Controller Board (GRBL 1.1f)

User Manual

CRITICAL PRE-OPERATION NOTICE

READ THIS BEFORE ANY INSTALLATION OR CONNECTION

This GRBL 1.1F control board is an industrial-grade control module for CNC machines. **THIS IS NOT A PLUG-AND-PLAY USB DEVICE**. Stable connection and normal operation with a PC can only be achieved after you complete the driver installation, dedicated power supply connection, matching control software setup, and port parameter configuration in strict accordance with this manual.

1. **POWER SUPPLY FIRST**: You must connect the board to a qualified 24V DC power supply and turn on the power switch BEFORE connecting it to your PC via USB. The board cannot be recognized by the PC or establish serial communication without correct 24V power supply.

2. **DRIVER INSTALLATION IS MANDATORY**: The board uses a CH340 USB-to-serial chip. You must install the official CH340 driver on your PC before connection, otherwise the COM port will not be recognized.

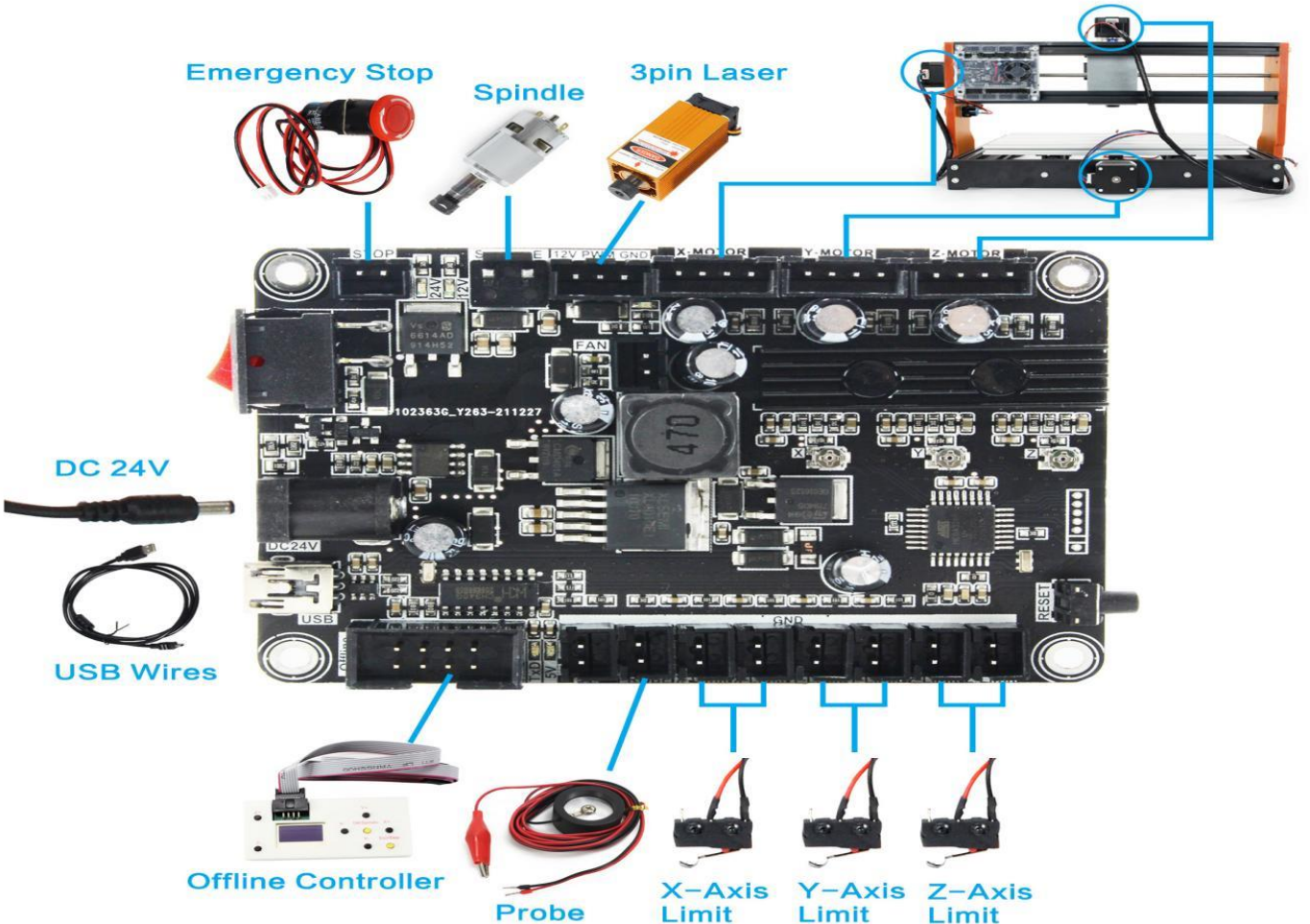
3. **PRE-OPERATION UNLOCK IS REQUIRED**: After the software is successfully connected to the board, you must click the "Unlock" button in the software toolbar before sending any motion commands.

If you encounter any connectivity or operation issues, please first refer to the "Comprehensive PC Connection Troubleshooting Guide" in this manual (95% of issues can be resolved quickly).
If you still need help, please contact our professional technical support team via Amazon buyer-seller messaging, and we will provide you with one-to-one guidance.

Package include:

- 1x Upgraded 3 Axis GRBL 1.1 control board
- 1x USB cable




Emergency Stop
Spindle
3pin Laser
DC 24V
USB Wires
Offline Controller
Probe
X-Axis Limit
Y-Axis Limit
Z-Axis Limit
X-MOTOR
Y-MOTOR
Z-MOTOR
FAN
DC24V
USB
RESET
GND

Connection for 24V spindle motor（2-pin VH3.96mm pitch)



Connection for Stepper Motors （4-pin 2.54mm pitch）

The module comes with 4-pin connectors for 3 stepper Motors. One for the X-, one for the Y- and another one for the Z-axis. The pin assignment is as follows.

Pin assignment:

XH 2.54 type



Connection for external 24V DC power supply adapter

On the left side of the control board, there is a DC power jack for connecting an external 24 VDC power supply.The outer ring of the jack is connected to GND, while the inner pin is connected to +24V.



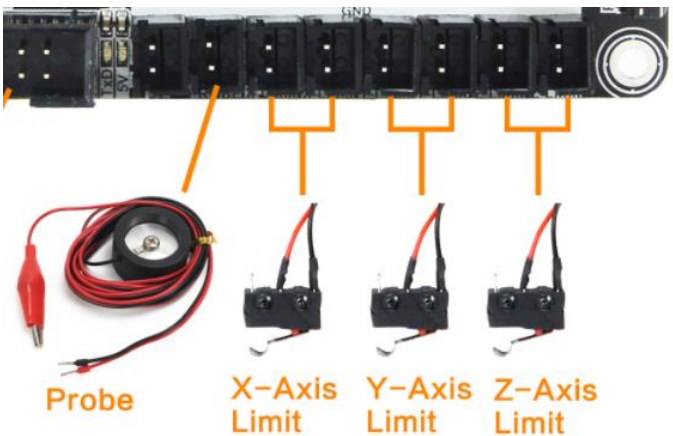
Connection for offline-controller

An external offline-controller can be connected to the 8-pin tub connector. This makes it possible to operate the CNC milling/engraving machine connected to the control module independently without an additional PC. In such a case, the positioning data (g-code) are stored beforehand on a micro-SD card located in the offline-controller.

Pin assignment:	+5V	GND	TxD	RxD
	+5V	GND	Reset	



Connection for limit switches and Z-Probe （2-pin 2.54mm pitch)



Pin assignment:

+5V Probe X-lim X-lim Y-lim Y-lim Z-lim Z-lim

GND GND GND GND GND GND GND GND

PC Connection Port

A PC can be connected via the mini-USB socket on the left side of the control module. The comes with a bootloader and GRBL firmware version 1.1F preinstalled at the factory.

Important Notes for PC Connection:
The default baud rate of the preinstalled GRBL 1.1F firmware is 115200, which is the only correct baud rate for serial communication.
The USB port only realizes serial communication between the board and the PC, and cannot supply power for the normal operation of the board. A separate 24V DC power supply is always required.

PC Connection Troubleshooting Guide

Step-by-Step PC Connection & Communication Guide

This chapter specifies the only correct operation sequence for establishing stable communication between the control board and your PC. Please follow the steps below in order, do not skip or reverse any steps.

4.1 Preparations Before Connection
A qualified 24V DC power supply for the control board
A high-quality shielded mini-USB data cable (charging-only cables will cause connection failure)
A Windows PC (this product is optimized for Windows XP / Win 7 / Win 8 / Win 10 (32/64 can be). Linux)
Please ensure that the CH340 driver and GRBL software are installed on the computer.

4.2 Mandatory Connection Operation Sequence

Step 1: Power on the control board

Connect the 24V DC power supply to the DC power jack on the left side of the board
Toggle the On/Off switch on the bottom side of the board to the ON position.

Step 2:
Driver Installation Verification: Open Windows Device Manager → Expand "Ports (COM & LPT)". If you can see "USB-SERIAL CH340 (COMX)" (X is the port number), the driver is installed successfully.

Step 3: Connect the board to your PC
Use the mini-USB data cable to connect the mini-USB socket on the left side of the board to the USB 2.0/3.0 port on your PC.
If the PC prompts "device recognized successfully", proceed to the next step. If not, replace the USB cable or PC USB port and try again.

Step 4: Establish software connection
Open the installed GrblControl/Candle or LaserGRBL software. Close any other software that may occupy the serial port (only one control software can be opened at a time).

PC Connection Troubleshooting Guide

In the software, select the COM port corresponding to "USB-SERIAL CH340 (COMX)" identified in Device Manager.
Set the serial port baud rate to 115200 (default parameter for the preinstalled GRBL 1.1F firmware).
Click the "Connect" button in the software. If the software status bar shows "Connected", the communication between the board and the PC is successfully established.
Step 5: Pre-operation unlock
After successful connection, click the "Unlock" icon in the software toolbar first. Confirm that the emergency stop switch is released and no limit switch is triggered, otherwise the board will remain in the locked state and cannot respond to commands.

Fault Phenomenon	Root Cause	Standard Solution
COM port for CH340 cannot be found in Windows Device Manager	1. CH340 driver is not installed or installation failed2. The control board is not correctly powered on3. USB cable is damaged or is a charging-only cable4. PC USB port	1. Reinstall the official CH340 driver with administrator privileges2. Confirm the 24V power supply is correctly connected, and the power indicator lights are steadily on3. Replace with a high-quality shielded mini-USB

Fault Phenomenon	Root Cause	Standard Solution
	is faulty or has insufficient power supply	data cable4. Switch to another USB port on the PC, avoid using a USB hub
Software shows "Port Opened", but the board has no response	1. Emergency stop switch is triggered2. Any axis limit switch is triggered3. Serial port is occupied by other software4. Baud rate setting does not match the firmware	1. Rotate to release the emergency stop switch, then click the "Unlock" button in the software2. Check and reset the triggered limit switch, click "Reset" first, then click "Unlock"3. Close all other software that may occupy the serial port, only keep one control software open4. Confirm the baud rate is set to 115200, which matches the preinstalled GRBL 1.1F firmware
Software connection is successful, but the motor cannot move	1. The "Unlock" operation is not performed after connection2. The control board power switch is not turned on3. Vref value of the stepper motor driver is not set correctly4. Stepper motor wiring is incorrect or loose	1. Click the "Unlock" button in the software toolbar immediately after successful connection2. Confirm the power switch is in the ON position, and the power indicator lights are on3. Set the correct Vref value according to the "Setting V ref" chapter in this manual4. Check the stepper motor wiring and pin assignment to ensure correct and firm connection

PC Connection Troubleshooting Guide

Fault Phenomenon	Root Cause	Standard Solution
Board is recognized occasionally, but connection is frequently interrupted	1. 24V power supply is unstable or insufficient2. USB cable is loose or has poor contact3. Firmware is damaged or abnormal4. Computer system has compatibility issues	1. Replace with a stable 24V DC power supply that meets the rated current requirements 2. Replace the USB data cable and ensure the interface is firmly connected 3. Re-flash the GRBL 1.1F firmware according to the "Firmware Update Guide" in this manual 4. Restart the computer, or test the connection on another Windows PC
Engraving result is oval instead of perfect circle	1. Synchronous belts of X/Y/Z axes are loose2. Stepper motor Vref value is set incorrectly	1. Check and tighten the synchronous belts of all axes, then fasten the M3 screws of the synchronous belt with an Allen wrench 2. Re-calibrate the Vref value of the X and Y axis stepper motor drivers

