

DWM (Digital Watt Meter) Firmware Update Guide



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1.0 Preparation

1.1 Programmer

1.1.0 What to Buy

The first step to upgrading the firmware on the DWM is to purchase a programmer. The required programmer is called an **ST-Link V2 Programmer**. They can come in a variety of colors and may vary in their pin order but they all work the same and will look like the following image:



Figure 1. St-Link V2 Programmer

Also, a 3-pin male header is needed to connect the jumper wires to the board.

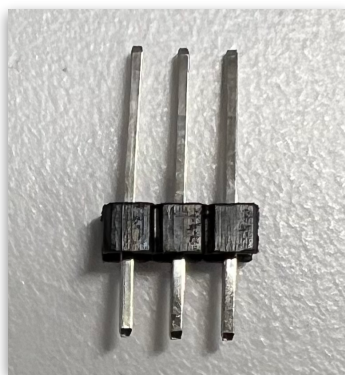


Figure 2. 3-Pin Male Header

1.1.1 Where to Buy

The programmer can be obtained on amazon, eBay, and Ali Express depending on how quickly you would like to receive the programmer. As of the writing of this guide, the price of the programmer is in the range from \$2 - \$12, do not pay much more for it unless you have to.

Try to make sure it comes with the little jumper wires as shown in figure 1.

1.2 Software

1.2.1 What to Get

The software needed to program the device is made by the designer company (ST) for the STM32 series microcontrollers which is what is being used on the DWM. The software they are maintaining for what we need is called **STM32CubeProg**. It supports operating systems including Windows, MacOS, and Linux.

1.2.2 Where to get

The link to the programming software is currently:

<https://www.st.com/en/development-tools/stm32cubeprog.html>

If the link doesn't work, navigate to ST's website by searching **STM32CubeProg** and selecting the link from [st.com](https://www.st.com). Watch out for google ads pretending to be ST.

Once on the STM32CubeProg webpage, scroll down to the bottom and select the version based on your operating system. If you are using windows and your computer is from this century, the WIN64 version is most likely going to work for you.

Then, click on "Get latest" to start the download process.

ST will then ask you to sign in or create an account, this is to limit spam. Only enter in the information you are required to and finish the account creation.

Once done, the software should begin downloading. If it does not begin automatically, click on "Get Latest" again while signed in and the download will work.

1.2.3 Installation

Once the download is complete, open the installer. The process will be generally the same for each operating system.

Click next, agree to the terms and conditions, and select the option that says you have read the privacy policy (because we all do that... right...?).



Figure 3. STM32CubeProg Installation

Then select the installation path. The default installation path it gives is good, so do not touch it unless you know what you are doing.

Click next and it will ask you to select the packs to install. Make sure all are selected just in case before continuing. The program will need about 600MB to install.

There should be a second installer window that may appear when installing on Windows. This is for the driver to allow the programmer to connect. Install that as well.

Once everything is finished installing, you are ready for the next step.

1.3 Firmware

1.3.0 Where to Get

Currently, the only way to get the firmware is by contacting me via email at: steamingcoax@gmail.com

Please include the 3-digit serial number written on your meter's board in the email.

This is because when I make each DWM, I recompile each firmware with the ADC calibration for the specific board it will be uploaded to.

Why you may ask?

Even though there is an EEPROM chip on the DWM, recompiling with the specific ADC calibration is done in case if anyone resets the ADC calibration through the hidden advanced calibration menu. So even if it is reset, the meter will still be calibrated correctly.

NOTE: The hidden advanced calibration menu can only be activated by holding down the MENU BUTTON while powering on the DWM. **DO NOT CHANGE THE VALUES IN THIS MENU!** To exit that menu, simply press the MENU BUTTON and the DWM will continue as normal.

1.3.1 Potential Issues

Because the firmware is a .bin file type, your system may think it is a virus or malware... Ignore the message if and only if you have gotten it from a trusted source (like from me).

If you get the new firmware from a friend, your meter will work just fine because the calibration for your specific meter that is used is in the EEPROM which does not change when you update your meter. Just don't reset the advanced calibration in the previously mentioned hidden advanced calibration menu!

