LASER TREE

X1 90W

USER MANUAL



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1. Safety Statement

⚠ Before use, please read this safety manual carefully to understand the operating procedures and potential hazards associated with the laser module.

• Laser Protection

The laser beam is high-energy and can cause **severe eye injury**. **Never** expose eyes to the beam or its reflections.

• Protective Goggles

When the laser is in operation, specialized protective goggles with matching wavelengths must be worn.

• User Restrictions

Children or teenagers are strictly prohibited from operating the laser module alone.

• No Hot-Plugging During Operation

Do NOT unplug the power cable while the laser is emitting. Such action may cause permanent damage to the module.

• Ventilation and Smoke Prevention

Smoke and gases may be generated during operation. Please operate in a well-ventilated environment.

• Fire Hazard

Never engrave materials of unknown composition. A **fire extinguisher must be kept** in the work area, away from flammable materials.

2. Packing List



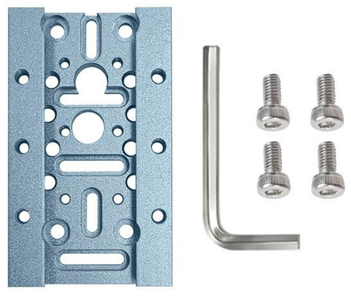
Laser Module x1



X1 Adapter Board x1



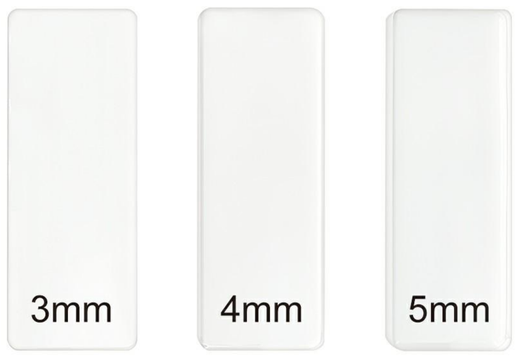
Spare
Protective Lens x4



Sliding Plate x1



Adjusting Screw
M4*60 x2