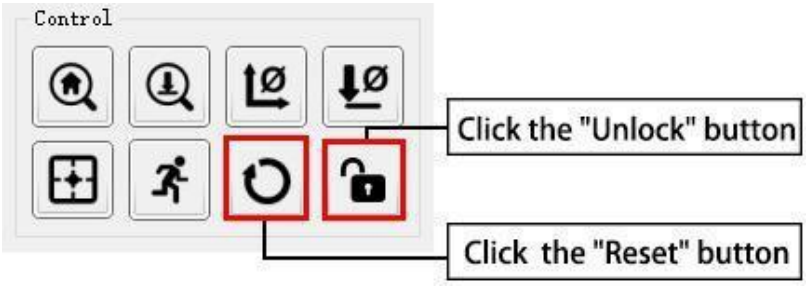
GRBL Driver&Software FAQ

Q1: Why can't the COM port number be found when the machine is connected to the software?

1. Please check if the CH340 driver program is installed successfully?
2. Check the USB port to make sure it is successfully connected.
3. Connect to other USB ports on the computer.

Q2: When the software is connected, the status line shows "port opened", what should we do?

1. Check whether the emergency stop switch is working, if it is, you need to rotate and loosen the emergency stop switch, and then click the "Unlock" icon in the toolbar to unlock it.
2. Check limit switches. The machine is also locked if any axis touches the limit switch. In this case, you need to click the "Reset" icon in the toolbar first, and then click the "Unlock" icon to unlock.



Q3: Why did you successfully connect the machine with the software, but the machine still cannot move?

1. Check whether the power switch on the control board is turned on, please make sure the machine is running under power on.
2. Every time you turn on the machine, please click the "unlock" icon first, and then start working.
3. Check the emergency stop switch and limit switch according to the steps of Q2.

Q4: If you can not engrave circles, only ovals, what should we do?

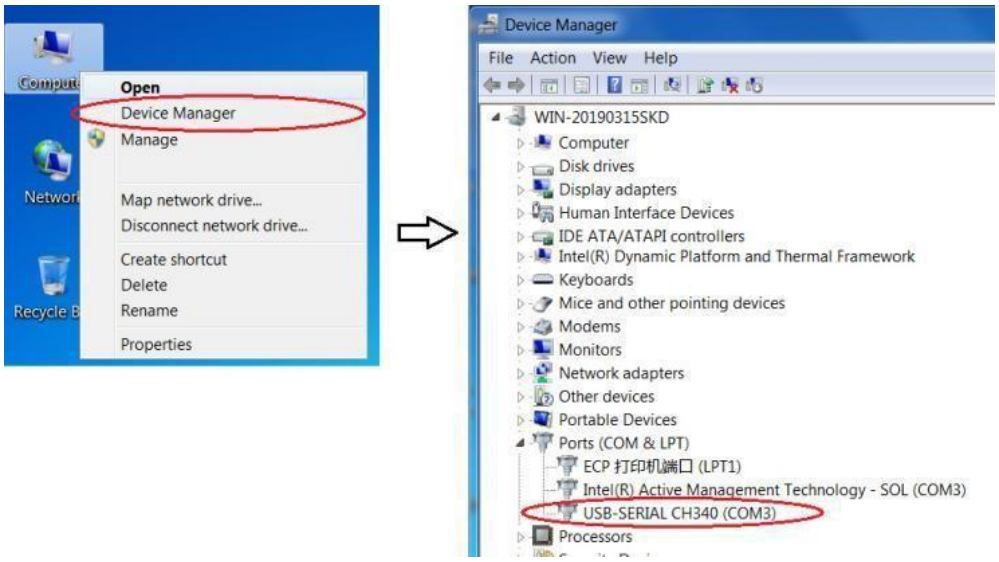
You need to check the synchronous belt of the Y1, Y2, X, and Z axis to make sure it is pulled taut. If the synchronous belt is loose, you need to tighten the synchronous belt first, and then tighten the synchronous belt's M3 screw with the Allen wrench.

