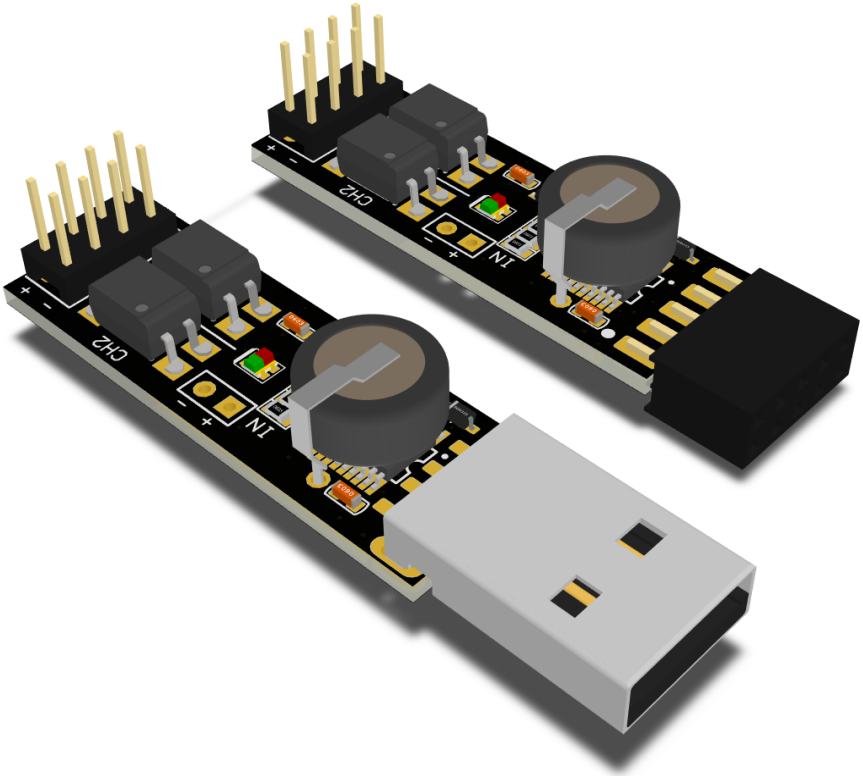
OPEN DEVELOPMENT

USB WATCHDOG PRO2

Auto Reboot Device



User manual

www.open-dev.ru
main@open-dev.ru
Open Development llc.

USB WATCHDOG PRO2

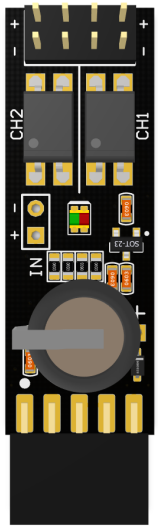
Product description

USB WatchDog Pro2 is the ideal solution for automatic reboot PC or other devices in case of computer is frozen. The main idea is to make sure the PC is always available and running, especially for systems that are not continuously monitored.

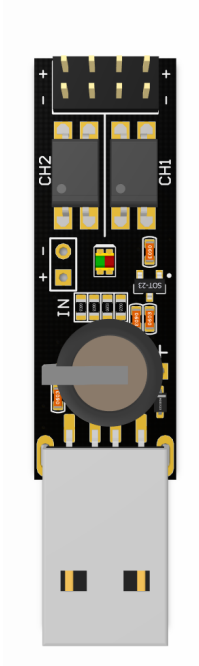
Key features

- Two modes for restart PC: push to «reset» pin and «power on/off» pin.
- Windows/Linux/macOS compatible.
- Connection via USB interface.
- Simple protocol allows implement own version of control software.
- Configurable time of waiting the PC signal from 1 to 15 minutes.
- Small size 57x14x10mm(USB TypeA) / 48x14x10mm(USB PBD10).
- Operates in temperature range -40/+85C.
- Doesn't need additional power supply.
- 2 led indicator.
- Ability to fine-tune the channels and algorithm of operation.
- Ability to limit attempts to restart the PC.

The device has two modifications: USB TypeA, USB PBD10.
Both devices have a USB interface, but different way to connection: PBD10 for connecting USB pins on a motherboard PBD10 socket or a USB TypeA to connect to a standard USB input.

