

CARVERA AIR

Desktop CNC Machine INSTRUCTION MANUAL



MAKERA

FOR THE ERA OF MAKERS



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Welcome

Welcome to the world of CNC! Whether you're new to CNC or an experienced user, Carvera Air provides a seamless experience with its advanced features. Enjoy the ease of a quick tool changer, automatic probing, and auto-leveling, all designed to simplify learning and operation, so you can fully harness Carvera Air's outstanding machining capabilities.

This manual focuses on operating the machine and its control software, rather than CAD and CAM tutorials. Carvera Air supports standard G-Code and is compatible with most CAD/CAM software.

For specifications and more information, please visit our official website:
www.makera.com

If you have any problems with Carvera Air, please contact us directly:
support@makera.com

Also, join in the Facebook group to discuss and share your experience with other Carvera Air users:
www.facebook.com/groups/carveraair

We will keep updating video tutorials and sample making cases on the YouTube channel, do not forget to subscribe!
www.youtube.com/c/Makera

In this manual, you will have a quick walkthrough of how to use your Carvera Air and know its powerful abilities.

But for more information, please see additional guides and tutorials on our wiki:
makera.com/wiki



Safety

Disclaimer

Please read this manual carefully before using the Carvera Air. Failure to read the manual may lead to personal injury, inferior results, or damage to the Carvera Air machine.

This manual is provided for reference purposes only. We reserve the right to modify or revise this manual, users can download the most up-to-date version of this manual on our website.

You should always monitor machines when in use. Milling cutters revolving in high-speed, unstable components or laser module in operation are dangerous to people without protection. Please carefully read the safety instructions below to avoid unnecessary harm.

Safety Instructions

1. Always wear safety goggles when operating the machine, especially when the protective cover is open.
2. Always wear laser protection goggles when using the laser module.
3. Please wear hearing protection when Carvera Air is machining on the hard materials.
4. Do not leave your machine unattended while it is machining.
5. Please be aware of the sharpness of the milling bits during installation, dust collection, and other operations.
6. Milling will generate heat. Inappropriate parameters will cause fire hazards. Make sure an extinguisher is in your vicinity.
7. Some materials are harmful to people when machining, such as carbon fiber. Please wear a face mask and connect a vacuum for dust collection.
8. Do not expose this machine to rain or wet conditions.
9. Keep children and bystanders away while operating this machine. It requires supervision and the assistance of an adult when children use this machine.

If an emergency occurred in machining, such as the workpiece being loose from holding, components damaging, unusual light or sound coming from the machine, etc. Press the main button or E-Stop button, all ongoing procedures will stop immediately, or cut off the power to shut it down.

Carvera Air has a safety option that allows the machine to automatically stop working when opening the cover, which is useful for schools or work environments where children may reach.

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio / TV technician for help.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

ISED Compliance





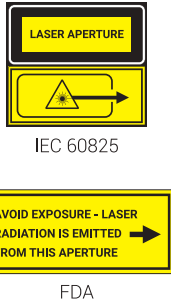
This device complies with Innovation, Science and Economic Development Canada License exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including inter ference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d' Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil nedit pas produire de brouillage, et(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The device is compliance with RF exposure guidelines, users can obtain Canadian information on RF exposure and compliance. The minimum distance from body to use the device is 20cm. Le présent appareil est conforme Après examen de ce matériel aux conformité ou aux limites d'intensité de champ RF, les utilisateurs peuvent sur l'exposition aux radiofréquences et compliance d'acquérir les informations correspondantes. La distance minimale du corps à utiliser le dispositif est de 20cm.

