Modbus protocol support

GLONASSSoft technical support:
portal request:http://help.glonasssoft.ru,
e-mail: support@glonasssoft.ru
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Enter these parameters to register on Wialon:
1. Identifier – IMEI 1111222233334444 (EXAMPLE)
2. IP server address: 193.193.165.165
3. Port: 21336 (UMKa300), 21510 (UMKa301), 21946(UMKa302); 21787(UMKa 310)

Modbus protocol support

Modbus protocol is the most popular industrial M2M-interaction protocol. It is the standard that is supported by practically all manufacturers of industrial equipment.

Due to versatility and transparency standard allows to intergrate equipment of various manufacturers. Modbus is used for collecting data from sensors, relay control and controllers, monitoring and etc.

UMKa302 supports Modbus RTU as the most popular protocol. It works above RS-485/232. Then under the Modbus term this format namely will be described.

As Modbus is designed for work with industrial automated technology, the internal protocol structure primarily describes parameters of industrial automated technology like discrete inputs and outputs, analog inputs and outputs.

At the moment the function of reading all standard types such as 1, 2, 3 and 4 is implemented in all UMKa302 and UMKa303 terminals.

Modbus-регистры SLAVE-устройств

10001-19999

DISCRETE INPUTS
Дискретные входы

Функции

• 02 - Чтение группы регистров

20001-29999

COILS
Дискретные выходы

• 01 - Чтение группы регистров
• 05 - Запись 1 регистра
• 15 - Запись группы регистров

30001-39999

INPUTS
16-битные входы

• 04 - Чтение группы регистров

40001-49999

HOLDING REGISTERS
16-битные выходы

• 03 - Чтение группы регистров
• 06 - Запись 1 регистра
• 16 - Запись группы регистров

Moreover, Modbus protocol suggests that all devices are of two different roles:
Master – leading device that enquires all other devices. <u>There can be only one Master on a bus.</u>

Slave – slave device, and it is enquired by Master. Each slave device has address within the range from 1 to 247. There can be several slave devices on bus. <u>The slave addresses in one bus must be unique.</u>

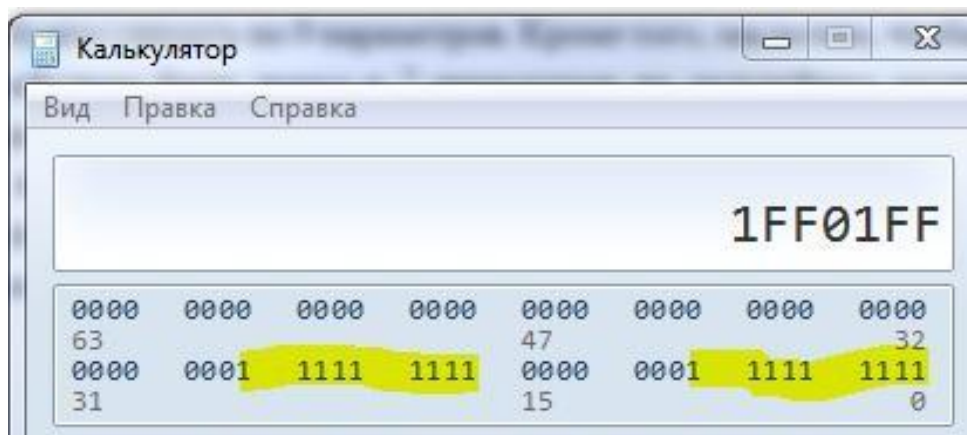# 1. Modbus implementation on UMKa302 and UMKa303

Modbus protocol for UMKa302 is implemented from version 2.11.0

UMKa302 performs as Master in Modbus bus and enquires Slave devices.

UMKa302 supports reading of up to 32 parameteres. Reading of 32 parameters from one connected Slave device is possible as well as reading of one parameter out of 32 connected Slave devices and all intermediate combinations.

Before starting work with Modbus it is necessary to configure interface. Configuration of RS-485 interface is implemented by command "RS485 8,19200" where 8 - Modbus mode, and 19200 - speed of interface operation.

Next specify the list of parameters that will be transmitted onto the server. Suppose, we have 2 devices from each of which we are going to read up to 9 parameters. Moreover, we want the interval between the first and the second devices to be 7 parameters for further expanding. In this case we have to turn on Modbus parameters transmission and configure the mask of trasmitted parameteres. For this purpose we use command "SetMdb 1,0x1FF01FF" where 1 - turn on the transmission of parameters onto the server, and 0x1FF01FF - the mask of transmitted parameters that are received with the help of calculator.

After reload we must get the following on history tab:

On the server in Wialon IPS 1.1 and 2.0 protocols Wialon IPS 1.1 and 2.0 parameters are transmitted with the same names as in history tab, i.e. Mdb0- Mdb8, Mdb16- Mdb24.

In Wialon Combine protocol parameters are transmitted with "Custom Parameters" type from parameter 256 to 287, i.e. Mdb0 is transmitted as param256, and Mdb1 - as param257, etc.

ID=0, avl_driver=0, status=2097204, pwr_ext=12.157, Mdb0=0, Mdb1=0, Mdb2=0, Mdb3=10, Mdb4=8, Mdb5=0

driver_code1=0, param1=2097204, param8=12.16, param256=0, param257=0, param258=0, param259=10, pa

2. Example of device connection

After preliminary setup it is necessary to perform the setup of single parameters for working with particular device. In order to do it the so called register map of device is needed. The addresses and types of parameters of particular device are described there.

Take cathodic protection station. An example of register map for the station is given below.

Таблица Г.1 - Input Registers

Адрес	Назначение	Диапазон	Примечание
0000 0001	ТИ-I (значение выходного тока)	0…150 A	Формат с плавающей точкой IEEE 754 32-bit
0002 0003	ТИ-U (значение выходного напряжения)	0…108 B	Формат с плавающей точкой IEEE 754 32-bit
0004 0005	ТИ-ПП (значение поляризационного потенциала)	0…4 B	Формат с плавающей точкой IEEE 754 32-bit
0006 0007	ТИ-E (счетчик электроэнергии)	[кВт/час]	Формат с плавающей точкой IEEE 754 32-bit
0008 0009	ТИ-Uвх (значение напряжения сети)	140…280 B	Формат с плавающей точкой IEEE 754 32-bit
0012	ТИ-T (показание встроенного датчика температуры)	-40…125 ºC	Знаковое целое в дополнительном коде
0013 0014	ТИ-Траб (время работы устройства)	0…0x7fff ffff [сек]	Беззнаковое целое, при достижении 0x8000 0000 обнуляются все счетчики
0015 0016	ТИ-Тстаб (время в режиме стабилизации)	0…0x7fff ffff [сек]	Беззнаковое целое, при достижении 0x8000 0000 обнуляются все счетчики
0018 0019	ТИ-СП (значение суммарного потенциала)	0…4 B	Формат с плавающей точкой IEEE 754 32-bit

The map has 9 parameters where the addresses are in a row. The particuliarity of Modbus protocol is that such parameters can be placed both as 9 single requests and one general.

UMKa302 is able to automatically create the plan of Modbus device enquiry in certain way to reduce the number of requests. It allows to significantly decrease the time of device enquiry.

For congifuring parameters command "DBPARAMn [X[,Y[,Z[,A[,B]]]]]" is used where n - the number of parameter from 0 to 31.

X - device address on the bus from 1 to 247 or 0 if enquiry is turned off,

Y - enquiry type. About enquiry types see below,

Z - initial register or input address for chosen enquiry,

A - recalculation formula as in CAN-filters,

B - name of parameter as in CAN-filters.

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For station imitation simulator program is used.