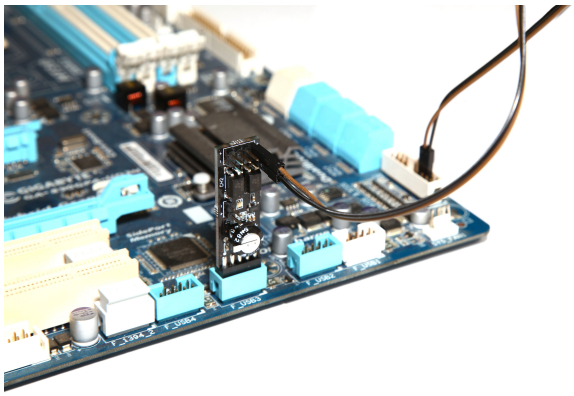


USB PBD10

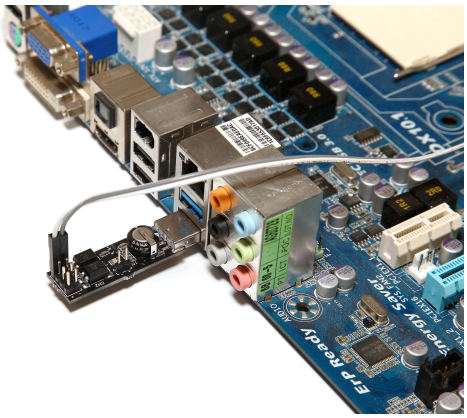


USB TypeA

Connection examples:



USB PBD10

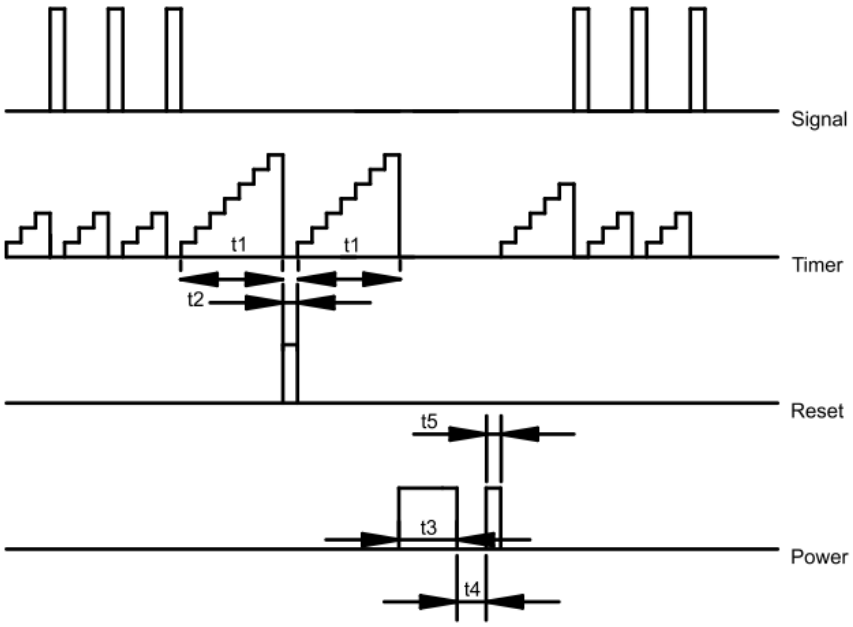


USB TypeA

Operation

The USB WatchDog device expects a periodic signal from the PC via USB. If no signal is received for a preset time t1, the USB WatchDog sends a signal of duration t2 to the Reset contacts. Further, if the signal does not appear after the time t1 has elapsed, a signal will be applied to the Power contacts of duration t3, waiting for duration of t4 and starting with a signal of duration t5.

The source of the signal for the watchdog timer is created by the program (or bat/bash script) running on the PC. If the PC is freezing, the program usually stops executing, hence the periodic signal disappears, which leads to the execution of the algorithm set in the watchdog timer.