2.0 Connections

2.1 Programmer Connections

There are 3 connections that are needed to program the DWM. The connections are labeled as follows: **SWDIO**, **SWCLK**, and **GND**.

The pin order on different programmers may vary. But they will all have the **SWDIO**, **SWCLK**, and **GND** pins.

Connect 3 jumper wires to the programmer and keep track of which color wire is connected to which pin. Make sure the connections are on the correct side of the programmer port. If the needed pins are on the right side of the label, then they will be on the right side of the header pins as can be seen in the following figures.

Then, connect the other end of the jumper wires to the 3-pin male header in the exact order: **SWDIO**, **SWCLK**, and **GND**. This can be seen in the following figures.

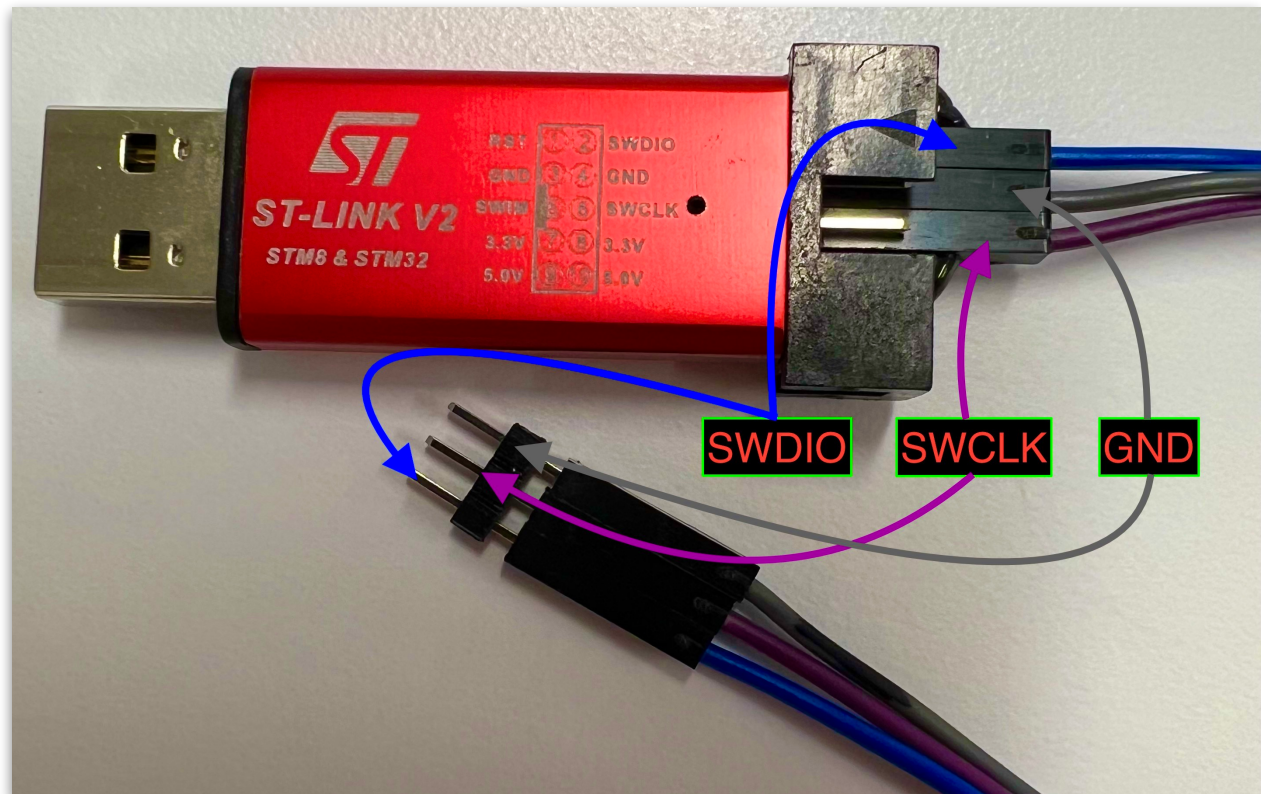


Figure 4. Programmer and 3-Pin Header Connection

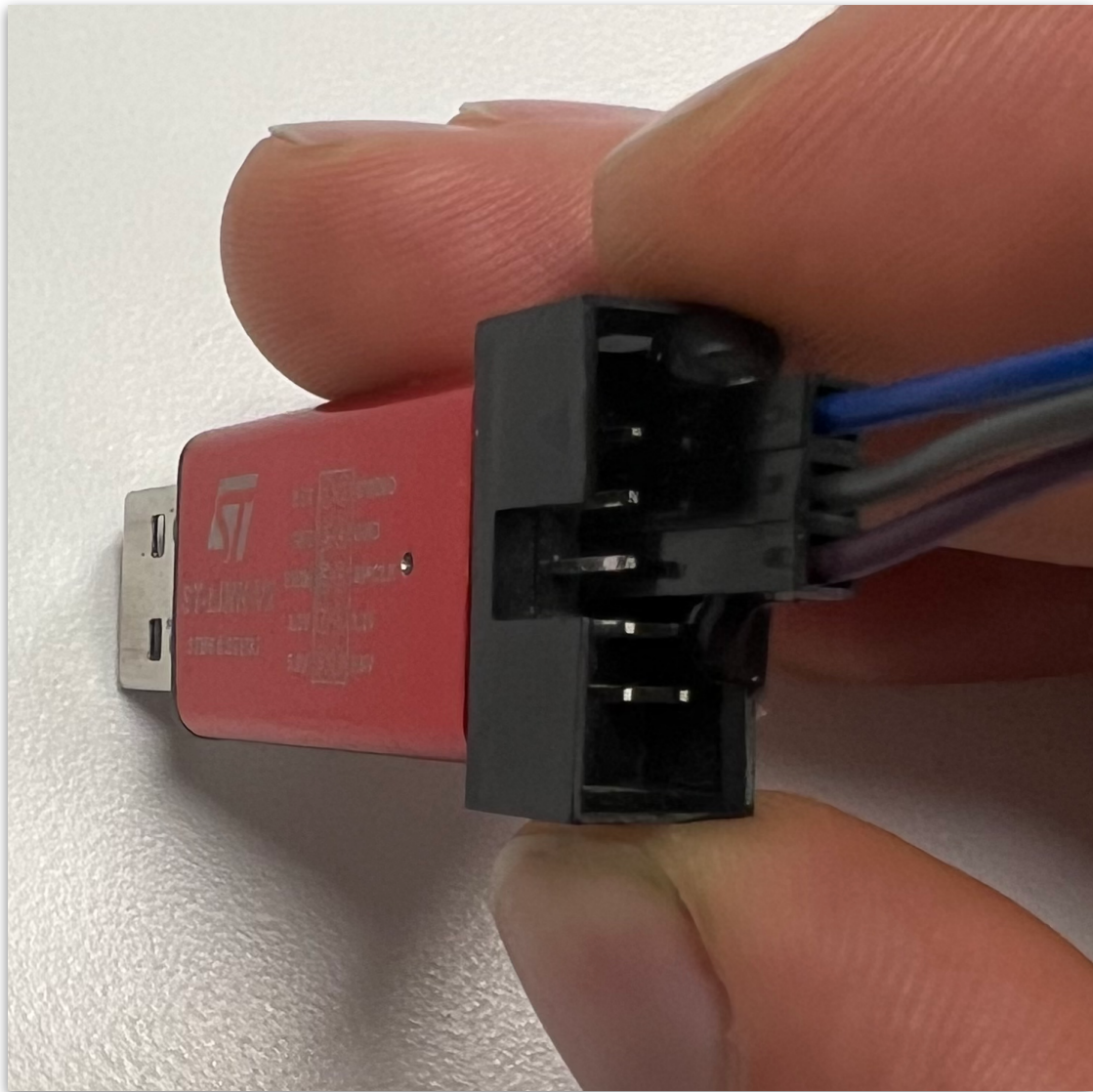


Figure 5. Needed Programmer Pins on Right Side

2.2 DWM Connections Location

First, remove the back cover from the DWM and locate the programming port as can be seen on the left in the following figure.

