

 **USER GUIDE**  
**GSM modem**  
**iRZ MC55i-485GI**





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## 1. Introduction

### 1.1. Document description

This manual is intended for experienced PC users. It describes the device and the operation of the GSM modem iRZ MC55i-485GI.

### 1.2. Service data

Document version		Issue date	
2.11		08.29.2013	
Prepared by	T.A. Surhaev, V.N. Golovin	Approved by	P.A. Kosolapov

### 1.3. Safety rules

Restrictions on the use of the device near other electronic devices:

- Turn the modem off in hospitals or when located near medical equipment such as pacemakers, hearing aids and so on. Interference for medical equipment may occur
- Turn the terminal off when on an airplane. Take measures to avoid accidental turning on
- Turn the modem off in the vicinity of gas stations, chemical plants, and places where demolition work is conducted. Interference for technical devices may occur
- At a close range, the modem may produce interference for television sets and radio transmitters

Maintenance requirements:

- Protect the modem against external hazards (high temperatures, caustic chemicals, dust, water and so on)
- Keep the modem safe from blows, falls, and strong vibrations
- Do not attempt to take apart or modify the modem on your own. Such actions will void your warranty

**Note:** Make sure you follow the operation manual for this device. Improper use of the device will disqualify your warranty.



## 2. General Information

### 2.1. Purpose

iRZ MC55i-485GI is an industrial GSM modem for receiving and transmitting data, text messages and faxes. It is perfectly suited both for providing mobile access to the Internet and for industrial applications including telemetry, wireless data collection from sensors, remote monitoring, control, and signaling.

The modem is equipped with a watchdog timer, which allows for an unconditional reboot of the equipment after a specified period of time. The modem is controlled by standard AT-commands and also possesses its own range of control commands. The device is equipped with LEDs to monitor connection status and signal for emergency.

This modem is mainly used for remote queries on CSD channel; and it is configured accordingly when manufactured. Please see p. 2.5.1 for more details.

### 2.2. Set

The set of the iRZ MC55i-485GI GSM modem includes:

- iRZ MC55i-485GI modem;
- Factory package

### 2.3. Features

Key features:

- Frequency bands: GSM 850/900/1800/1900 MHz;
- Output power:
  - 2W (class 4 for EGSM 850/900);
  - 1W (class 1 for GSM 1800/1900);
- GPRS class 10;
- TCP/IP stack accessed via AT-commands;
- MS class B;
- CSD up to 14.4 kbps;
- USSD;
- SMS;
- Fax group 3, class 1

Power:

- Power supply from 9 to 28 V;
- Consumption current not exceeding:
  - with the supply voltage of +12 V — 200mA;
  - with the supply voltage of +24 V — 100mA



Physical characteristics:

- Dimensions not exceeding 75x82x28 mm;
- Weight not exceeding 130g;
- Operating temperatures from -40°C to +65°C;
- Storage temperatures from -50°C to +85°C

Interfaces:

- TJ6-6P6C for RJ12 power connector;
- Terminal connector for powering the modem, connecting the communication cable with RS485 interface;
- SMA Jack (female) for connecting the GSM antenna

The device can be powered using either of the first two connectors.



## 2.4. Appearance

MC55i-485GI modem is a compact device in an aluminum case. Its appearance is displayed on Fig. 2.4.1 and Fig. 2.4.2:

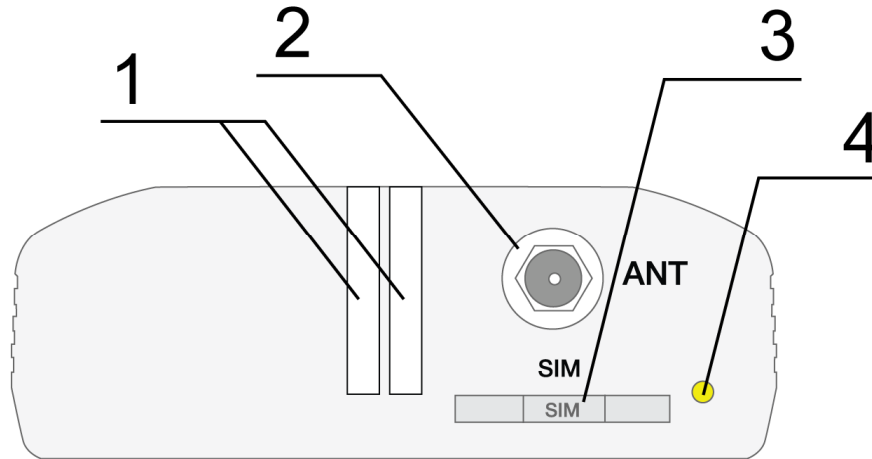


Fig. 2.4.1. Front view

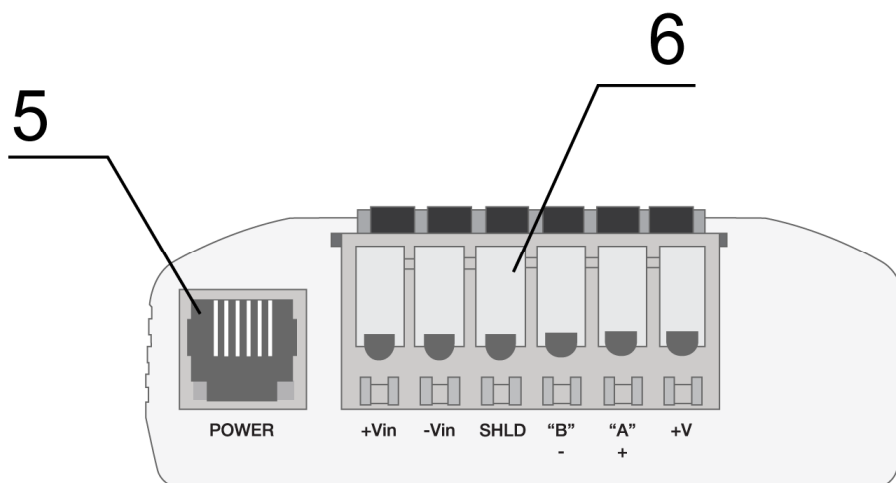


Fig. 2.4.2. Back view

The numbers on Fig. 2.4.1 and Fig. 2.4.2 stand for:

1. Emergency LED (left, red) and Network LED (right, green)
2. SMA Jack (female) for connecting the GSM antenna
3. SIM card holder
4. SIM card holder ejector button
5. Power connector TJ6-6P6C
6. Terminal connector



## 2.5. Interfaces

### 2.5.1. Terminal connector

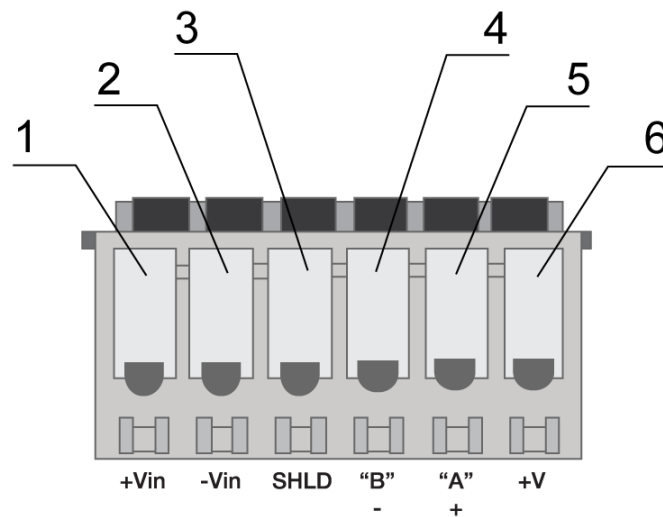
This connector is used for communication with a controlling device, interface RS485. The AT-commands are used to control the modem operation (see the module description).

Factory settings: Speed: 9600 bps, Data Bit: 8, Parity: None, Stop Bit: 1.