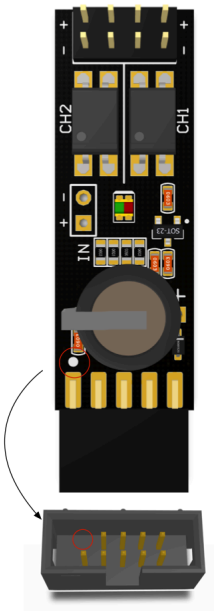
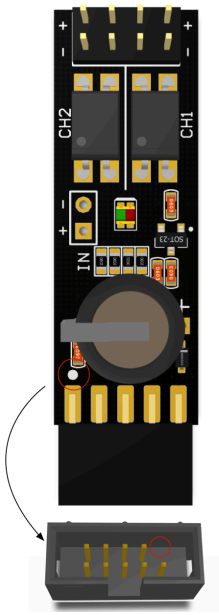


By default, channel 1 is configured to execute the Reset function, and channel 2 is to perform the Power function. But for fine tuning, the device allows you to change the function of the channels. Each channel can operate in one of 4 modes: the Reset function, the Power function, the controlled output or the channel is disabled.
You can set the same functions on both channels: for example, both reset or power.
If none of the channels is set to reset or power - the internal timer does not start, the device waits for commands from the PC. This allows you to build your own logic for controlling the watchdog timer (see the section "Advanced Device Management").

USB connection

- Connect a device with a TypeA connector.
  Connect the device to a suitable connector on the motherboard or PC system unit.

- Connection a device with PBD10-R plug
- During installation the device to the mainboard, make sure that you exactly connect to the internal USB header. Some interfaces (for instance ieee 1394) have the same 10-pins connector on the motherboard. **Connection not to USB interface can cause the damage of device.**
  On the version with PBD10 connector there is an arrow on the watchdog board. When connected to the PC motherboard, it should be aligned with the connector side which has no 1 metal pin.

	
OK	Rotate 180 degrees

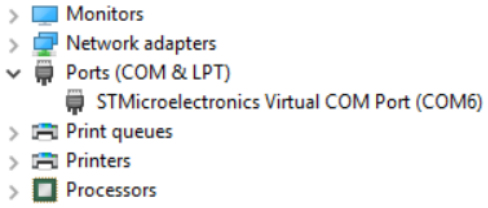
For the first time, do not connect the device's alarm contacts to the "Reset" and "Power" contacts, because the software must be pre-installed.

Note: Be extremely careful when installing the device. Since the device is open-frame, that is, the risk of a short circuit by touching metal objects or surfaces. This type of damage belongs to non-warranty cases.

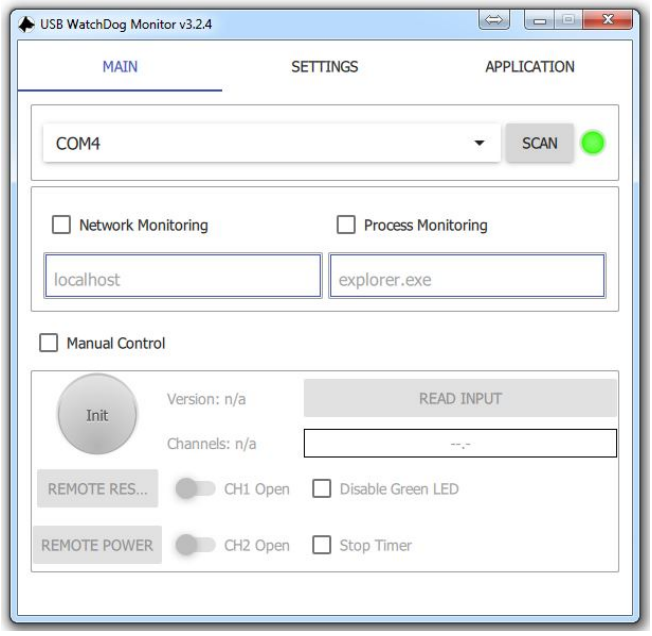
Configure

Before using the device, you may need to install device drivers [3]. In the operating system, the device will be defined as a "virtual COM port".

A. Windows, the device will be defined as a COM port (for example, COM12).
B. GNU/Linux, the device will be defined as a serial port (for example, /dev/ttyACM0).
C. macOS, the device must be defined as a serial port (for example /dev/cu.usbmodem1421)



A few seconds after turning on the device, the red LED will flash on the device, which indicates the correct operation of the device and its serviceability.
To work with the device, a cross-platform program with open source code is proposed [1] [2] [4].