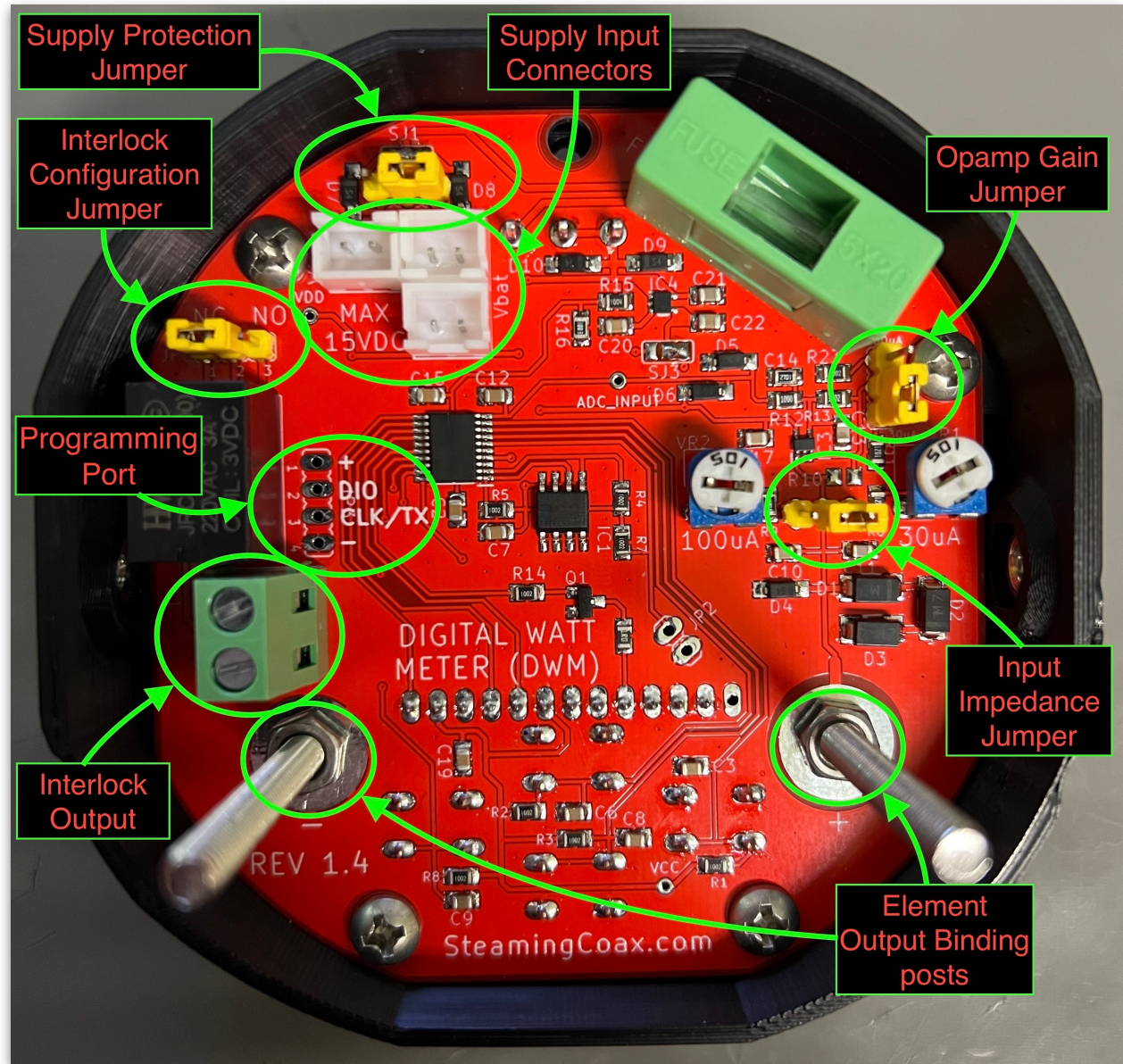


Figure 6. Significant Board Locations

2.3 Connecting Programmer to DWM

The port names on the DWM's board differ slightly from the port names on programmer. They correspond as follows:

Programmer	DWM
SWDIO	DIO
SWCLK	CLK/TX
GND	-

Table 1. Programmer and DWM Port Name Correspondence

Once verified, ensure the DWM is powered off and connect the jumper with the 3-pin male header into the port on the DWM's board. Be careful of the orientation!



