case meter works with speed different from 9600 that usually is standard.

You can also change the energy meter's serial number connected to the Gateway. This step is required to enable communication between Gateway and the meter.

Time between readouts can be set from 10 to 120 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.



2.2 Gateway Settings

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

This brings us to the home screen of the device configuration and clicking on *Network Setup*, you can change the network settings of the device.

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

Changes in *Hardware Setup* and in *Network Setup* are applied to the gateway after a power reboot.

Home General Setup Hardware Setup Network Setup PLC Setup	
Home	
System Informations	
Device Data	Code: MPS046B100 , Serial: 439 , UID: 1966519
Manufacturer Code	3
Software Code	SFW184A870
Run since	Tuesday, 22/04/2014 07:24:23
Up time	0 Days, 0 Hours, 2 Minutes, 2 Seconds
Main loop time	0.280 [0.185 <=> 9.343](mSec)
PLC Informations	
Program	ISKRA_232 , Version:6.80 (Wednesday, 14/05/2014 17:14:52)
Run since	Tuesday, 22/04/2014 09:25:28
Up time	0 Days, 0 Hours, 0 Minutes, 57 Seconds
Loop time	Fast:1.0, Slow:10.0, Back:0.4 (mS)
Execution time	Boot:0.1, Fast:0.0, Slow:0.0, Back:0.0 (mS)
Memory stack	Used:12, Free:4084
Username	Admin 
Password 
<input type="button" value="Login"/>	

While going on hardware setup, you can change:

- RS485 serial port communication settings; "COM0" and "COM1" ports changes don't serve, because they are forced by the program-specific settings
- MODBUS node number, to communicate with the MODBUS RTU and MODBUS TCP

Home General Setup Hardware Setup Network Setup PLC Setup									
Hardware Setup									
Serial port setup									
Serial port "COM0"	115200 ▼	E ▼	8 ▼	DTR Auto ▼	DTR On: 0	DTR Off: 0			
Serial port "COM1"	115200 ▼	E ▼	8 ▼	DTR Auto ▼	DTR On: 0	DTR Off: 0			
Serial port "COM2"	115200 ▼	E ▼	8 ▼	DTR Auto ▼	DTR On: 0	DTR Off: 0			
Modbus setup									
Modbus on "COM0"	RTU ▼	Node: 1							
Modbus on "COM1"	RTU ▼	Node: 1							
Modbus on "COM2"	RTU ▼	Node: 1							
Modbus Socket 0	Over IP ▼	Node: 1		Socket Type: TCP ▼	Port: 502	Max Conn.: 3			
Modbus Socket 1	Disabled ▼	Node: 1		Socket Type: TCP ▼	Port: 502	Max Conn.: 0			
Modbus Socket 2	Disabled ▼	Node: 1		Socket Type: TCP ▼	Port: 502	Max Conn.: 0			
<div>Save</div> <p>Reboot the system to validate the changes</p>									

2.3 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	OBIS CODE	METER COM0	METER COM1	DATA TYPE	NOTE
-	-	4x40000		UINT	DI 00
-	-	4x40001		UINT	DI 01
-	-	4x40002		UINT	DO 00
-	-	4x40003		UINT	DO 01
-	-	4x40004	4x40006	ULONG	Energy meter's serial code to start communication
-	-	4x40012		FLOAT	Index reading meter
-	-	4x40014		FLOAT	Error number
0	F.F	4x40016	4x40216	LONG	Error Code
1	0.9.1	4x40018	4x40218	LONG	Time
2	0.9.2	4x40020	4x40220	LONG	Date
3	0.0.0	4x40022	4x40222	LONG	Address
4	0.1.0	4x40024	4x40224	FLOAT	Billing period counter
5	0.1.2*	4x40026	4x40226	FLOAT	Time stamp of the billing period
6	1.4.0	4x40028	4x40228	FLOAT	Sum Li Active power+ (QI+QIV)
7	2.4.0	4x40030	4x40230	FLOAT	Sum Li Active power- (QII+QIII)
8	5.4.0	4x40032	4x40232	FLOAT	Sum Li Reactive power QI
9	6.4.0	4x40034	4x40234	FLOAT	Sum Li Reactive power QII
10	7.4.0	4x40036	4x40236	FLOAT	Sum Li Reactive power QIII
11	8.4.0	4x40038	4x40238	FLOAT	Sum Li Reactive power QIV
12	1.6.1	4x40040	4x40240	FLOAT	Max Active Power - Import - Tariff 1 (kW)
13	1.6.1*	4x40042	4x40242	FLOAT	Max Active Power - Import - Tariff 1 (kW) - previous period
14	1.6.2	4x40044	4x40244	FLOAT	Max Active Power - Import - Tariff 2 (kW)
15	1.6.2*	4x40046	4x40246	FLOAT	Max Active Power - Import - Tariff 2 (kW) - previous period
16	1.6.3	4x40048	4x40248	FLOAT	Max Active Power - Import - Tariff 3 (kW)
17	1.6.3*	4x40050	4x40250	FLOAT	Max Active Power - Import - Tariff 3 (kW) - previous period
18	2.6.1	4x40052	4x40252	FLOAT	Max Active Power - Export - Tariff 1 (kW)
19	2.6.1*	4x40054	4x40254	FLOAT	Max Active Power - Export - Tariff 1 (kW) - previous period
20	2.6.2	4x40056	4x40256	FLOAT	Max Active Power - Export - Tariff 2 (kW)
21	2.6.2*	4x40058	4x40258	FLOAT	Max Active Power - Export - Tariff 2 (kW) - previous period
22	2.6.3	4x40060	4x40260	FLOAT	Max Active Power - Export - Tariff 3 (kW)
23	2.6.3*	4x40062	4x40262	FLOAT	Max Active Power - Export - Tariff 3 (kW) - previous period
24	1.8.0	4x40064	4x40264	FLOAT	Active Energy - Import - Total (kWh)
25	1.8.0*	4x40066	4x40266	FLOAT	Active Energy - Import - Total (kWh) - previous period
26	1.9.1	4x40068	4x40268	FLOAT	Sum Li Active power+ (QI+QIV) - Tariff 1