This modem is mainly used for remote queries on CSD channel; and it is configured accordingly when manufactured:

- ats0=1 (automatic answer)
- at&c1 (set DCD line mode)
- at&d0 (ignore status of the DTR line)
- at+cbst=71,0,1 (select bearer service type)
- ate0 (echo mode off)

Please see the external look of the connector on Figure 2.5.1:



**Fig. 2.5.1.** Terminal connector





**Table 2.5.1:** Using terminal connector pins

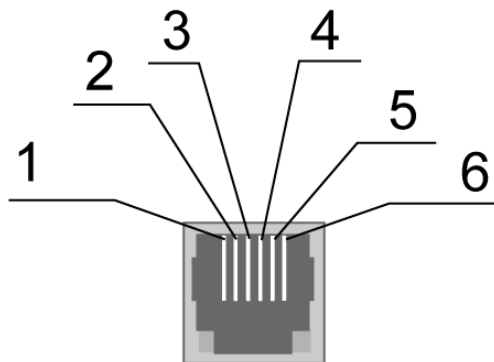
Clamps	Signal	Purpose	
1	+Vin	“+” modem power supply	
2	-Vin	“-” modem power supply	
3	SHLD	“Shield” of RS485 interface	
4	“B”	“d-“ of RS485 interface; inverse differential I/O	Interface lines are protected by self-healing fuses and a circuit of impulse noise suppression, as well as overvoltage protection
5	“A”	“d+“ of RS485 interface; direct differential I/O	
6	+5V	Output “+5V” (RS485), 100mA (to power external devices)*	

\*For instance, it might be used to power RS485 interface of heat and electricity counters, etc.

**Notes:** RS485 interface is half duplex. It needs to be considered in case of data transfer. When echo is enabled, data is sent to the modem will return. This can lead to collision. In this case we recommend to disable echo (AT-command **ate0**).

### 2.5.2. Power connector

The connector is used to power the device.



**Fig. 2.5.2.** Power connector

**Table 2.5.2:** Using connector power pins

Pin	Signal	Purpose
1	+ 12V	The positive pole of DC supply voltage. Fused circuit and overvoltage protection (when input voltage of over 30V is applied) and reverse polarity.
2	Not used	
3	Not used	
4	Not used	
5	Not used	
6	GND	Ground



## 2.6. Modem status display

LED is used to indicate the connection status. This function can be controlling by a corresponding AT-command (AT^SSYNC=1 — LED mode on; AT^SSYNC=0 — LED mode off). By default, AT^SSYNC=1.

**Table 2.6.1:** Connection status LED (green)

LED mode	Conditional indication display	Operation mode
Turned off	○	Modem is turned off or is in the emergency status, power saving mode, alarm mode
600ms on / 600ms off	●●●●●●○○○○○○	Modem is not logged to the network
75ms on / 3s off	●○○○○○○○○○...○	Modem is logged to the network
75ms on / 75ms off / 75ms on / 3s off	●○●○○○○○○○...○	GPRS connection is activated
500ms on / 50ms off	●●●●●○	Data transfer in progress
250ms on / 10s off	●●●○○○○○○○...○	Sleep mode
250ms on / 250ms off	●●●○○○	Programming mode, menu mode
Permanently turned on	●	Voice call, CSD

**Table 2.6.2:** Emergency LED (red)

LED mode	Conditional indication display	Operation mode
Permanently turned on	●	Invalid input voltage
0.5s on / 0.5s off	●●○○	Invalid module power supply
0.25s on / 0.25s off / 0.25s on / 1s off	●○●○○○	GSM module has not launched



## 3. Connecting and configuring

### 3.1. Connecting

Only individuals with specialized technical training and who have studied the product specifications are permitted to assemble (install) the modem.

Before connecting the device, install the unlocked SIM card into the modem. The SIM card must be connected and removed when the power is turned off. In order to install the SIM card do the following:

- Eject the SIM holder by pressing the SIM card holder ejector button (Fig.2.4.1)
- Place the SIM card into the SIM card holder
- Insert the SIM card holder into the modem

Be careful when installing the SIM card.

Connect the GSM antenna and the commuting RS485 cable. Power the modem using the power connector or the terminal connector (Fig.2.4.2). The frequent blinking of the green LED indicates that the modem is turned on (Table 2.6.1). Remove the PIN code of the SIM card to complete automatic online registration. After the registration is complete the modem goes into the operation mode and green LED blinks less frequently.

**Note:** GSM antenna, the commuting cables and the power supply are not included in the set.

### 3.2. Control, rebooting, and connecting

The modem is controlled using standard and expanded AT-commands. For more detail see AT-commands description for the GSM module. You can find additional information and support at [www.irz.net](http://www.irz.net).