Focus Fixing Plate*3



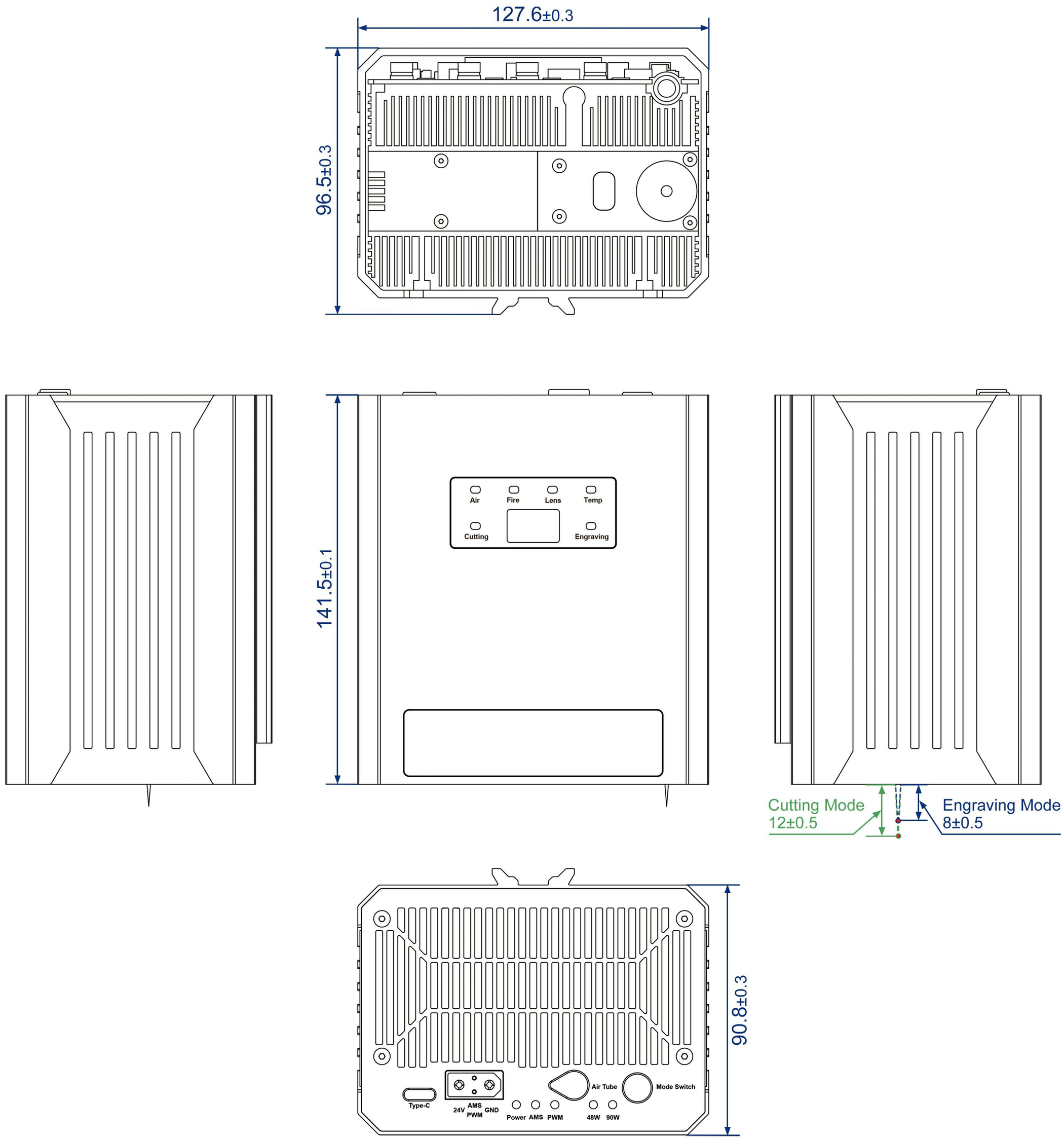
Input Cable x1



AMS Signal Cable x1

3. Outline Dimension

Unit: mm



4. Core Parameters

Brand	LASERTREE		
Model	X1		
Wavelength	450nm(±20nm)	Input Voltage	24V
Switchable Optical Power	48/90W(±8W)	Input Current	12A
Working Distance	• Cutting mode: 12±0.5mm • Engraving mode: 8±0.5mm	Input Interface	XT60(2+2) -F
PWM Signal	0/3.3V~12V，0~5KHz	Red Cross Positioning Offset	Y-axis -37mm
Operation Temperature	0~35°C	Single Module Weight	1.680 Kg
Air Assist	Built-in airway	Application	Cutting & Engraving

5. Operating Mode Description

The module uses a two-layer nested menu. Long-press "Mode Switch" to enter, short-press to toggle, long-press again to proceed or save/exit.

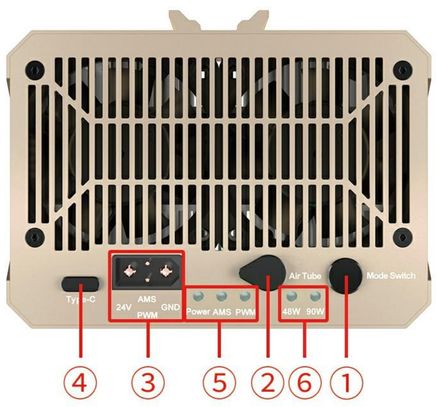
Step	Display	Description
Step 1 (P-layer)	**P1** or **P2**	Select function layer entry (P1=Power Control, P2=Mode Switch)
Step 2 (A/B-layer)	**A1/A2** (if P1) **b1/b2** (if P2)	If P1: A1=90W, A2=48W; If P2: b1=Manual Focus, b2=AMS Auto Focus

Default power-on state: P1 + A1 = 90W output; P2 + b2 = AMS mode. User-selected modes are automatically saved and retained for the next power-on.

Note: The digital tube displays "b1/b2" in lowercase. For readability, this manual refers to them as B1/B2 in descriptive text.