2.0 Configuration and Modbus map

27	1.9.1*	4x40070	4x40270	FLOAT	Sum Li Active power+ (QI+QIV) - Tariff 1 - previous period
28	1.9.2	4x40072	4x40272	FLOAT	Sum Li Active power+ (QI+QIV) - Tariff 2
29	1.9.2*	4x40074	4x40274	FLOAT	Sum Li Active power+ (QI+QIV) - Tariff 2 - previous period
30	1.9.3	4x40076	4x40276	FLOAT	Sum Li Active power+ (QI+QIV) - Tariff 3
31	1.9.3*	4x40078	4x40278	FLOAT	Sum Li Active power+ (QI+QIV) - Tariff 3 - previous period
32	2.8.0	4x40080	4x40280	FLOAT	Active Energy - Export - Total (kWh)
33	2.8.0*	4x40082	4x40282	FLOAT	Active Energy - Export - Total (kWh) - previous period
34	2.9.1	4x40084	4x40284	FLOAT	Sum Li Active power- (QII+QIII) - tariff 1
35	2.9.1*	4x40086	4x40286	FLOAT	Sum Li Active power- (QII+QIII) - tariff 1 - previous period
36	2.9.2	4x40088	4x40288	FLOAT	Sum Li Active power- (QII+QIII) - tariff 2
37	2.9.2*	4x40090	4x40290	FLOAT	Sum Li Active power- (QII+QIII) - tariff 2 - previous period
38	2.9.3	4x40092	4x40292	FLOAT	Sum Li Active power- (QII+QIII) - tariff 3
39	2.9.3*	4x40094	4x40294	FLOAT	Sum Li Active power- (QII+QIII) - tariff 3 - previous period
40	5.8.0	4x40096	4x40296	FLOAT	Reactive Energy QI - Total (kvarh)
41	5.8.0*	4x40098	4x40298	FLOAT	Reactive Energy QI - Total (kvarh) - previous period
42	5.9.1	4x40100	4x40300	FLOAT	Sum Li Reactive power QI - Tariff 1
43	5.9.1*	4x40102	4x40302	FLOAT	Sum Li Reactive power QI - Tariff 1 - previous period
44	5.9.2	4x40104	4x40304	FLOAT	Sum Li Reactive power QI - Tariff 2
45	5.9.2*	4x40106	4x40306	FLOAT	Sum Li Reactive power QI - Tariff 2 - previous period
46	5.9.3	4x40108	4x40308	FLOAT	Sum Li Reactive power QI - Tariff 3
47	5.9.3*	4x40110	4x40310	FLOAT	Sum Li Reactive power QI - Tariff 3 - previous period
48	6.8.0	4x40112	4x40312	FLOAT	Reactive Energy QII - Total (kvarh)
49	6.8.0*	4x40114	4x40314	FLOAT	Reactive Energy QII - Total (kvarh) - previous period
50	6.9.1	4x40116	4x40316	FLOAT	Sum Li Reactive power QII - Tariff 1
51	6.9.1*	4x40118	4x40318	FLOAT	Sum Li Reactive power QII - Tariff 1 - previous period
52	6.9.2	4x40120	4x40320	FLOAT	Sum Li Reactive power QII - Tariff 2
53	6.9.2*	4x40122	4x40322	FLOAT	Sum Li Reactive power QII - Tariff 2 - previous period
54	6.9.3	4x40124	4x40324	FLOAT	Sum Li Reactive power QII - Tariff 3
55	6.9.3*	4x40126	4x40326	FLOAT	Sum Li Reactive power QII - Tariff 3 - previous period
56	7.8.0	4x40128	4x40328	FLOAT	Reactive Energy QIII - Total (kvarh)
57	7.8.0*	4x40130	4x40330	FLOAT	Reactive Energy QIII - Total (kvarh) - previous period
58	7.9.1	4x40132	4x40332	FLOAT	Sum Li Reactive power QIII - Tariff 1
59	7.9.1*	4x40134	4x40334	FLOAT	Sum Li Reactive power QIII - Tariff 1 - previous period
60	7.9.2	4x40136	4x40336	FLOAT	Sum Li Reactive power QIII - Tariff 2
61	7.9.2*	4x40138	4x40338	FLOAT	Sum Li Reactive power QIII - Tariff 2 - previous period
62	7.9.3	4x40140	4x40340	FLOAT	Sum Li Reactive power QIII - Tariff 3
63	7.9.3*	4x40142	4x40342	FLOAT	Sum Li Reactive power QIII - Tariff 3 - previous period
64	8.8.0	4x40144	4x40344	FLOAT	Reactive Energy QIV - Total (kvarh)
65	8.8.0*	4x40146	4x40346	FLOAT	Reactive Energy QIV - Total (kvarh) - previous period
66	8.9.1	4x40148	4x40348	FLOAT	Sum Li Reactive power QIV - Tariff 1
67	8.9.1*	4x40150	4x40350	FLOAT	Sum Li Reactive power QIV - Tariff 1 - previous period
68	8.9.2	4x40152	4x40352	FLOAT	Sum Li Reactive power QIV - Tariff 2
69	8.9.2*	4x40154	4x40354	FLOAT	Sum Li Reactive power QIV - Tariff 2 - previous period
70	8.9.3	4x40156	4x40356	FLOAT	Sum Li Reactive power QIV - Tariff 3
71	8.9.3*	4x40158	4x40358	FLOAT	Sum Li Reactive power QIV - Tariff 3 - previous period
72	31.7.0	4x40160	4x40360	FLOAT	L1 Current; Inst.value
73	51.7.0	4x40162	4x40362	FLOAT	L2 Current; Inst.value
74	71.7.0	4x40164	4x40364	FLOAT	L3 Current; Inst.value