Safety Labels

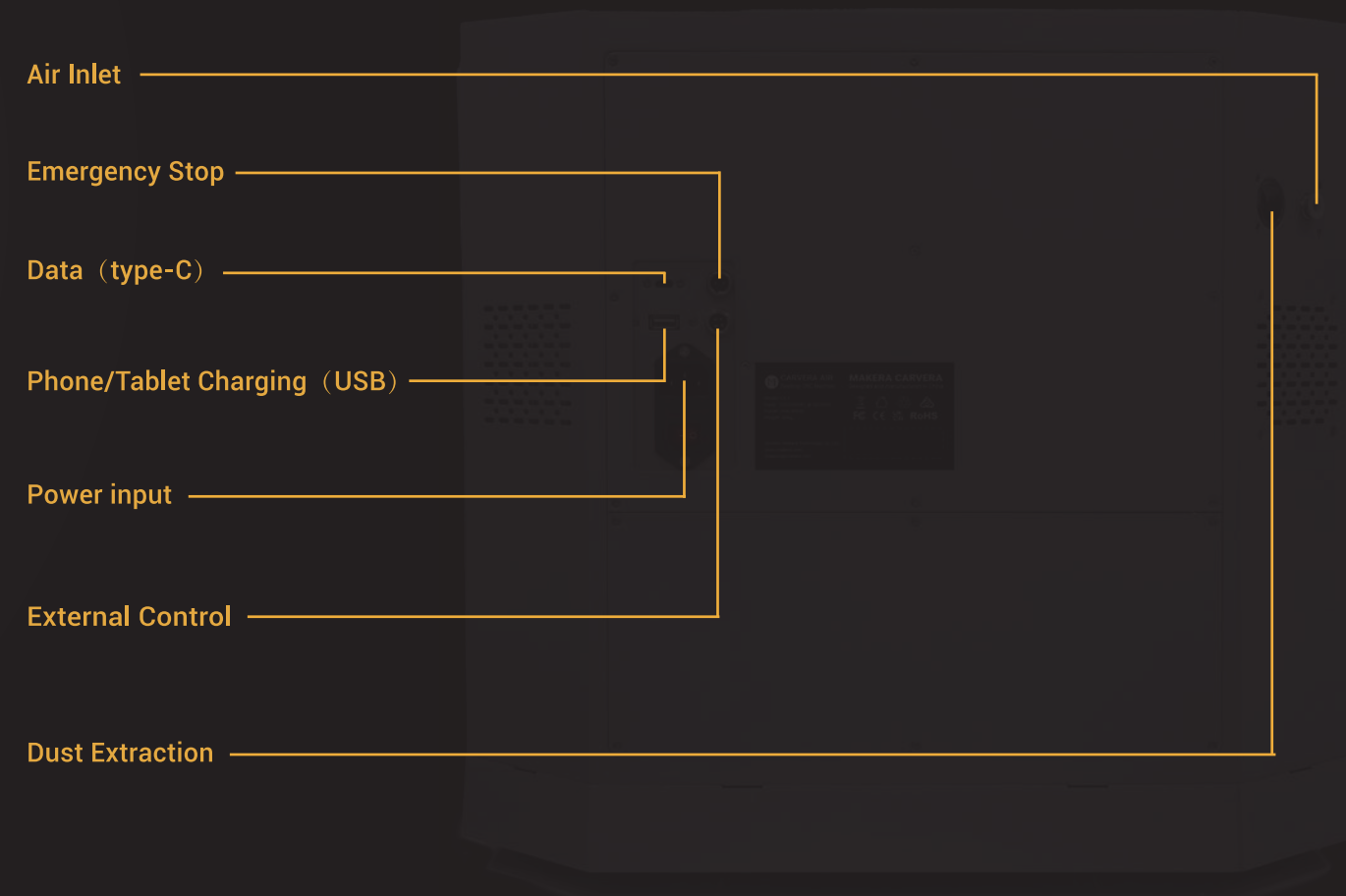
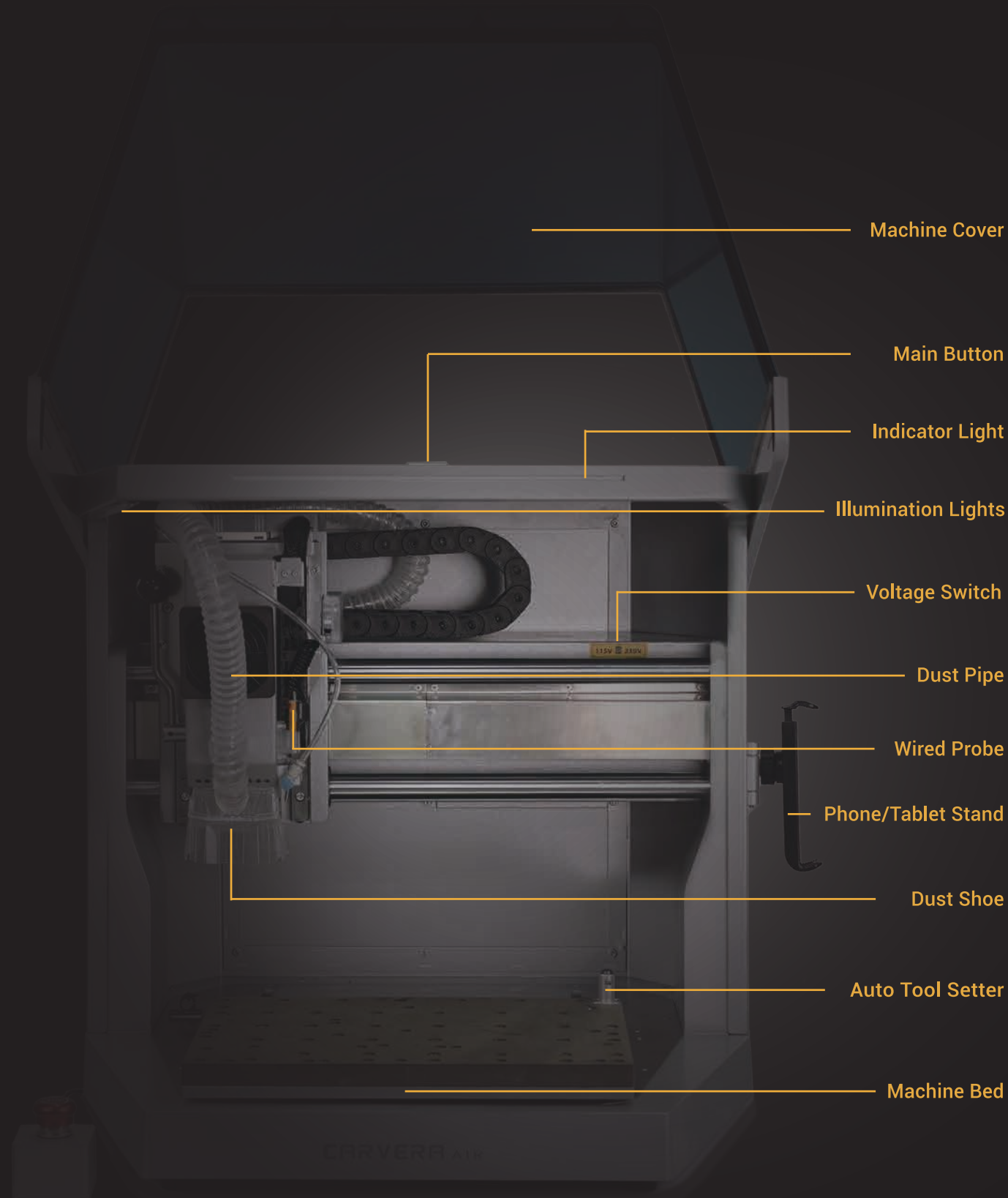
Safety Labels	Meaning	Location
	Keep hands clear of moving parts: machine axis, spindle, etc.	On the machining cover
	Wear safety goggles when operating the CNC function or laser goggles when operating the laser.	On the machining cover
	Caution sharp cutters when installing milling bits and doing dust collection.	On the machining cover
	Laser radiation - Class 4 laser product, avoid eyes or skin exposure to direct or scattered radiation.	On the Laser module cover
	Laser aperture - Laser radiation is emitted from this aperture.	On the Laser module