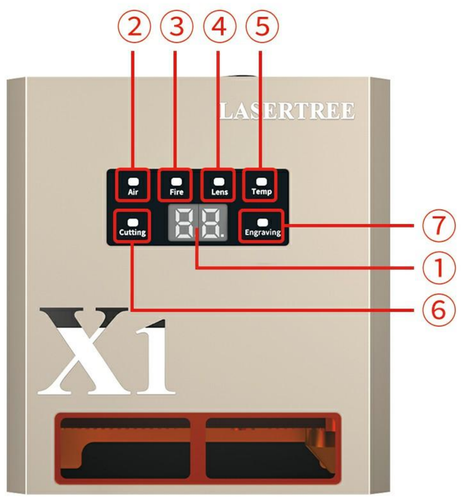
6. Function Description

6.1 Laser Module



Top View

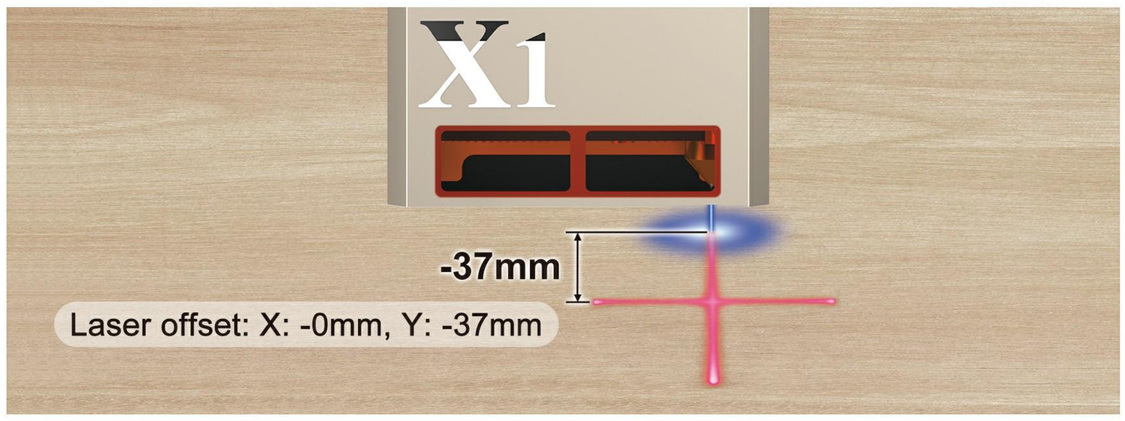
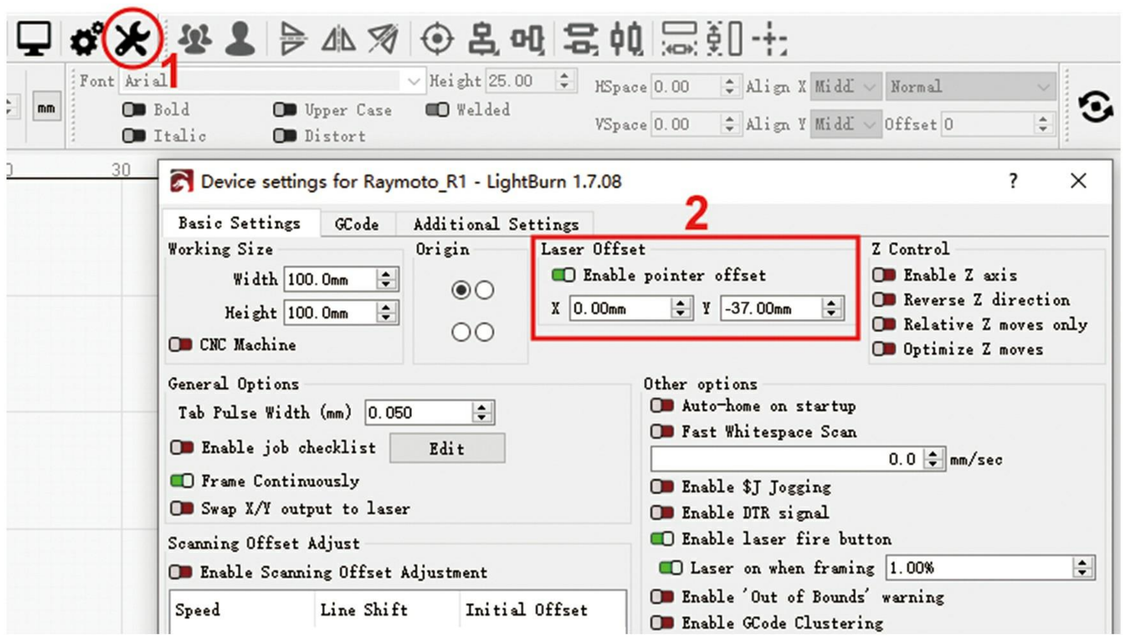
Name	Functional Description	
① Mode Switch	● Mode Switching Steps (1) Press and hold: View the current settings. (2) Short press: Cycle through the mode options. (3) Press and hold again: Move to the next setting item or save and exit.	
② Air Tube	Barbed fitting, Connect an air tube with an outer diameter of 8mm and an inner diameter of 6mm.	
③ Input Interface	● AMS/PWM	Auto Mode Signal and PWM Signal interface
	● GND/24V	Power Signal interface
④ Type-C	For downloading programs and serial communication.	
⑤ Status Indicator	● Power	Solid green when powered on.
	● PWM	Solid green when the module receives a PWM signal. (in engraving/cutting mode, the green light intensity corresponds to the power level.)
	● AMS	Solid green when in AMS automatic focus mode (B2 mode).
⑥ Power Indicator	● 90W	Solid green when current power is set to 90W (A1 mode).
	● 48W	Solid green when current power is set to 48W (A2 mode).