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75	32.7.0	4x40166	4x40366	FLOAT	L1 Voltage; Inst.value
76	52.7.0	4x40168	4x40368	FLOAT	L2 Voltage; Inst.value
77	72.7.0	4x40170	4x40370	FLOAT	L3 Voltage; Inst.value
78	14.7.0	4x40172	4x40372	FLOAT	Supply frequency
79	33.7.0	4x40174	4x40374	FLOAT	L1 Power factor; Inst.value
80	53.7.0	4x40176	4x40376	FLOAT	L2 Power factor; Inst.value
81	73.7.0	4x40178	4x40378	FLOAT	L3 Power factor; Inst.value
82	81.7.40	4x40180	4x40380	FLOAT	Angle of U(L1) - I(L1)
83	81.7.51	4x40182	4x40382	FLOAT	Angle of U(L2) - I(L2)
84	81.7.62	4x40184	4x40384	FLOAT	Angle of U(L3) - I(L3)

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:

		METER COM0	METER COM1		
0	1.8.0	4x41046	4x41086	ULONG	Active Energy - Import - Total (kWh)
1	1.8.0*	4x41048	4x41088	ULONG	Active Energy - Import - Total (kWh) - previous period
2	2.8.0	4x41050	4x41090	ULONG	Active Energy - Export - Total (kWh)
3	2.8.0*	4x41052	4x41092	ULONG	Active Energy - Export - Total (kWh) - previous period
4	5.8.0	4x41054	4x41094	ULONG	Reactive Energy QI - Total (kvarh)
5	5.8.0*	4x41056	4x41096	ULONG	Reactive Energy QI - Total (kvarh) - previous period
6	6.8.0	4x41058	4x41098	ULONG	Reactive Energy QII - Total (kvarh)
7	6.8.0*	4x41060	4x41100	ULONG	Reactive Energy QII - Total (kvarh) - previous period
8	7.8.0	4x41062	4x41102	ULONG	Reactive Energy QIII - Total (kvarh)
9	7.8.0*	4x41064	4x41104	ULONG	Reactive Energy QIII - Total (kvarh) - previous period
10	8.8.0	4x41066	4x41106	ULONG	Reactive Energy QIV - Total (kvarh)
11	8.8.0*	4x41068	4x41108	ULONG	Reactive Energy QIV - Total (kvarh) - previous period

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
 - **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 size of the gateway are the following:

