

Instructions for updating the microcode and method of configuring the Octopus KDS-2, Octopus KDS-2 Mini and KDS-2 Nano controllers

General clause

The KDS-2, KDS-2 Mini and KDS-2 controllers are sophisticated software and hardware tools for controlling electrochromic glass. The controllers are based on genuine STM32 microcontrollers using Cortex-M3 central processing units. Controllers with a significant amount of both RAM and permanent memory, as well as ST-Link and USART outputs. Thanks to this, the end user / installer has the opportunity to update the microcode of the controller as well as to make user-accessible configuration of the controller functions.

When updating the firmware code, pay attention to the versions of both factory and user settings. The current version of the firmware code is available for viewing through the USART connection, the version of the code installed at the factory is also indicated in the passport for the device supplied. If the versions of the user settings in the already installed version and the new version of the microcode do not match it will be necessary to reconfigure the user settings again, which the user can make himself. If the versions of the factory settings do not match, reconfiguration can only be performed at the factory or under supervision of the factory representative.

Since the firmware code is constantly being improved, additional functions are added, existing errors are eliminated, if it is necessary to update the firmware code it is advisable not to perform this operation end-user if the qualification of the end user is not at the required level, but to contact nearest Octoglass dealer.

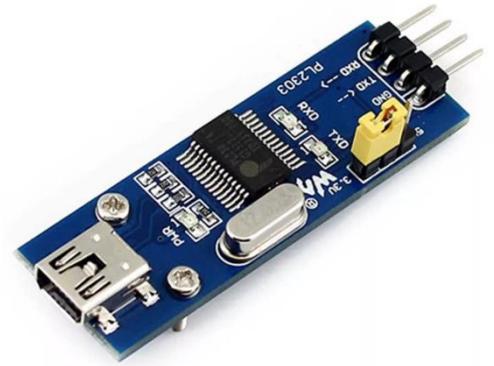
Hardware

To make an update of the microcode or configuring the controller, the following hardware must be used:

1. A stabilized 12 V DC power supply with a power of at least 0.5 A, 3 A is recommended. When operating from a power supply with a current of less than 3 A, electrochromic glass usage is not recommended.
2. ST-Link programmer version not lower than 2.0. ST-Link v2 Mini programmers have proven themselves well (on the photo).



3. USART or UART interface unit (usually USB-UART) with 3.3 V outputs. Do not connect interface units with outputs over 3.3 V to the controller. WareShark units based on PL2303 chips have proven themselves well (on the photo).



4. Personal computer with 2 USB ports and Windows 10 operating system (if it is possible).

Other compatible hardware may be used.

Software

The software must be installed on the PC before connecting the devices.

It is recommended to use the STM32Cube Programmer product as an environment for updating the microcode. During product installation, the corresponding device drivers are also installed.

Serial terminal is used as a configuration medium. Configuration is done via the command line. Any modern terminal can be used for the connection to a controller. It is recommended to use one of the following: KiTTY, RuTTY, PuTTY.

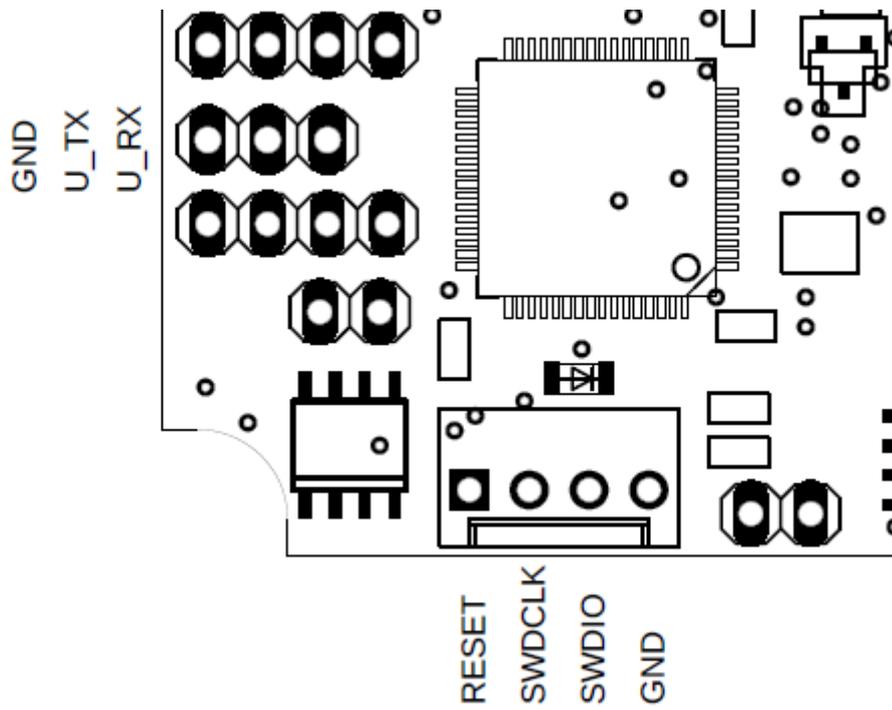


Figure 3 Connection points of KDS-2 Nano

On KDS-2 Mini and KDS-2 Nano connectors are not marked, however the connector for ST-Link has 4 pins, the connector for USART has 3 pins.

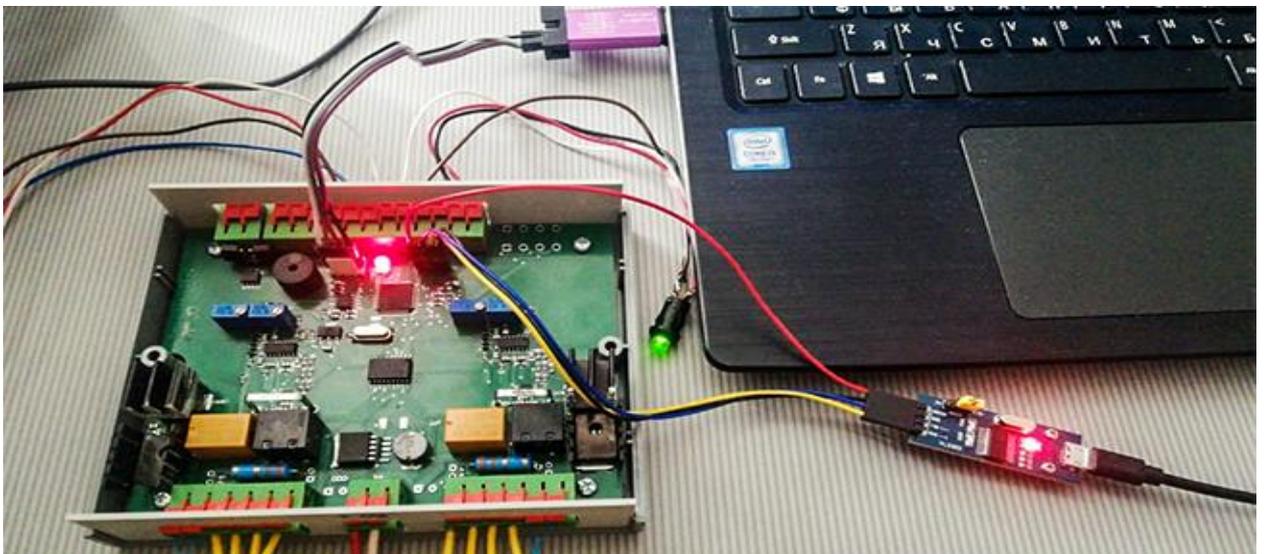


Figure 4 One of the options for connecting KDS-2 to a laptop

When connecting devices, be sure to connect the GND pin on each of the devices. When connecting to the UART connector, pay attention to the fact that RX and TX pins of the controller and the interface unit must be cross-connected: RX of the controller is connected to the TX of the interface unit, TX of the controller to RX of the interface unit. By connecting the pin, if any, 3.3 V on the USART board to the corresponding pin on the controller, it is possible to work with the controller in a limited mode without connecting an external power supply. When connecting an external power supply, it is recommended not to connect the 3.3 V pin of the USART controller to the corresponding output of the USB-UART interface block.

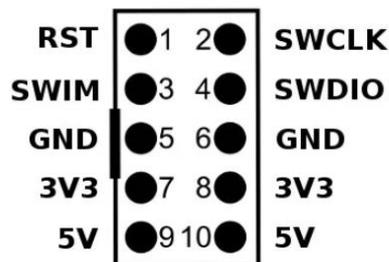


Figure 5 Standard ST-Link v2 Mini connector

When working with ST-Link v2 Mini you may often have questions about finding the required outputs and the differences between their designations. The connection must be made in the manner indicated in the following table.

Pin ST-Link v2 Mini	Pin KDS-2	Pin KDS-2 Mini
GND	GND	GND
SWDIO	SWDIO	IO
SWCLK	SWCLK	CLK

Table 1 Conformity of the outputs of ST-Link v2 Mini, KDS-2 and KDS-2 Mini

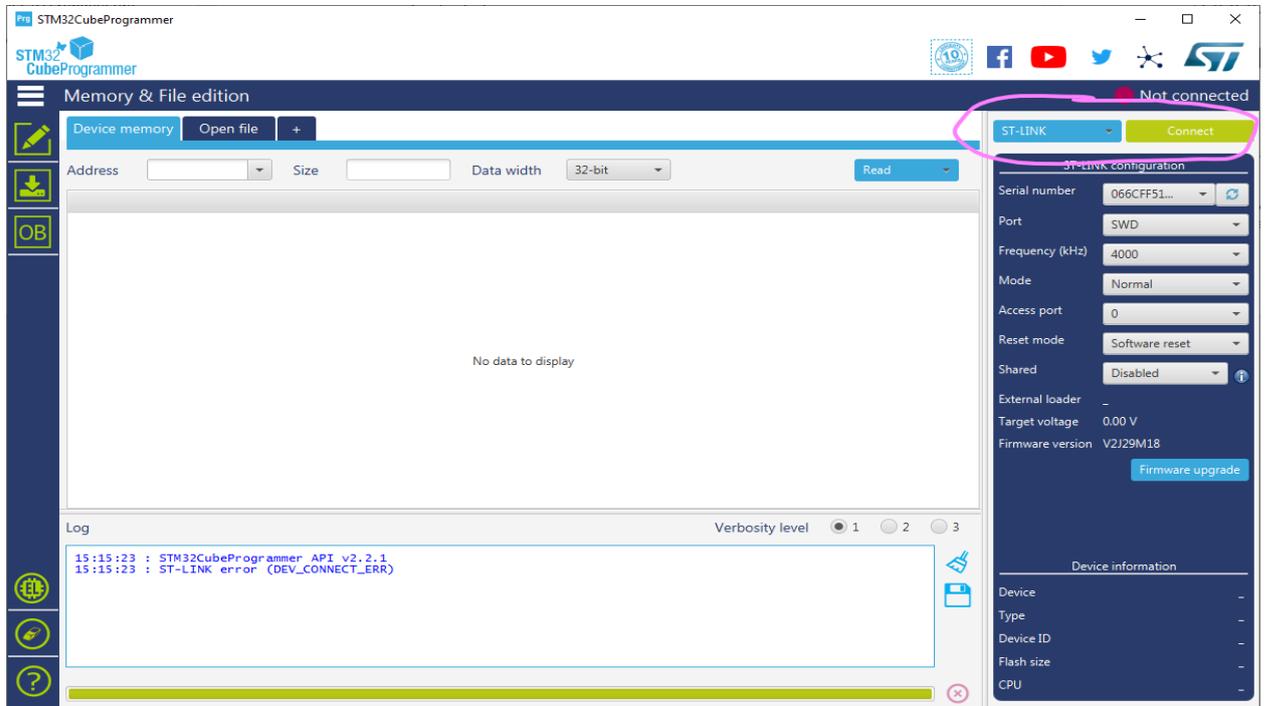
Note: Controllers made with a microcontroller manufactured by ST Electronic (chip designation begins with STM32) can be programmed using any ST-Link adapters from version v2 and above. At the same time, the controllers made with a microcontroller manufactured by Giga Device (chip designation begins with GD32) can be programmed only with ST-Link v2 devices.

Firmware code update

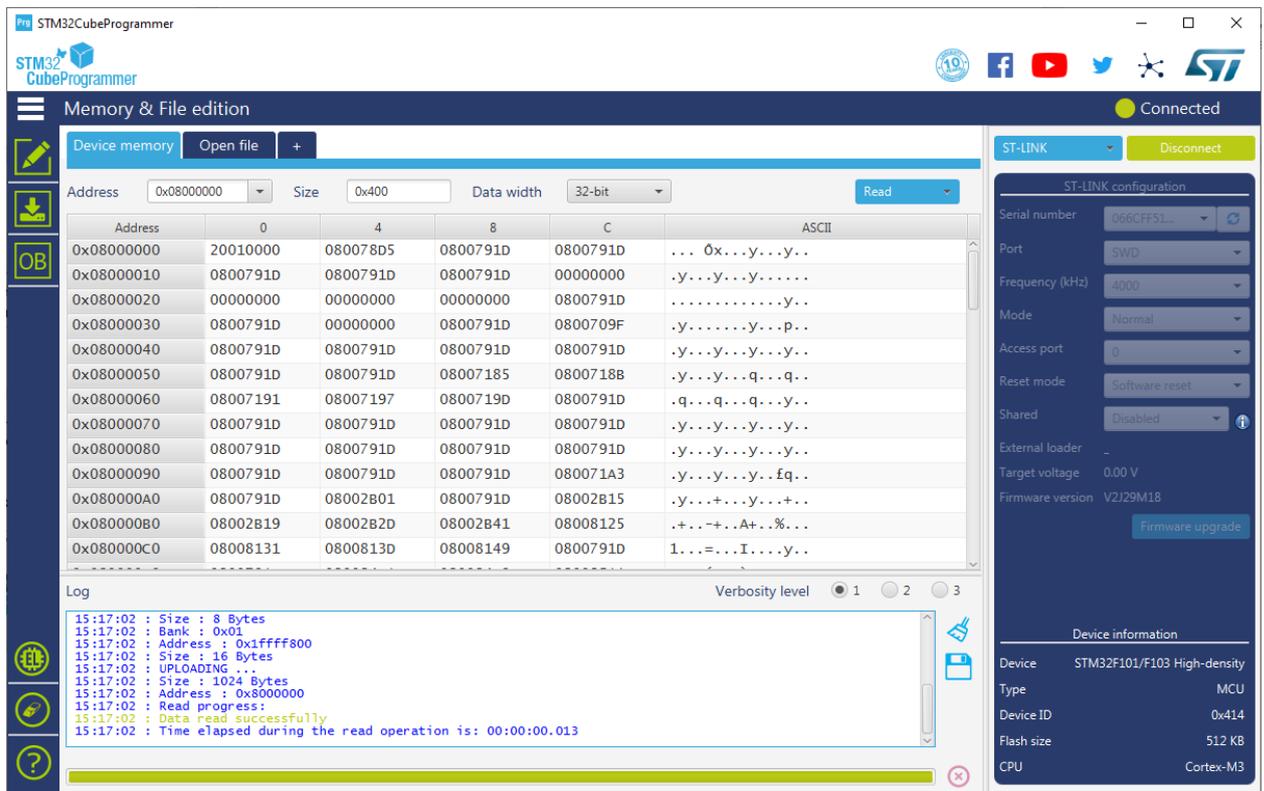
To update the firmware code, the controller must be connected to the ST-Link, the ST-Link must be connected to the PC, the controller must be powered.

The controller cannot perform any operations while the firmware is being updated. It should be at IDLE mode (not power the glass).