Figure 7. Programmer Jumper Header DWM Connection

You are now ready to upload the new firmware!

3.0 Firmware Upload

3.1 Setting up STM32CubeProg

When opening STM32Cube Prog, the window like in the following figure will appear. Click on the download icon in green as indicated in the following figure to open the programming page.

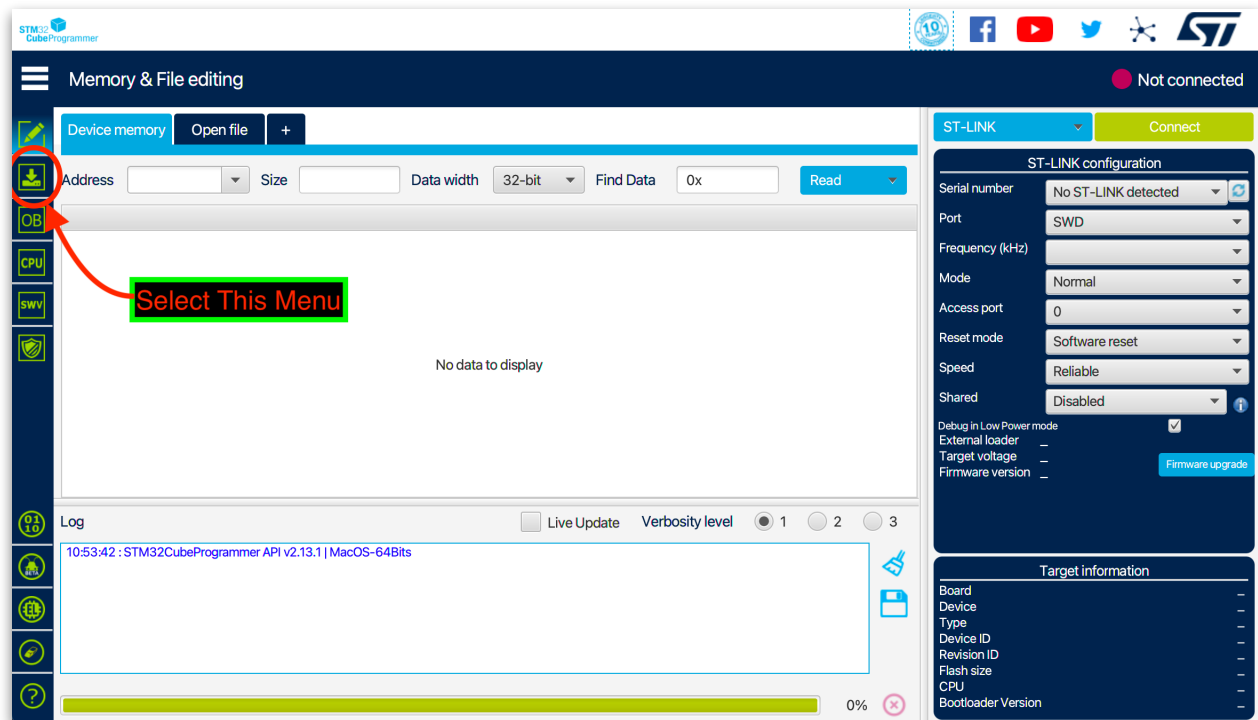


Figure 8. STM32CubeProg Startup Window

Once in the “Erasing & Programming” menu page, check the required boxes as indicated in the following figure.

Then, you will need to tell the program where to find the new firmware. This can be done by clicking the “Browse” button, then finding the firmware file location on your computer. It will most likely be in your downloads folder.