Q5: When should we update the control board firmware for the 3020PLUS?

1. In the case of Q2, but you can not solve it according to the Q2 step, you need to update the firmware of the control board.
2. In the case of Q3, but you can not solve it according to the Q3 step, you need to update the firmware of the control board.

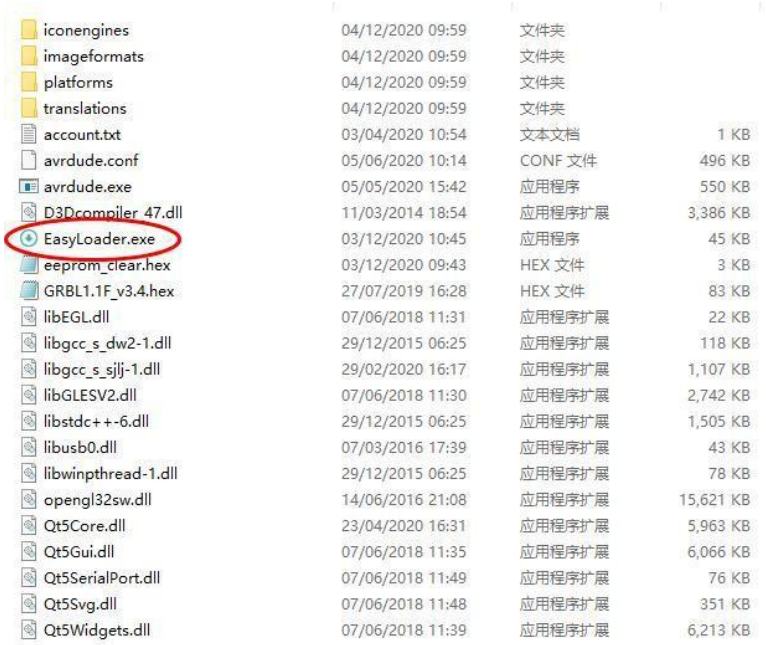
Q6: How do you update the firmware of the 3020PLUS control board?

1. Connect the computer and the control board, and make sure the connection is successful, you can find the COM port number of CH340 in the device manager.

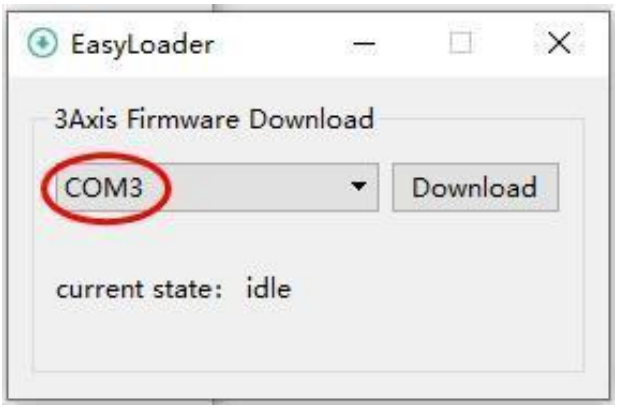


2. Grblcontrol and LaserGrbl software must be closed before the firmware update.

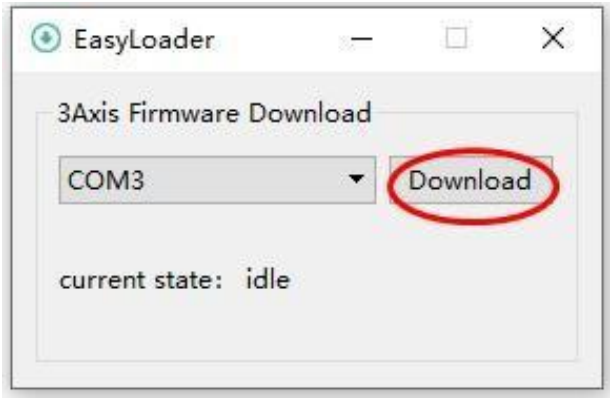
3. Double click to open the application: EasyLoader（U disk→EasyloaderV1.0→EasyLoader.exe）



4. Select the COM port number corresponding to CH340.



5. Click "Download" for firmware updates.



6. The firmware update is successful.