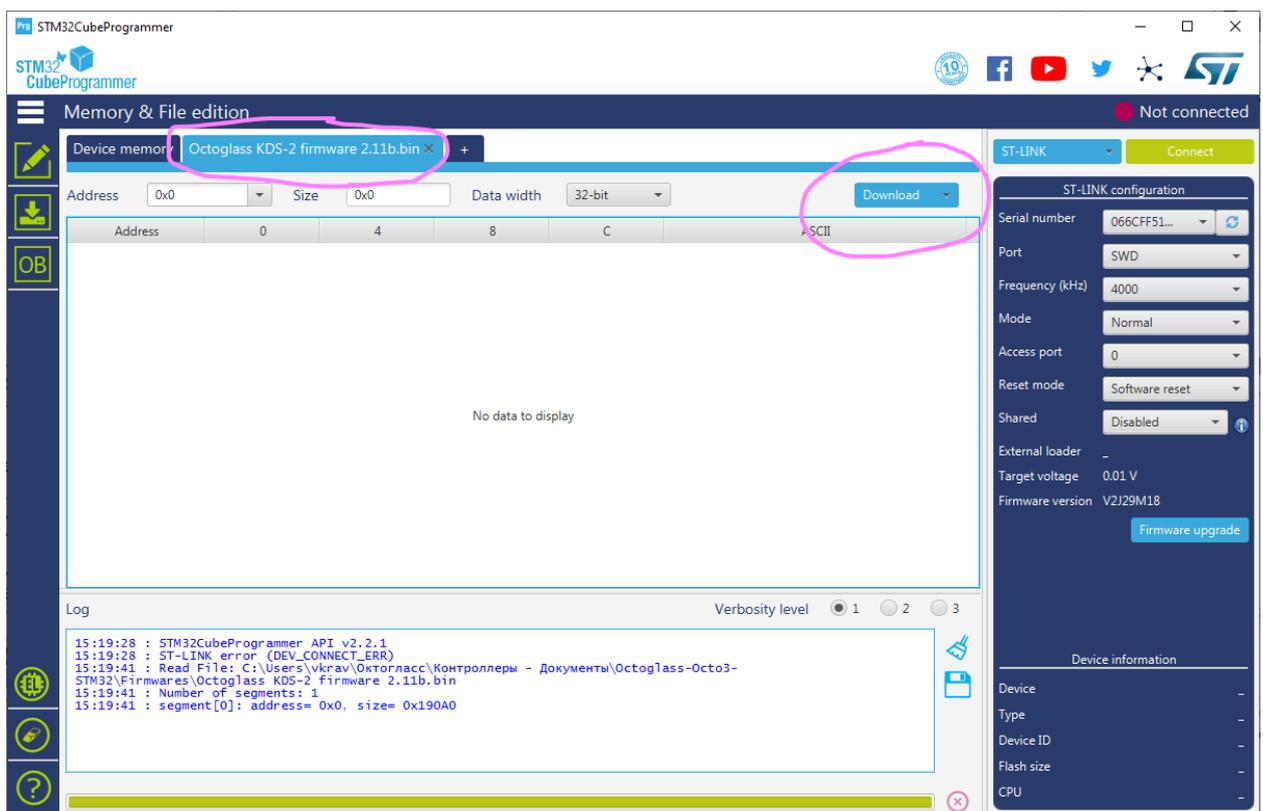
1. Launch STM32Cube Programmer. Make sure that ST-Link is selected in the programmer selection menu and press the Connect button.



2. After successful connection, the status in the upper right corner changes to Connected, and the Device memory tab is filled with information read from the controller's memory.



3. In the same window, select the new firmware file (a file with the bin extension) through the Open file tab and click on the Download button.



4. After completing the download procedure, press the Connect button and thereby disable the programming mode, the controller returns to the operating mode.

Note. Some ST-Link v2 Mini programmers are made on non-original ST chips and cannot be used with STM32CubeProgrammer. In this case it is necessary to use ST-Link Utility to update the controller software.

Custom configuration

If there is a need for custom configuration, you need to connect the USART to the controller and run the terminal program to access the controller command line.

Determining the COM port number for connection in the terminal program

To determine the COM port number for connection in the terminal program, you need to call the Device Manager in Windows and expand the tab with the ports initialized in the system.