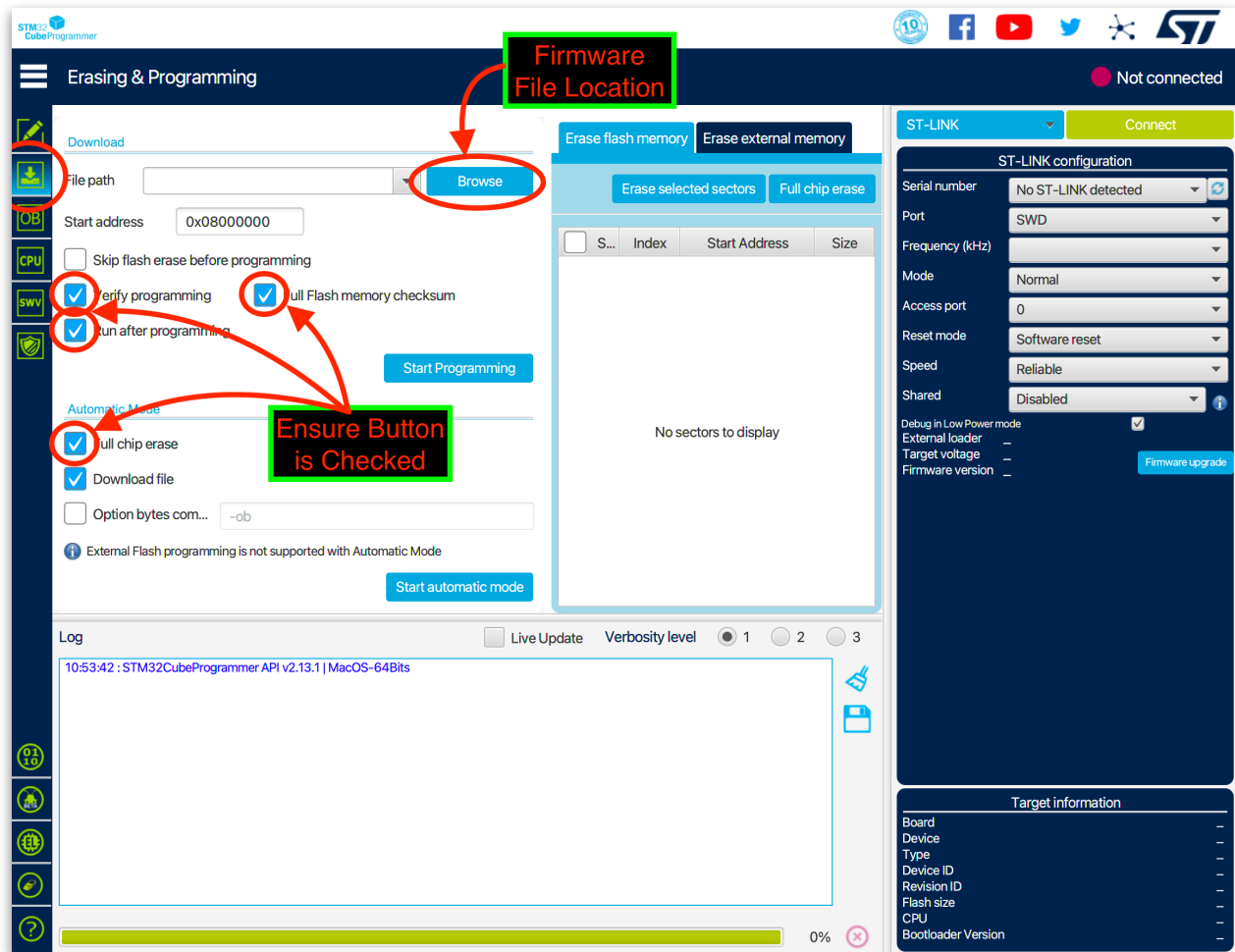


Figure 9. Erasing & Programming Menu Page

3.2 Uploading New Firmware

Next, connect the programmer to your computer's USB port, connect power to the DWM, and power on the DWM. Also, ensure the programmer's jumpers are still properly connected to the DWM's programming port.

Then, press the connect button in STM32CubeProg. Once connected, the display on the DWM will go dark. Then, wait until the top right of the window shows connected in the programming software.

Then, press the “Start Programming” button and the program will be uploaded.

WARNING: Do not adjust or move the wires during programming. This may cause the upload to fail.