The modem can be rebooted using one of the following ways:

- Rebooting after a given period of time (WD interval, turned off by default), setting is done in the menu mode
- By using AT-command "AT+CFUN=1,1"
- Temporary power shutdown

The modem can be turned off using one of the following ways:

- By power shutdown
- By using AT-command "AT^SMSO"

When modem is disabled by using AT-commands, you can use the alarm function (ALARM mode) to run modem.

Switch-over of modem into power saving mode by using AT-command "AT+CFUN". Controlling the alarm mode by using AT-command "AT+CALA". For more detail see AT-commands description for the GSM module.



### 3.3. Menu mode

The menu mode's function is to change the modem's parameters and access the statistics. In this menu, the power of the GSM module is switched off. After leaving the menu mode automatic rebooting takes place. The menu mode can be accessed from the operation mode. Before accessing the menu mode connect the modem to the computer (speed: 115200 bit/sec, 8-N-1), run Hyper Terminal or a similar program to communicate with the modem. Then remove the SIM holder (by pressing the SIM holder ejector button).

The modem will go into the menu mode:

Menu mode:

Variant XX

<P1> View statistics

<P2> WD interval=OFF

<P3> 'AT' control=OFF

<PC> Power control

<PR> Clear statistic

<PS> Change speed: auto

**Variant XX** is the software version

Symbols <P...> stand for control commands. A command is sent after pressing "Enter". If an incorrect command has been sent, the "ERROR" message appears. Entering commands is case-insensitive.

After entering the <P1> command a transition into the submenu of statistics occurs:

Statistics:

Power\_Modem = XX...X

Bad\_Power\_Modem = XX...X

Power\_Module = XX...X

Bad\_Power\_Module = XX...X

Start\_Module = XX...X

Bad\_Start\_Module = XX...X

Deadlock\_of\_Module = XX...X

Reset = XX...X



The modem automatically stores the number of the following situations:

**Power\_Modem** or the number of times the modem has been turned on

**Bad\_Power\_Modem** or the number of times the modem power has deviated from the allowed

**Power\_Module** or the number of times the power of the GSM module has been turned on

**Bad\_Power\_Module** or the number of times the GSM module power has deviated from the allowed

**Start\_Module** or the number of the successful launches of the GSM module

**Bad\_Start\_Module** or the number of situations when the GSM module failed to launch

**Deadlock\_of\_Module** or the number of GSM module deadlocks

**Reset** or the number of resets.

After the statistics appears the transition to the main menu occurs.

Use **<P2>** command to proceed to the WD submenu:

WD interval, hour (0 - WD off, max - 255)

**<Q>** Quit

WD interval=

To change the reboot interval, enter a number from 0 to 255 (by pressing "Enter"). The reboot interval is set in hours. If you need to switch off this function enter 0. Keep in mind that after the set interval expires, the unconditional reboot of the modem will occur. In case incorrect information is entered the modem displays "ERROR" and offers the WD submenu once again. In case correct information is entered or **<Q>** command is sent a transition into the main menu takes place.

Use **<P3>** command to proceed to the AT submenu:

'AT' control, minutes (0 - off, max - 255)

**<Q>** Quit

control=

In this submenu the interval of the periodical check by the managing microcontroller of the GSM module deadlock is set. To change the interval of the check enter a number from 0 to 255 by pressing "Enter". The reboot interval is set in minutes. If you need to switch off this function enter 0. In case incorrect information is entered the modem will show "ERROR" and will offer the AT submenu once again. In case correct information is entered or **<Q>** command is sent a transition into the main menu will take place.

After entering the **<PC>** command review the input voltage and the voltage of the module (measurement precision 5%):

POWER Uin=12.0 Umd=3.9

After the output a transition into the main menu occurs.



After entering the **<PR>** command a transition into the submenu of clearing the statistics occurs:

Clear statistics?

**<YES>** YES

**<Q>** Quit

The accumulated statistics is cleared by the **<YES>** command. In case incorrect information is entered the modem displays "ERROR" and offers the submenu of clearing the statistics once again. In case correct information is entered or **<Q>** command is sent a transition into the main menu takes place.

After entering the **<PS>** command a transition into the menu of determining data transmission speed in the operation mode occurs. Modem is always set to receive data. A switch to transition occurs when data to be transmitted appears. Setting a fixed speed of data transmission eliminates errors in calculating the interval of transmission switch. This allows minimizing pauses between transmission and reception of data and to eliminate the disappearance of data transmission start. By default, the modem is set to determine the data transmission speed automatically.

Menu speed:

**<0>** auto

**<1>** 115200

**<2>** 57600

**<3>** 38400

**<4>** 28800

**<5>** 19200

**<6>** 14400

**<7>** 9600

**<8>** 4800

**<9>** 2400

**<10>** 1200

**<11>** 600

**<12>** 300

**<Q>** Quit

To choose the data transmission speed enter a number between 1 and 12 (by pressing "Enter"). If you need to switch off this function enter "0". In case incorrect information is entered, the modem will display "ERROR" and will offer the menu of determining data transmission speed once again. In case correct rebooting interval is entered or **<Q>** command is sent, a transition into the main menu will take place.

After entering the **<M>** command the main menu appears.

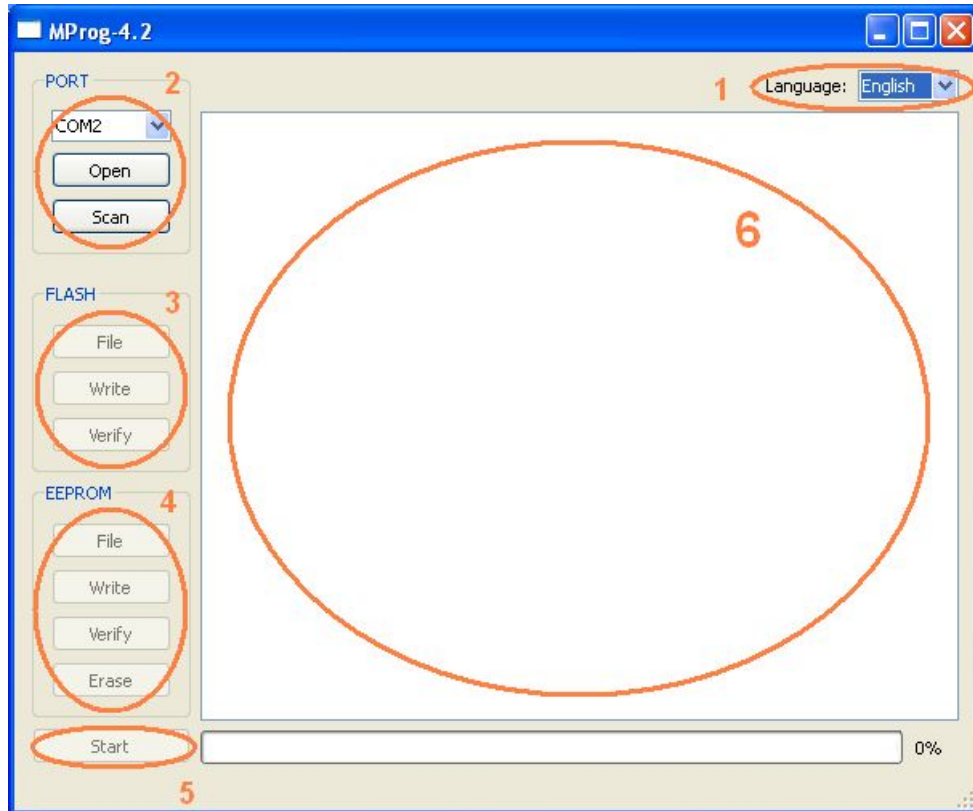
The exit from the menu mode occurs after the SIM holder is installed back again.



### 3.4. Programming mode

Program “mprog” is used to change or update software of the managing microcontroller of the modem. Figure 3.1 shows an external view and main features:

1 – language, 2 – working with ports, 3 – working with Flash, 4 – working with EEPROM, 5 – start button, 6 – view window.



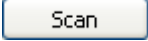
**Fig. 3.1.** Main view

If within 10 seconds after powering the device an update has not started, the modem will leave the programming mode and enter the menu mode.

To change the software do the following:


1. Start the program

Close all programs, which can use the port you will connect to the modem.

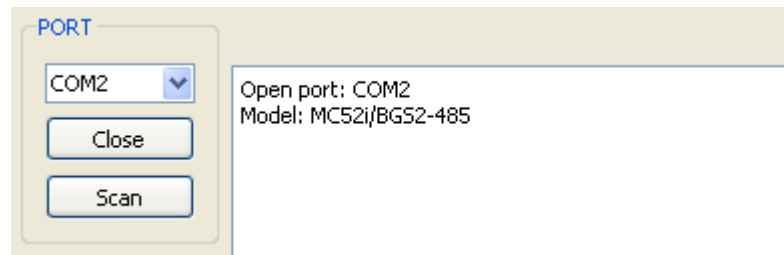
2. Click the  button in “Port” frame;
3. Choose the number of the COM port where the modem will be connected
4. Connect the modem (without the SIM holder) to the computer and turn on the modem;

Turn on the modem. The modem will go into the programming mode. The green LED will blink: 250ms on / 250ms off. “Open” button (not later than 10 sec once the modem was powered).




5. Click the  button (not later than 10 sec once the modem was powered) in “Port” frame;

The device model should appear. For example see figure 3.2 – “MC55i-485” (or “BGS2-485”).

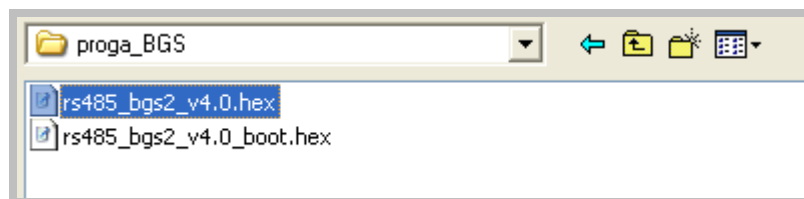


**Fig. 3.2.** Port opening

Then select the new firmware file to be downloaded.

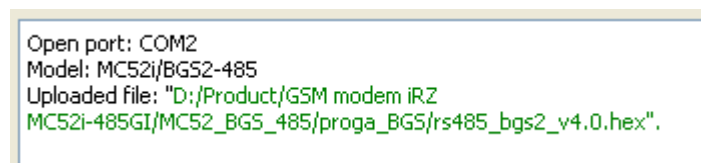
6. Click the  button in “Flash” frame and choose firmware file (file in “hex”-format) in «Open file» dialog

For example see figure 3.3 – “rs485\_bgs2\_v4.0.hex”.



**Fig. 3.3.** File uploading

If the file has uploaded successfully, the program window will show message “Uploaded file:”.