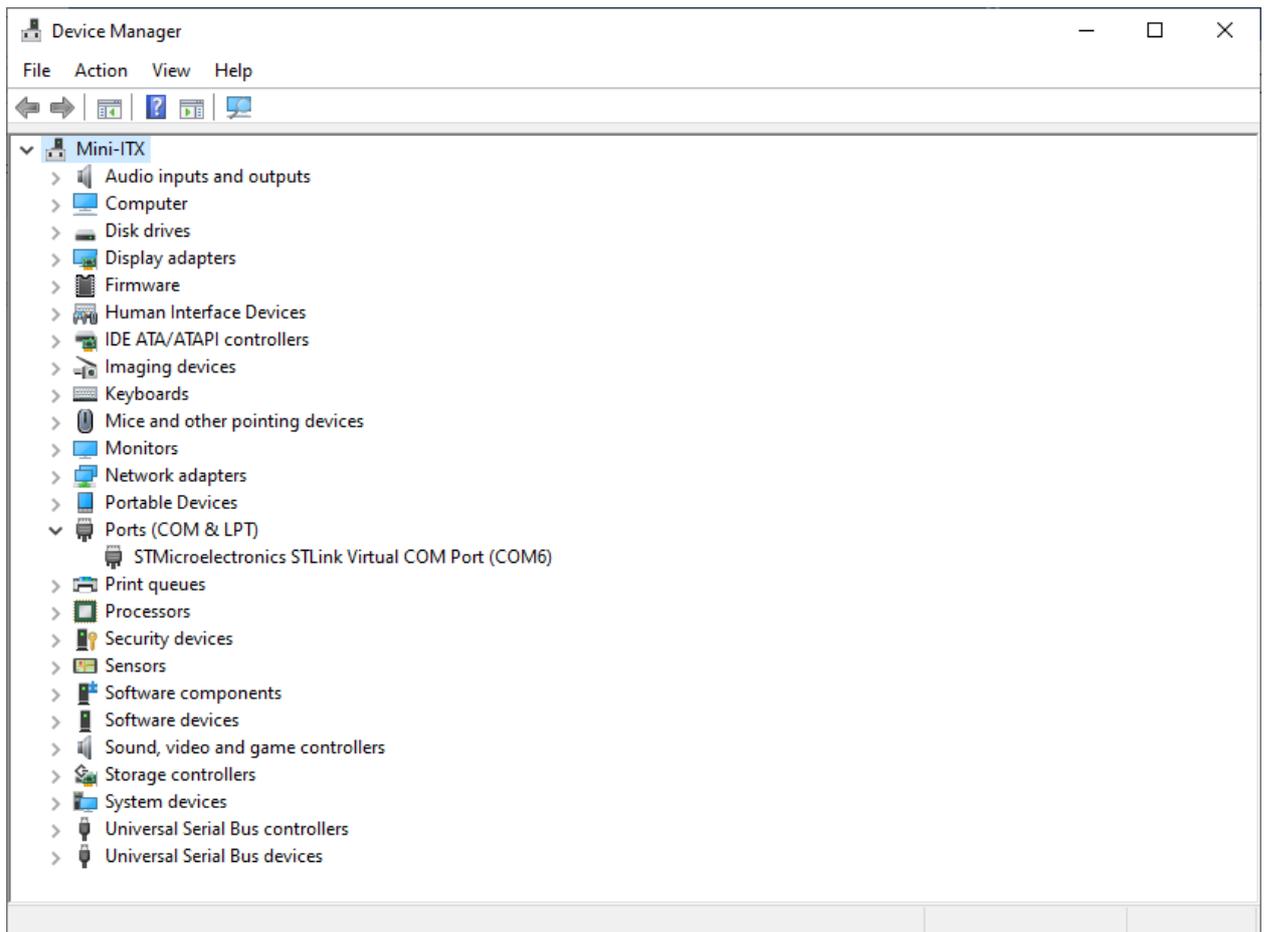


Figure 6 The view of the Device Manager window with a single connected device on COM6