MAKERA

The mass of the box weighs more than 50Kg/ 110lb.
The net weight of the Carvera Air desktop milling machine is around 35Kg/77lb. We suggest moving this machine by at least two people (with gloves) to ensure both personal and machine's safety. Please make sure your desk is sturdy enough and has no less than 60 x 60 cm space to place this machine.

Unpack



Unpack

1. Remove the protective foam from the top and sides inside the box.



2. With the help of another person, carefully lift the machine out of the box from the positions shown in the illustration.

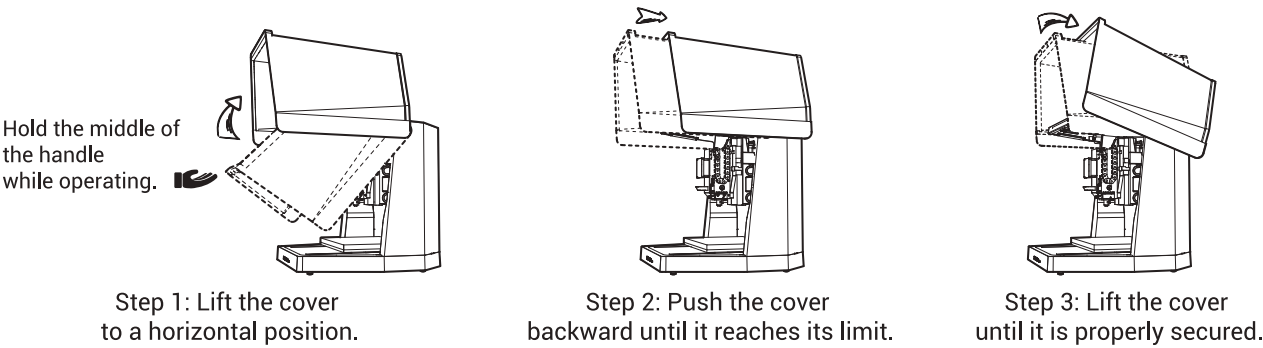


Note: Please keep the carton, foam, and plastic packaging bag for future use.

3. Place the machine on a stable, flat surface.

4. Remove the plastic packaging bag.

5. Carefully open the machine's top cover by following the operational steps shown in the illustration below.



Note: When opening the top cover, follow the illustrated steps to avoid damage.

6. Gently remove the inner foam and accessories from inside the machine.




Parts list



Spare 1/8" bit collar x 30



Spare tool bit x 10




Safety goggles x 1



Emergency stop button x 1



Manual tool setter x 1



USB cable x 1

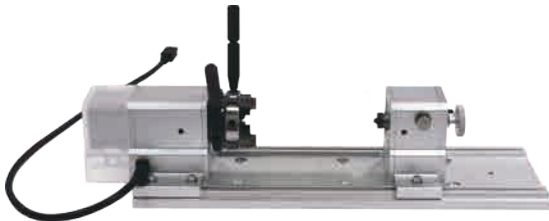


Power cable x 1

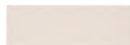


Phone/Tablet Stand x 1







4th Axis x 1




Epoxy tooling board for 4th Axis x 2




4th Axis chuck wrench x 2




Laser Module x 1




Connection cable x 1




Laser goggles x 1




L bracket x 1




4mm Dowel pin x 10




M5 Screws x 20




Screw driver x 1




Top clamp x 4




Spare tool bit x 10




Bit collar installer x 1




Spindle collet (optional)