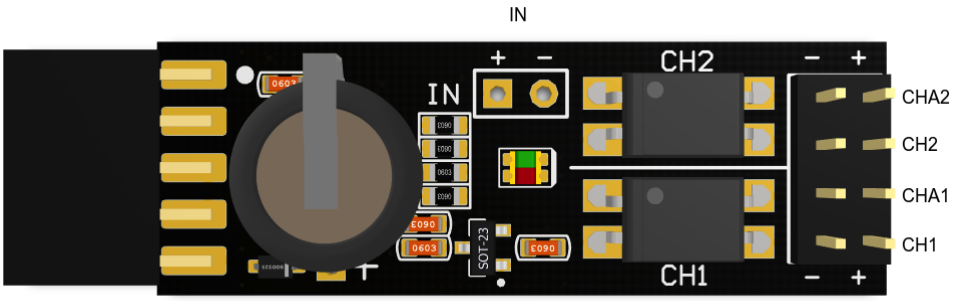


Main window

- When you first start the program, you must click the Scan button and select the COM port of the device in the drop-down list. If there are no ports in the list or there is only COM1, run the program from administrator.
- When the device is correctly selected, a green "light" starts flashing in the program. At the same time, a green LED will flash on the device.
- After that, restart the program so that the settings are guaranteed to be saved in the registry.
- If it turned out that after restart the settings were not saved, then the program did not have the rights to save settings in the registry and it should be run from administrator.

After installing the drivers (if necessary) and setting the software, you can turn off the PC and connect the Reset and Power signal contacts. **Observe the polarity when connecting! Otherwise, during the functional test, you will not have a PC response to the command (Reset or Power).** Please note that polarity may not be indicated on the motherboard, or it may be incorrect, therefore, it is easiest to establish the correctness of the connection by the experimental method (see the section "Testing the operability").

Signal contacts of the device:

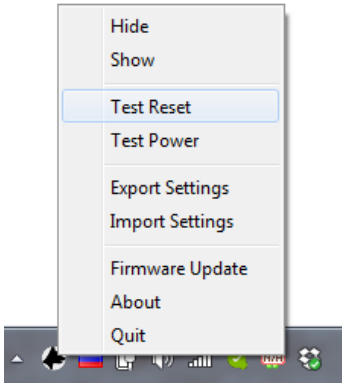


CH1 and **CHA1** – Channel1 parallel contacts. By default, Basic1 should be connected to the «Reset» contacts, Additional1 to the «Reset» button.

CH2 and **CHA2** - Channel2 parallel contacts. By default, Basic2 is connected to the «Power», Additional2 - to the «Power» button.

IN – A channel for a limit switch or an external temperature sensor DS18B20 connection. This input is directly connected to the processor. **Feeding signals with voltage higher than 3.6V and below -0.6V to this input will result in damage to the device.**

Testing the operability



To make sure that the device is properly connected to the motherboard, you can force the PC to reboot with the commands ~ T1 and ~ T2 to test the RESET and POWER signals respectively.

This operation can also be performed using a graphical program, by calling the menu item: "Restart test" and "Hard reset test" in the pop-up menu in the system tray.

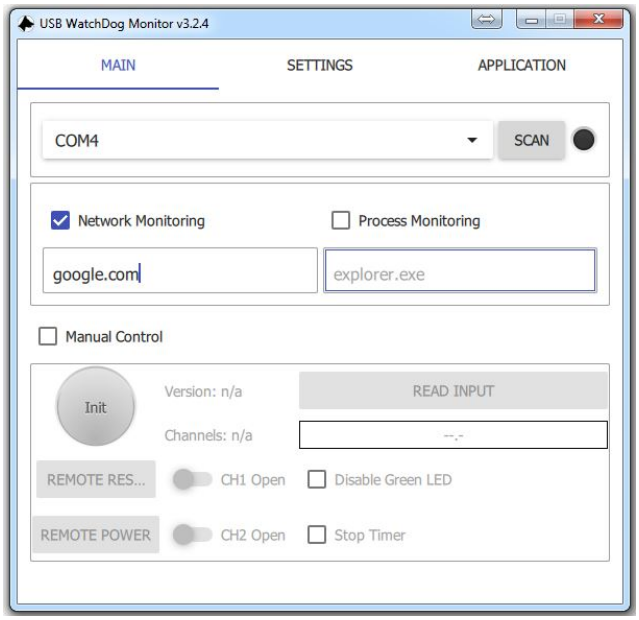
If the command fails, make sure the connection is correct and change the polarity of the connection.

Note: To ensure operation, each program periodically sends a signal to the watchdog timer about its operability. If the PC "freezes", the program will not be able to send a signal and the watchdog timer will begin its countdown before the reboot. Therefore, the ***program should autostart with OS.***

Checking the network node using the program. “Network Monitoring” Mode.