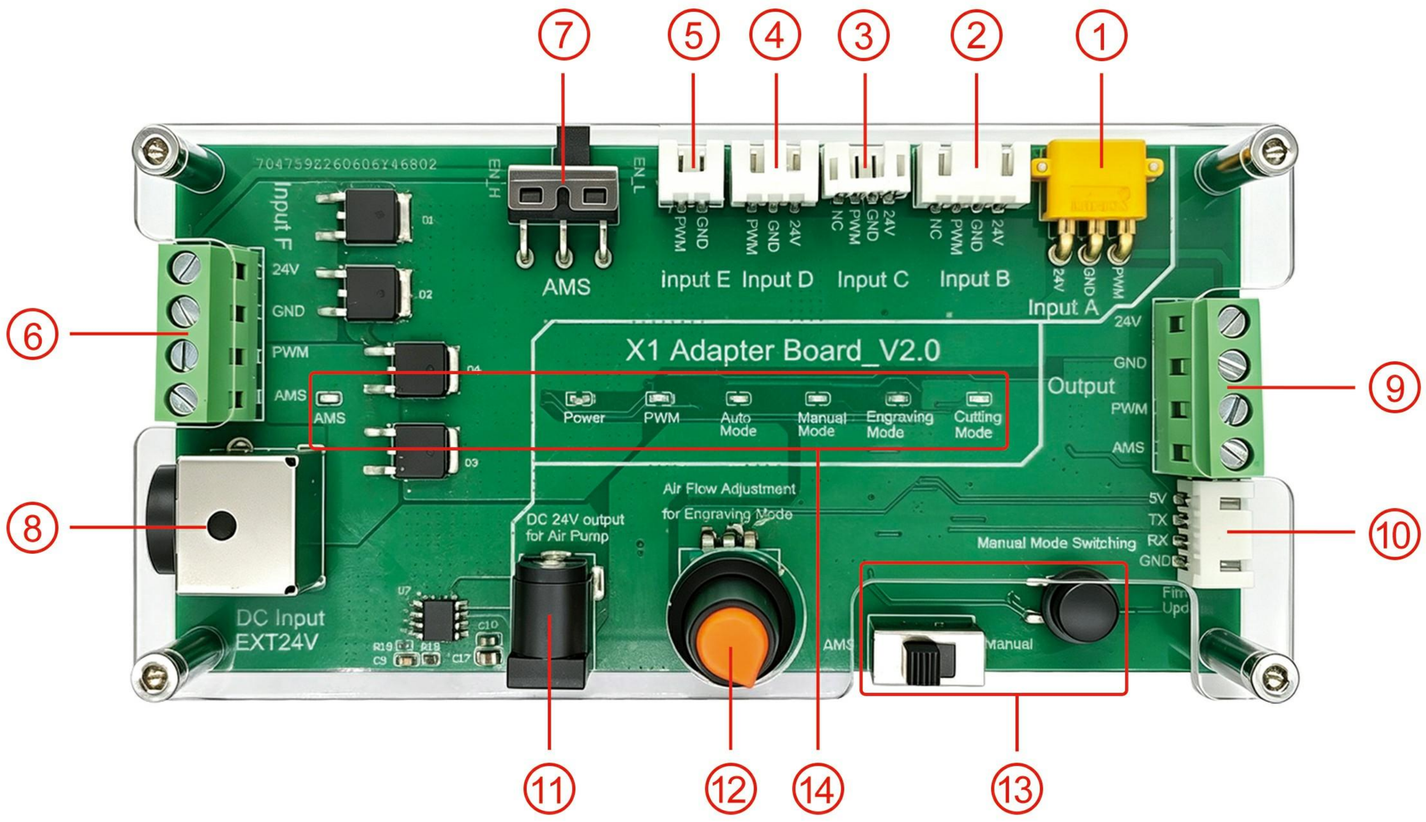
Front View

Name	Functional Description	
① Digital Tube	Displays the internal temperature of the main body during engraving/cutting. P1/P2: Shows the selected mode when switching between modes (P1: A1/A2, P2: B1/B2).	
② Air	● Solid green	Air assist pressure is normal.
	● Flashing red	Low pressure or no assist gas, buzzer sounds. (Adjust the air pressure at the Air Tube connector to clear the alarm.)
③ Fire	● Solid green	No flame detected.
	● Flashing red	Flame detected, buzzer sounds. (Laser continues operating; restart is required to clear the alarm.)
④ Lens	● Solid green	Protective lens is clean.
	● Flashing orange	Protective lens is slightly dirty.
	● Flashing red	Protective lens is heavily dirty, buzzer sounds. ⚠ Note: After an alarm, you can power off the machine once the current job is finished, then clean or replace the protective lens.
⑤ Temp	● Solid green	Laser module temperature is below 55°C.
	● Flashing red	Laser module temperature is above 55°C, buzzer sounds. ⚠ Note: To minimize laser power attenuation and extend service life, it is recommended that the module's operating temperature be maintained below 55°C. The ambient temperature should be below 35°C.