Spindle collet installer x 1




Sand block x 2




Epoxy tooling board x 2




LED light assembly kit x 1




Mini hand saw x 1




Single side PCB x 2




Double side PCB x 2




Acrylic plate x 2



MDF Waste board x 2



ABS Plastic board x 1



Aluminum plate x 1



UV curable solder mask paint x 5



UV solder mask roller x 1



1/8" 60degree 0.1mm V-Bit x 2



1/8" 30degree 0.2mm V-Bit x 2



Single side PCB(10*15cm) x 10



Double side PCB(10*15cm) x 10



UV solder mask removal tool x 2



Double side machining dowel pin x 20



PCB milling / drilling bits x 20



Through hole rivet(0.2mm-1mm) x 1000



UV cure lamp x 1

Preparation



Voltage Adjustment

The default voltage of the machine is 220V. Adjust the machine's power voltage according to your supply voltage, as a voltage mismatch may damage the machine.



Step 1: Open the cover, find the voltage switch on the right side of the beam, and set it to the local specifications.



Step 2: Tear off the power port seal and connect the power supply.

Power On

1. Plug the power cable and turn on the power switch.
2. Carvera Air homes all axes automatically and turn on the Illumination lights.

Phone/Tablet Stand Installation

To facilitate transportation, the phone/tablet stand is not pre-installed. To install it, remove the screws from the stand base, position the stand, and secure it by reattaching the screws.

For your convenience, the stand can be installed on either the right or left side of the machine; the default position is the right side.



Control Software Installation

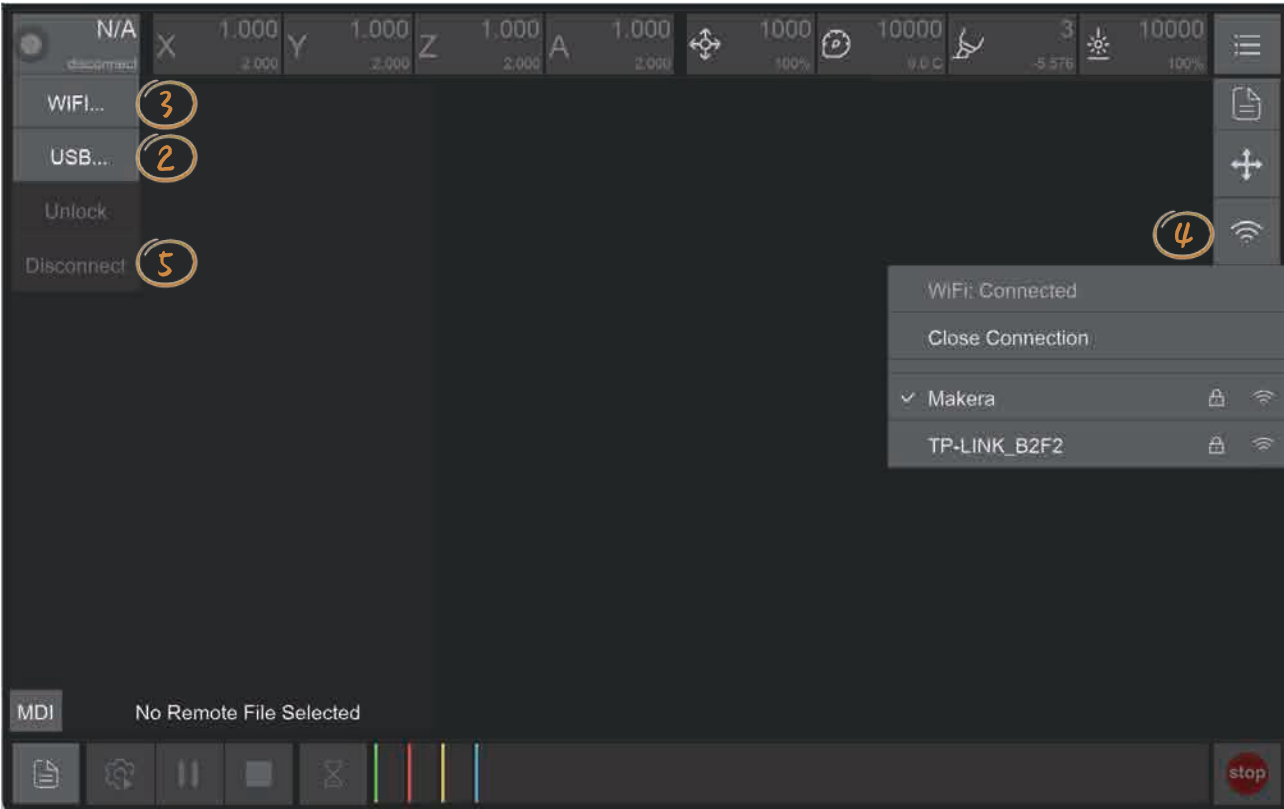
1. Go to www.makera.com to download and install the Carvera Controller. It currently supports computers, tablets, and phones. We recommend using the computer version of the control software for your first use. Please refer to the next chapter for software instructions.

2. If you plan to connect via USB, download and install the Carvera Air USB driver.

WiFi Configuration

The purpose of configuring WIFI is to allow Carvera Air to join the network at your workplace so that your computer can control the machine without being restricted.

1. The network can be configured via a USB cable or the machine's built-in WiFi accessing point.



2. Connect via USB: Connect the USB cable and open the Carvera Air control software. Click the status button in the status bar, click “USB...”, you will see your USB device and choose one to connect. Then the status button will be updated, displaying machine is connected in USB mode.

3. Connect via accessing point: Open the WiFi setting on your computer, find the accessing point named CARVERA_AIR_XXXXX and connect (No password). After successfully connected, open the Carvera Air control software; click the status button in the status bar; click” WIFI...”;Carvera Air will automatically search connectable devices. Please refresh it if Carvera Air cannot find any devices. After connecting to the device, the status button will be updated; displaying machine is connected in WiFi mode.

4. WiFi configuration: Click the “more” button (end of the status bar) in the status bar; click the WIFI icon, the system will start searching WIFI in the workplace. Select a WIFI, enter the password and connect. Please retry if the connection failed.

5. Disconnect: Click the status button; click “Disconnect”; Switch back to your WiFi.

6. Redo step 3 from Click “WIFI”to connect Carvera Air through WIFI.

CARVERA AIR

Software Introduction



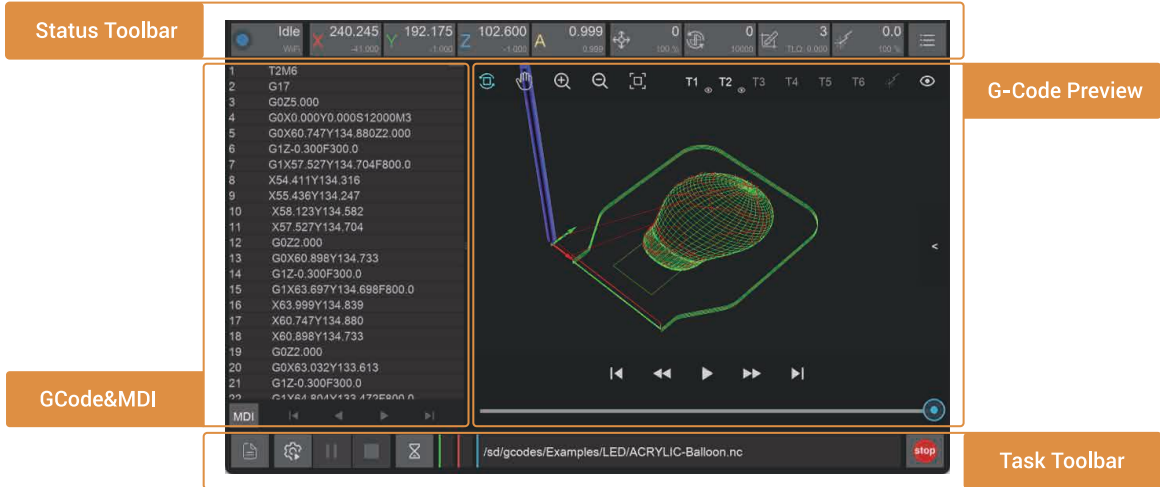
Overview

1. Status Toolbar

The status toolbar is on top of the interface. It shows the real-time data of key indicators and can be used to control these indicators.

2. Task Toolbar

Task toolbar is at the bottom of the interface. In the task toolbar, you can manage G-Code files, configure, track and control machining process.



3. G-Code & MDI

By default, this interface displays the G-Code of the currently opened file. It can be switched to the command information sent/received by the machine.

4. G-Code Preview

The G-Code preview graphically displays the currently opened file G-Code..



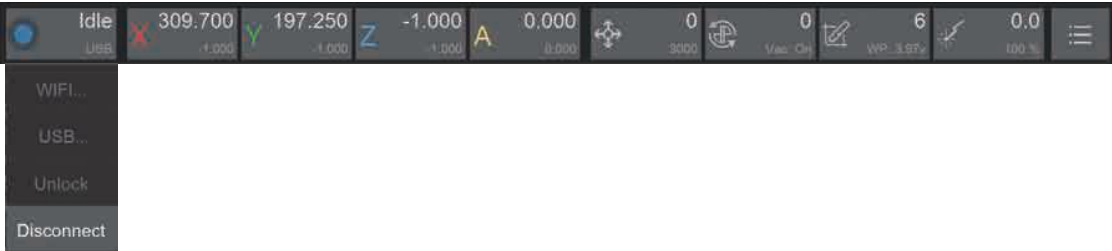
5. Manual Operation

Manually control Carvera's movement and execute other commands. Because Carvera does most of the jobs automatically, the manual control interface is hidden by default. Click the arrow on the right side of the interface to switch whether to display it.

Status Toolbar

All indicators include 3 items: a symbol, main data and sub-data. Click the button can open the corresponding drop-down list.