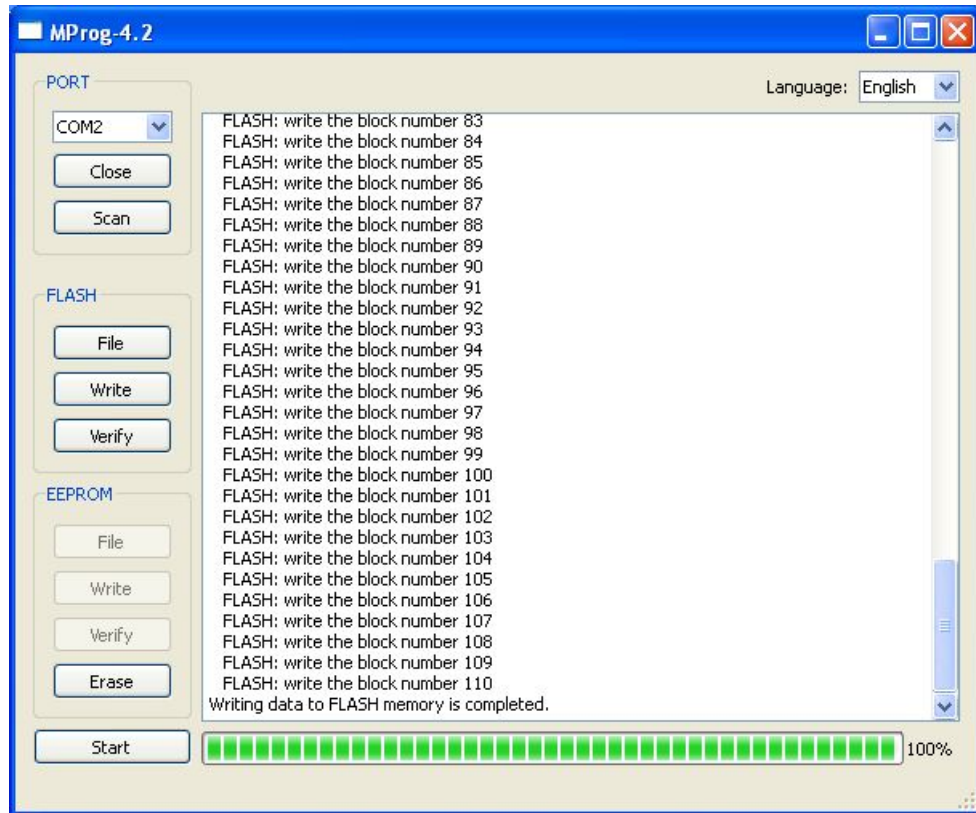


**Fig. 3.4.** File is uploaded


7. Click the  button in “Flash” frame

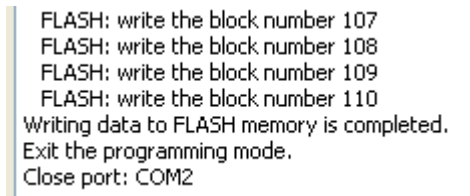
After this, data will be written in Flash-memory and you see such text:





**Fig. 3.5.** Flash-memory writing

8. Next click the  button in bottom part of program window;  
This will make the modem exit from programming mode and the port will be closed.



**Fig. 3.6.** Exiting program mode

9. Close the program  
10. Place the SIM holder into the modem  
The software update is completed. The modem goes into the work mode.



## **4. Emergencies**

To facilitate the use of the modem, tracking and display of emergencies are provided.

### **4.1. Emergency 1 (incorrect input power supply)**

Emergency 1 occurs when the input power supply deviates from the permissible value. The modem stops working and it shuts down the GSM module power. A permanent red LED signals that the emergency has occurred. The recovery is possible only when the input power supply is re-established.

### **4.2. Emergency 2 (incorrect module power supply)**

Emergency 2 occurs when the GSM module power supply deviates from the permissible value. The modem stops working and it shuts off the GSM module power. A red LED signals that the emergency has occurred (0.5s on / 0.5s off). The recovery is possible only if the module power supply is re-established within 10 seconds after the emergency occurred. If within 10 seconds the module power supply remains incorrect (with a correct input power supply), the modem goes into the waiting mode meaning that the modem's power supply is turned off, the emergency indication is preserved. The waiting mode can be terminated only after the power is completely disconnected.

In case of repeated emergency, the modem should be serviced.

### **4.3. Emergency 3 (GSM module failed to start)**

Emergency 3 occurs if the GSM module does not turn on or is absent. A red LED signal (0.25s on / 0.25s off / 0.25s on / 1s off) turns on after a precise determination by the modem of the emergency situation (~15 sec). The recovery is possible only after a successful launch of the GSM module. After 10 unsuccessful attempts to launch the module, the modem goes into the waiting mode meaning that the modem's power supply is turned off, the emergency indication is preserved. The waiting mode can be terminated only after the power is completely disconnected.

In case of repeated emergency after the modem is turned back on, the modem should be serviced.



## 5. Support

New document versions and software are available using:

<b>St. Petersburg</b>	
The company's website:	<a href="http://www.radiofid.ru">www.radiofid.ru</a>
Phone number in St. Petersburg:	+7 (812) 318 18 19
E-mail:	<a href="mailto:support@radiofid.ru">support@radiofid.ru</a>
<b>Moscow</b>	
The company's website:	<a href="http://www.digitalangel.ru">www.digitalangel.ru</a>
Phone number in Moscow:	+7 (495) 974 74 22
E-mail:	<a href="mailto:info@digitalangel.ru">info@digitalangel.ru</a>

Our support team is ready to assist you with any questions you might have when installing, configuring or solving issues with our equipment.