Program appearance is given in the picture below.
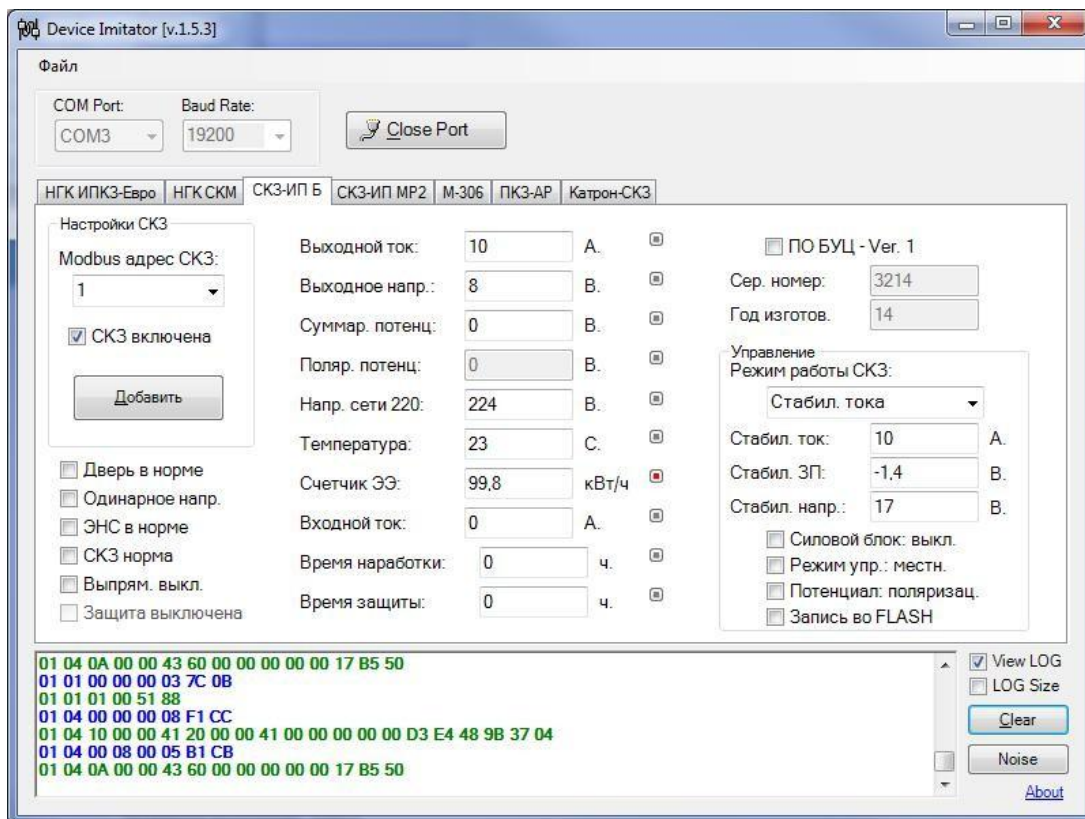
Y enquiry type is chosen from the following considerations:

Y=0 – function 1. Reading 1of Coils byte type,

Y=1 – function 2. Reading 1 of Input Discrete byte type,

Y=2 – function 3. Reading 1 of Holding Registers register type. Unsigned. 0…65535,

Y=3 – function 3. Reading 1 of Holding Registers register type. Signed -32768…32767,

Y=4 – function 4. Reading 1 of Input Register register type. Unsigned. 0…65535,

Y=5 – function 4. Reading 1 of Input Register register type. Signed -32768…32767,

Y=6 – function 3. Reading 2 of Holding Registers register type. Registers are processed as float. The junior part is in junior refister (Bytes order 1023),

Y=7 – function 4. Reading 2 of Input Register register type. Registers are processed as float. The junior part is in junior refister (Bytes order 1023),

Y=8 – function 3. Reading 2 of Holding Registers register type. R e g i s t e r s a r e p r o c e s s e d a s s i g n e d i n t e g e r v a l u e . The junior part is in junior refister (Bytes order 1023),

Y=9 –function 4. Reading 2 of Holding Registers register type. R e g i s t e r s a r e p r o c e s s e d a s s i g n e d i n t e g e r v a l u e . The junior part is in junior register (Bytes order 1023).

This list is not complete and will be expanded if the necessity arises. Only the most frequently faced formats of data presenting are submitted in it. A wider number of them is dealt with more rarely.