1、Machine status and control



- 1.1. Symbol: A unique colour to distinguish the status.
- 1.2. Main data: Explanation of device status.
- 1.3. Sub-data: Current connection mode.(No connection, WiFi or USB)
- 1.4. Drop-down list:
 - 1.4.1. **WIFI**: Connecting Carvera Air via WiFi.
 - 1.4.2. **USB**: Connecting Carvera Air via USB.
 - 1.4.3 **Unlock/Reset**: Unlock or reset Carvera Air.
 - 1.4.4. **Disconnect**: Disconnect Carvera Air from your device.

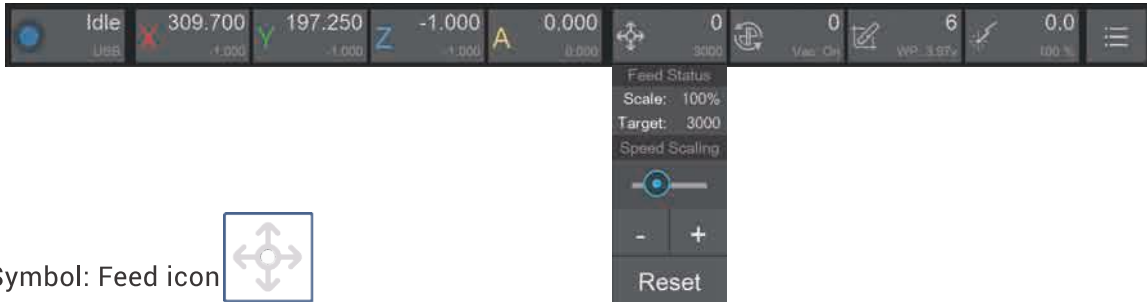
Explanation of different Carvera Air statuses :

Colour	Status	How It Is Triggerer/How To Quit
	Idle	Carvera is idle
	Run	Carvera is working
	Alarm	Carvera has an alarm/Unlock it to restore
	Home	Carvera is resetting the coordinate
	Hold	Click the hold button/Click again to resume
	Wait	Carvera is emptying the buffer
	Disable	No device has been connected
	Sleep	Timeout/Reboot Carvera to restore
	Pause	Click the pause button/Click again to resume
	Tool Wait	Wait for tool changing

2、Coordination status and control



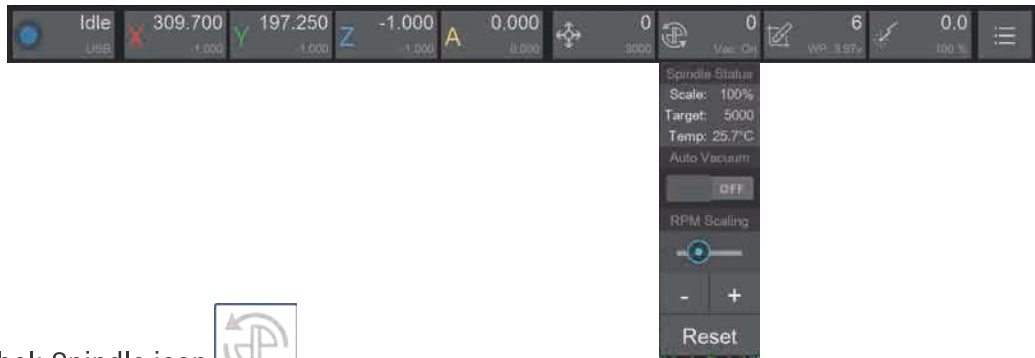
- 2.1. Symbols: X/Y/Z/A
- 2.2. Main data: Work Coordinates (The position of the tool relative to the work origin). This position depends on where you place your workpiece and where you want to start machining on it.
- 2.3. Sub-data: Machine coordinates (The position of the tool relative to the machine origin). The machine origin is fixed and located at the upper-right corner of the machine, so these coordinates are generally negative.
- 2.4. Drop-down list:
 - 2.4.1 Set Origin: Use this option to set the work coordinates for the X, Y, Z, and A axes; You can either set them to zero or specify a specific value based on the current position; Typically, Carvera Air uses two fixed anchor points to automatically set the starting point, so you usually don't need to set the origin manually.
 - 2.4.2 Rotary axis (A axis):
 - Shrink Function: Use this to calculate the remainder of the rotation angle modulo 360 degrees when dealing with large rotation angles.
 - Fast Move Function: This function first executes the "Shrink" function and then rotates directly to the specified position.



- 3.1. Symbol: Feed icon
- 3.2. Main data: Real-time feeding speed
- 3.3. Sub-data: Target feeding speed/Feeding speed scale(moving message)
- 3.4. Drop-down list:
 - 3.4.1. Feed Status: Target feeding speed /Feeding speed scale
 - 3.4.2. Speed Scaling: Set the feed rate by percentage. For safety reasons, the adjustment range is limited to 50% to 200%

Note: Adjusting the feed rate will not take effect immediately. Generally, it will take a few seconds to wait for the current command to finish.

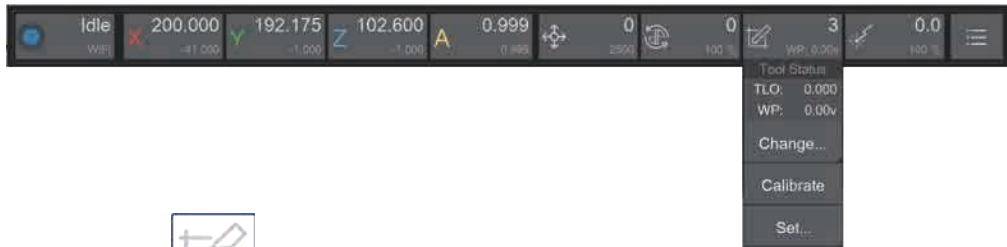
4、Spindle status and control



- 4.1. Symbol: Spindle icon
- 4.2. Main data: Real-time spindle rotary speed (RPM)
- 4.3. Sub-data: Target spindle rotary speed/ Spindle speed scale/Real-time spindle temperature (moving message)
- 4.4. Drop-down list:
 - 4.4.1. Spindle Status: Target spindle rotary speed/ Spindle speed range /Real-time spindle temperature summary display
 - 4.4.2. Auto Vacuum: Choose to turn on/off auto vacuum while the spindle is rotating. Default - on.
 - 4.4.3. RPM Scaling: Set the spindle speed range by percentage. For safety reasons, the adjustment amount range is limited from 50% to 200%.

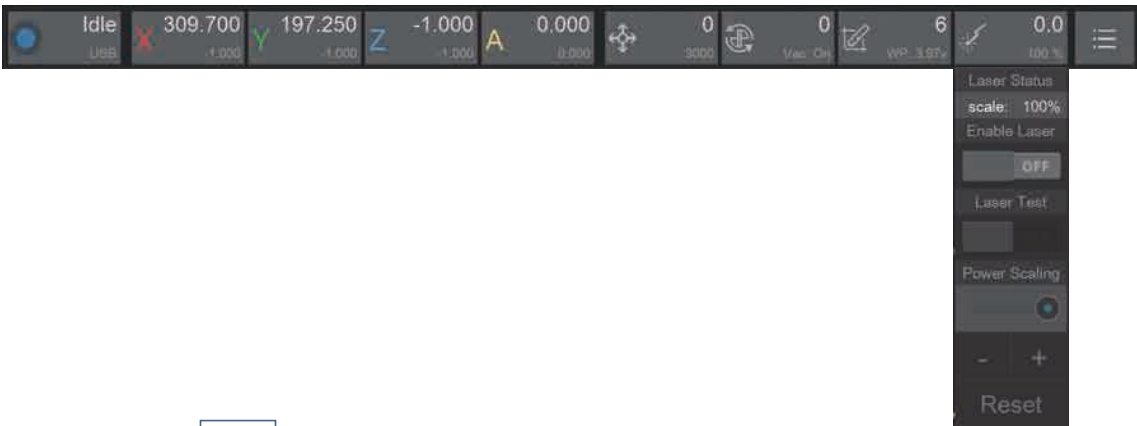
Note: Turn on the Vacuum or adjust the spindle rotary speed will not take effect immediately. Generally, it will take a few seconds to wait for the current command to finish.

5、Tool status and control



- 5.1. Symbol: Tool icon
- 5.2. Main data: Display the number 1 to 6 of the current tool on the spindle, no tool - "None", wireless probe - "Probe"
- 5.3. Sub-data: Current Tool Length Offset (TLO) /Wireless Probe Power(moving message)
- 5.4. Drop-down list:
 - 5.4.1 Tool Status: TLO/Wireless Probe Power summary display
 - 5.4.2. Change tool: Change to the selected tool or wireless probe, and perform automatic calibration.
 - 5.4.3. Calibrate tool: Automatically calibrate the current tool and set TLO.
 - 5.4.4. Drop tool: Drop the current tool.
 - 5.4.5. Set tool: Manually set the current tool number. Only use when the tool number is wrong.

6、Laser status and control



6.1. Symbol: Laser icon



6.2. Main data: Current laser rate

6.3. Sub-data: Laser power scale

6.4. Drop-down list:

6.4.1. Laser Status: Laser power scale

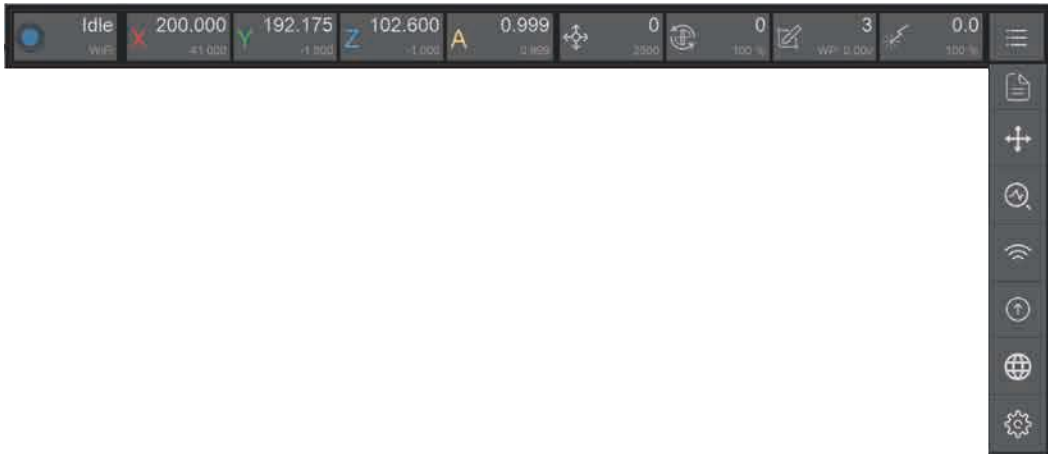
6.4.2. Enable Laser: Switch to laser mode. The working coordinates will be automatically updated according to the preset offset. If there is a tool on the current spindle, Carvera will drop it first and calibrate again to check the laser head's height.