In the network monitoring mode, the program updates the device timer only when receiving a positive signal from ping. This mode is used to reboot when the network connection is lost.

To enable this mode, check the "Network monitoring" checkbox and specify the address of the remote host (ip or url).



Checking the operability of the process using the program.

In the process monitoring mode, the program updates the device timer only if a process is in the running list at a given moment.

To enable this mode, check the "Process Monitoring" checkbox and specify the name of the process (as in the list of processes in the task manager).

Work with input signals. Port IN.

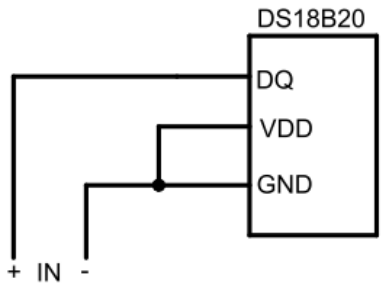
The IN port allows you to connect sources of external signals to the watchdog timer: the digital temperature sensor, for temperature monitoring or the limit switch for monitoring the opening of the housing, etc.

This channel has a pull-up to a voltage of 3.3V through a 4.7kΩ resistor. It should be remembered that the input is connected directly to the processor. **Feeding signals with voltage higher than 3.6V and below -0.6V to this input will result in damage to the processor.**

1. Working with a temperature sensor.

An external DS18B20 temperature sensor can be connected to the I / In USB WatchDog Pro2 input. For this, the combined inputs GND and VDD of the sensor DS18B20 are connected to the "-" input, and to the "+" DQ of the sensor.

Input to the program (parameter IN channel) should be set to "Temperature".



If the temperature sensor is connected, the temperature data can be periodically read by the ~ G command (see Table 1 of the "Advanced Device Control" section). The temperature data should be read no more than once in 3 seconds.

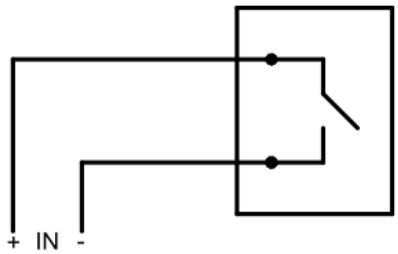
If the value of Temperature threshold (critical temperature threshold) is set to more than 0, the automatic temperature control mode

2. Automatic temperature control mode.

To enable the mode, you must set the input to the operating mode with an external temperature sensor (Temperature), and also set a non-zero threshold temperature. USB WatchDog analyzes the temperature value every 3 seconds. When the temperature is exceeded, the same actions are performed as for the timer overflow, which are determined by the channel configuration. For example, it is possible to configure automatic restart or shutdown of the device in case of overheating.

3. Working with a discrete input.

To enable the mode, you must set the input to the mode of operation with an external signal. It is possible to connect the normally closed / normally opened limit switch to the input Bx / In USB WatchDog according to the figure:



It should be remembered that the input is connected directly to the processor. Feeding signals with voltage higher than 3.6V and below -0.6V to this input will result in damage to the processor..

Restriction of the number of attempts to restart the system with a watchdog timer

By default, the watchdog tries to reboot the PC for an unlimited number of times in a row. If you want to limit the maximum number of successive reboot attempts, you must set the Reset Counter parameter value to be nonzero (1-15). For example, if you set the value to 10, the watchdog repeats 10 cycles of the PC reset (Reset + Power), turns off the machine and stops while waiting for the command. Each attempt to execute a Reset or Power is counted as one, i.e. With 10 attempts being made - it will be 5 attempts of Reset and 5 Power. If one of the channels is disabled, for example, only Power is activated, then it will be 10 attempts to reboot by clicking on the Power in a row.

Advanced device management

For integration with other systems, the device has a simple text protocol: each command starts with a "~" signal, followed by a command and an optional parameter

Table1. List of supported commands

Command	Value
~U	The periodic signal from the PC.
~Sx	Set channel x (1 or 2) to state 1 (for GPIO mode)
~Rx	Set the channel x (1 or 2) to 0 (for GPIO mode).
~Tx	Test operation: (1 - Reset; 2- Power).
~Px	Set the timer to pause - 1, remove from pause - 0.
~Mx	Commands for controlling remote devices: 1 - Reset, 2 - Power.
~Lx	0 - disable the light cycle indicator, 1 - enable.
~B	Reboot the module.
~D	Switch to the bootloader.
~I	Get the firmware version
~G	Get the input channel info. See Table 2.