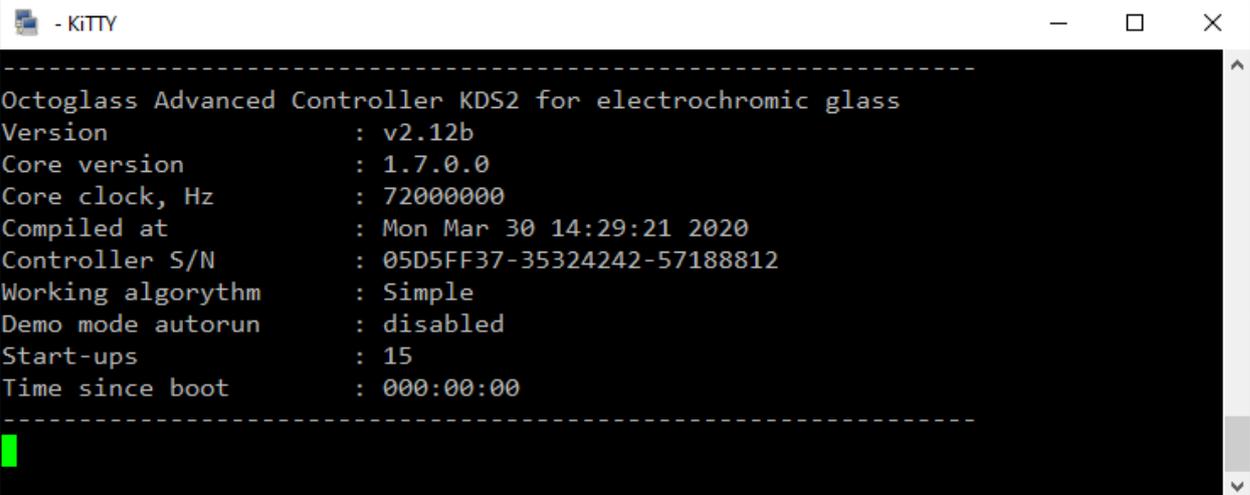
Connection in a terminal program and work in it

To connect to the controller via a serial protocol, select the COM port on which the device with the controller is connected in the terminal program, select the connection speed of 115200. When working in terminal mode, you do not have to disconnect the ST-Link device, but you must exit the programming mode.

After successful connection to the controller, in the terminal window you can enter commands to the controller and receive output from it. In all modes, the controller responds to the following basic commands:

- STAT - displays the current information about the controller.
- REBOOT - reboots the controller.

All commands are entered in uppercase Latin letters (if other instructions are clearly not stated). Completion of the command is indicated by pressing the Enter key.

A screenshot of a terminal window titled "- KiTTY". The terminal displays the following text:

```
-----  
Octoglass Advanced Controller KDS2 for electrochromic glass  
Version           : v2.12b  
Core version      : 1.7.0.0  
Core clock, Hz    : 72000000  
Compiled at      : Mon Mar 30 14:29:21 2020  
Controller S/N   : 05D5FF37-35324242-57188812  
Working algorith : Simple  
Demo mode autorun : disabled  
Start-ups        : 15  
Time since boot  : 000:00:00  
-----  
█
```

Figure 7 Example of controller output in terminal mode

To enter the user configuration mode, enter the CONFIG command. To exit this mode, use the EXIT command. The complete set of commands for configuration is given in the user documentation for the controller.

Configuration with help of a dedicated Windows application

For ease of use, a Windows application has been developed that allows you to configure the parameters, not using commands in the terminal mode, but using the graphical interface of the application in the Windows environment. The application allows you to configure all parameters using a simple interface.

Additional materials:

1. STM32Cube Programmer can be downloaded from the official website ST <https://www.st.com/en/development-tools/stm32cubeprog.html>
2. PyTTY can be downloaded from the official website <https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>
3. KiTTY can be downloaded from the official website <http://www.9bis.net/kitty/#!pages/download.md>
4. RuTTY can be downloaded from the official website

<https://sourceforge.net/projects/rutty/>

5. Support page with downloads

https://octoglass.ru/services_constructions_support_en.html

6. ST-Link Utility can be downloaded from the official website

<https://www.st.com/en/development-tools/stsw-link004.html>