6.4.3. Laser Test: Performing a laser test after turn on the laser mode will trigger a low-power laser beam for focus calibration.

6.4.4. Power Scaling: Set the laser power range by percentage. For safety reasons, the adjustment amount range is limited from 50% to 200%.

Note: Carvera has already set the coordinate offset of the laser before delivery, only reset it when the coordinates deviate. We will add relevant tutorials in the online instructions.

7、Other functions



7.1. Manual control: Same function as the arrow button on the right side of the interface. Switch to display manual control interface and file preview interface.

7.2. Device status diagnose: Check and your Carvera Air in detail and debug. No need to use it when Carvera Air runs in good condition. We will add a tutorial in the formal version of the instruction manual.

7.3. WiFi configuration: Refer to the previous WiFi setting instruction in chapter 4.

7.4. Software Upgrade:

7.4.1. Controller: Controll software upgrade

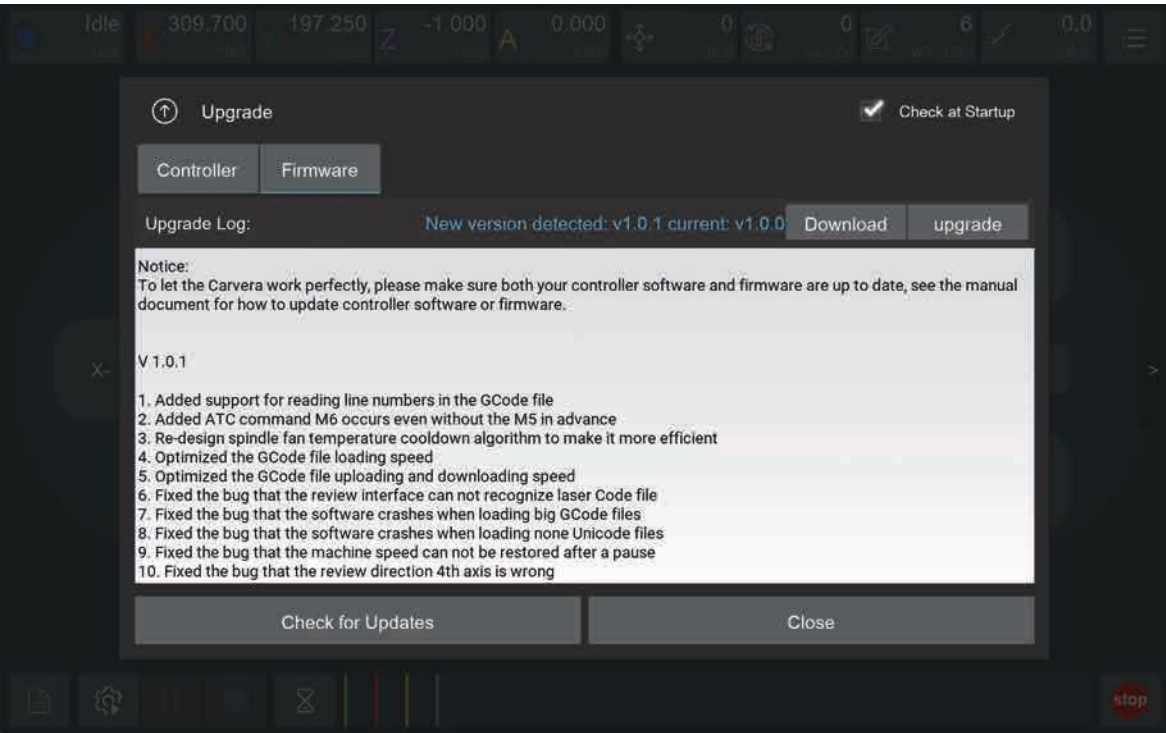
7.4.2. Firmware: Firmware upgrade

7.4.3. Download: Link to the download page

7.4.4. Upgrade: For control software, just install the new version and you are ready to use. For firmware, you need to upload it to the machine using the control software

7.4.5. Check at Startup: Check software updates and notice at the startup

7.5. Language selection.



7.6. Parameters settings:

7.6.1. Basic parameters: Adjust functional parameters by requirements.

7.6.2. Advanced parameters: System-level of the machine. All set in the factory generally does not need to be changed. Do not change it unless it has to.

7.6.3. Restore setting: Restore factory setting, or save current setting as factory setting.

Note: You need to click the Apply button to save all parameters after changing them and rebooting the machine to apply changes. Parameter introduction and recommended settings are provided in the parameter list. We will add more detailed parameter introductions and setting suggestions in the online instruction manual.