Command	Value
~Wxxxxxxxxxxx	Write parameters. See Table 3.
~F	Reading parameters. See Table 3.

Table2. The response of the device to the command.

Command	Response
~U	~A
~Sx	~Sx
~Rx	~Rx
~Tx	~Tx
~Px	~Px
~G	~Gxxxx (See Table2).
~I	Firmware info
~Wxxxxxxxxxxx	Response with the F command ("Reading parameters").
~F	Reading parameters (See Table3).
~Lx	~Lx

Table3. Parameters.

Parameter	Units	Description
1	1 min*	Time before reboot (t1).
2	100 ms*	The duration of the «Reset» signal pulse (t2).
3	1 s*	The duration of the «Power» signal pulse (t3).
4	1 s*	The duration of the waiting time (t4).
5	100 ms*	The duration of the "Power" signal pulse (t5).
6		Channel mode 1: 0 - off, 1 - RESET, 2 - POWER, 3 - controlled (start state - open), 4 - controlled (start state - closed).

Parameter	Units	Description
7		Channel 2 mode: 0 - off, 1 - RESET, 2 - POWER, 3 - controlled (start state - open), 4 - controlled (start state - closed).
8		Set reload limit. 0 - no limit.
9		Channel 3 (I / In) mode: 0 - off, 1 - quantized input, 3 - temperature sensor input ds18b20.
10		Temperature threshold for an automatic reboot. Actual for channel 3 (I / In) set to the temperature sensor interrogation mode. It is set by the value of the threshold temperature in hexadecimal format, for example: 32 degrees - 20, 80 degrees - 50, 00 - disabled.
11		

*The values of parameters 1-5 can be in the range 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A (10), B (11), C (12), D (13), E (14), F (15).

Examples of using the device without a control program.

Windows

- Basic script example:

```
@echo off
SET portname=COM12
:loop
set /p x="~U" <nul >\\.\%portname%
ping -n 2 127.0.0.1 > nul
goto loop
```

The portname parameter specifies the device port.

The command ping -n 2 127.0.0.1> nul creates a pause equal to n-1 seconds.

- Node availability check script:

This script checks the availability of the host specified by the hostname parameter.

```
@echo off
SET hostname=open-dev.ru
SET portname=COM12
:loop
  ping -n 1 -l 4 -w 1000 %hostname% >nul
  if %errorlevel%==0 set /p x="~U" <nul >\\.\%portname%
  ping -n 2 127.0.0.1 > nul
goto loop
```

The portname parameter specifies the device port.

The command ping -n 2 127.0.0.1> nul creates a pause equal to n-1 seconds.

Linux. BASH.

- Basic script example:

```
#!/bin/bash
PORT=/dev/ttyACM0
while true
do
  echo -n "~U" > $PORT
  sleep 1
done
```

The PORT parameter specifies the device port.

- Node availability check script:

```
#!/bin/bash
HOST="open-dev.ru"
PORT=/dev/ttyACM0
while true
do
  if ping -c 1 $HOST; then
    echo -n "~U" > $PORT
  fi
  sleep 3
```

The PORT parameter specifies the device port.

Technical characteristics.

Category	Value
Supply voltage USB, V	5 ± 10%
Maximum current consumption for all active channels, mA	80
Output Type	Transistor optocoupler
Maximum output voltage, V	35
Dimensions USB TypeA / USB PBD10, mm	57x14x10/48x14x10
Operating temperature range, C	-25…+70

Warranty

The warranty period is 12 months from the date of production or 6 months from the sale to the end user. Malfunctions revealed during the warranty period, caused by the fault of the manufacturer, are repaired at the manufacturer's expense.

The manufacturer is not liable for damage to property and health caused to the consumer and / or third parties as a result of actions during installation, commissioning and operation of the product.

Repair and maintenance of products with expired warranty period is carried out at the expense of consumer funds.

Delivery to the place of warranty repair is carried out at the expense of the consumer

Download.

1. Application source code: https://bitbucket.org/Rdmr/open-dev/src

2. Applicaition download link Win/Lin/OSX

3. Driver for Windows:
32x https://open-dev.ru/software/VCP_V1.3.1_Setup.exe
64x https://open-dev.ru/software/VCP_V1.3.1_Setup_x64.exe

4. Support: support.open-dev.ru