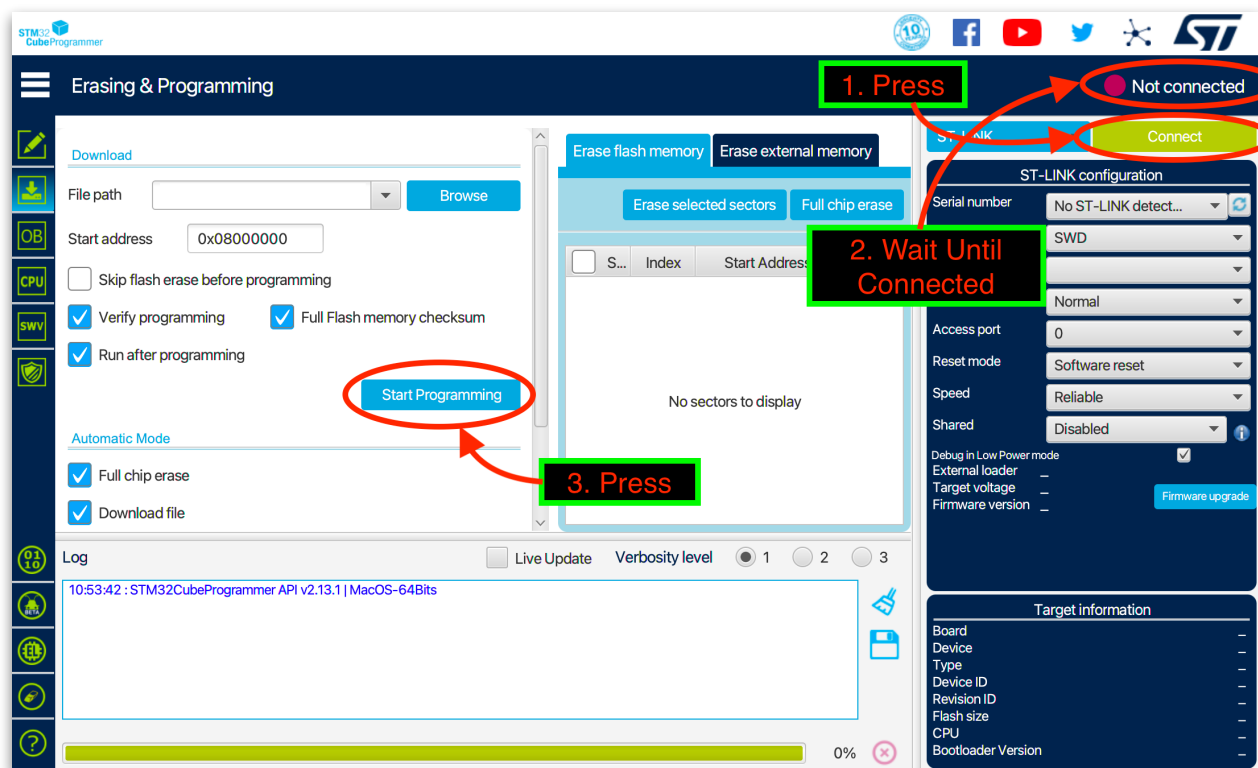


Figure 10. Connect and Program

Once programmed, press the “Disconnect” button and disconnect the programmer from the DWM's programming port.

Finally, head over to the Main menu on the DWM by pressing the MENU BUTTON and select the *info* menu and ensure the “FW:” line shows the new firmware version. If so, then your meter is now upgraded!

4.0 Troubleshooting

If the programming software fails to connect to the DWM, here are a couple potential reasons:

- DWM is not powered on.
- Programmer jumper header is placed backwards.
- The programmers jumpers are not properly crimped (sometimes happens with these kinds of programmers).

If the upload process is interrupted and the upload fails, restart the programming software, re-plug the programmer, and power cycle the DWM. The DWM may not power on correctly afterwards if the upload is interrupted, this is normal and continue again to upload the new firmware.

If you are having any trouble and you have properly followed the steps to the guide or if you just aren't sure of something, feel free to contact me by email at: steamingcoax@gmail.com