Configure the simulator on work with address 1. Find the following parameters in register map:

Таблица Г.1 - Input Registers

Адрес	Назначение	Диапазон	Примечание
0000 0001	ТИ-I (значение выходного тока)	0…150 А	Формат с плавающей точкой IEEE 754 32-bit
0002 0003	ТИ-U (значение выходного напряжения)	0…108 В	Формат с плавающей точкой IEEE 754 32-bit
0004 0005	ТИ-ПП (значение поляризационного потенциала)	0…4 В	Формат с плавающей точкой IEEE 754 32-bit
0006 0007	ТИ-Е (счетчик электроэнергии)	[кВт/час]	Формат с плавающей точкой IEEE 754 32-bit
0008 0009	ТИ-Uвх (значение напряжения сети)	140…280 В	Формат с плавающей точкой IEEE 754 32-bit
0012	ТИ-Т (показание встроенного датчика температуры)	-40…125 °C	Знаковое целое в дополнительном коде
0013 0014	ТИ-Траб (время работы устройства)	0…0x7fff ffff [сек]	Беззнаковое целое, при достижении 0x8000 0000 обнуляются все счетчики
0015 0016	ТИ-Тстаб (время в режиме стабилизации)	0…0x7fff ffff [сек]	Беззнаковое целое, при достижении 0x8000 0000 обнуляются все счетчики
0018 0019	ТИ-СП (значение суммарного потенциала)	0…4 В	Формат с плавающей точкой IEEE 754 32-bit

Configure the first 5 parameters with commands:

MdbParam0 1,7,0,,I

MdbParam1 1,7,2,,U

MdbParam2 1,7,4,,PP

MdbParam3 1,7,6,,E

MdbParam4 1,7,8,,Uin

Configure temperature:

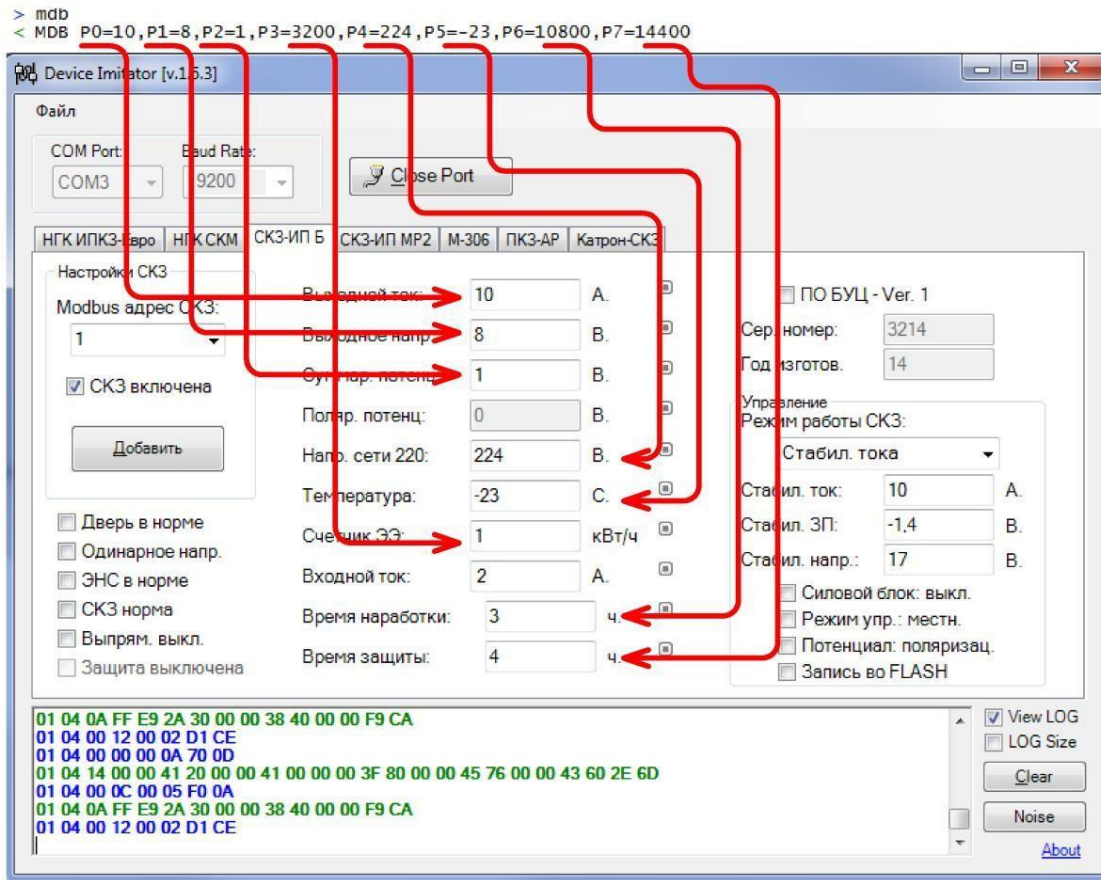MdbParam5 1,5,12,,T

Configure work time:

MdbParam6 1,9,13,,Twork

MdbParam7 1,9,15,,Tstab

Configure the last parameter

MdbParam8 1,7,18,,SP

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Reload the terminal. With "Mdb" command perform check.

```
> mdb
< MDB P0=10,P1=8,P2=1,P3=3200,P4=224,P5=-23,P6=10800,P7=14400
```


Enquiry has been set up. Check in the system.

Параметры	N
driver_code1=0, param1=2097712, param8=12.179, param256=10, param257=8, param258=1, param259=3200, param260=224, param261=-23, param262=10800, param263=14400, I/O=	
driver_code1=0, param1=2097712, param8=12.168, param256=10, param257=8, param258=1, param259=3200, param260=224, param261=-23, param262=10800, param263=14400, I/O=	
driver_code1=0, param1=2097712, param8=12.179, param256=10, param257=8, param258=1, param259=3200, param260=224, param261=-23, param262=10800, param263=14400, I/O=	
driver_code1=0, param1=2097712, param8=12.187, param256=10, param257=8, param258=1, param259=3200, param260=224, param261=-23, param262=10800, param263=14400, I/O=	
driver_code1=0, param1=2097712, param8=12.206, param256=10, param257=8, param258=1, param259=3200, param260=224, param261=-23, param262=10800, param263=14400, I/O=	
driver_code1=0, param1=2097712, param8=12.176, param256=10, param257=8, param258=1, param259=3200, param260=224, param261=-23, param262=10800, param263=14400, I/O=	
driver_code1=0, param1=2097712, param8=12.189, param256=10, param257=8, param258=1, param259=3200, param260=224, param261=-23, param262=10800, param263=14400, I/O=	
driver_code1=0, param1=2097712, param8=12.157, param256=10, param257=8, param258=1, param259=3200, param260=224, param261=-23, param262=10800, param263=14400, I/O=	
driver_code1=0, param1=2097204, param8=12.197, param256=10, param257=8, param258=1, param259=1, param260=224, param261=-23, param262=3, param263=14400, I/O=0/0	
driver_code1=0, param1=2097204, param8=12.168, param256=10, param257=8, param258=1, param259=1, param260=224, param261=-23, param262=3, param263=4, I/O=0/0	
driver_code1=0, param1=2097200, param8=12.176, param256=10, param257=8, param258=1, param259=1, param260=224, param261=-23, param262=3, param263=4, I/O=0/0	
driver_code1=0, param1=2097200, param8=12.166, param256=10, param257=8, param258=1, param259=1, param260=224, param261=-23, param262=3, param263=4, I/O=0/0	
driver_code1=0, param1=2097200, param8=12.179, param256=10, param257=8, param258=1, param259=1.23, param260=224, param261=-23, param262=3, param263=4, I/O=0/0	
driver_code1=0, param1=2097200, param8=12.161, param256=10, param257=8, param258=1, param259=1.23, param260=224, param261=-23, param262=3, param263=4, I/O=0/0	
driver_code1=0, param1=2097200, param8=12.179, param256=10, param257=8, param258=1, param259=1.23, param260=224, param261=-23, param262=3, param263=4, I/O=0/0	