⑥ Cutting	● Solid blue	Cutting mode is active.
⑦ Engraving	● Solid blue	Engraving mode is active.

Bottom View

Name	Functional Description
① Red Cross Line Locating	● The red cross line turns off when a PWM signal is detected. ● The red cross line turns on when no PWM signal is detected. ● **Red Cross Positioning Offset: Y-axis -37mm**  LightBurn Setup Path: Open Settings → Under "Basic Settings," find "Laser Offset" → Enable "Enable pointer offset," and enter -37.00 mm in the Y offset field. 
② Laser Aperture	● Laser emission occurs when a PWM signal is detected. ● No laser emission occurs in the absence of a PWM signal. (Laser intensity varies with the magnitude of the PWM signal.)
③ Flame Detection Window	The flame sensor monitors the engraving/cutting process and activates an alarm buzzer if a flame is detected.

6.2 X1 Adapter Board



① Input A:	MR30-M	② Input B:	XH2.54 -4Pin
③ Input C:	PH2.0 -4Pin	④ Input D:	XH2.54 -3Pin
⑤ Input E:	XH2.54 -2Pin	⑥ Input F:	KF350 -4Pin
⑦ AMS:	High/Low Trigger Signal Switch	⑧ 12V/24V DC Input:	MPC-4Pin
⑨ Output:	KF350 -4Pin	⑩ Firmware Update Input Port:	XH2.54 -4Pin

⑪ DC 24V output for air pump: DC 5.5*2.1mm

⑫ Air Flow Adjustment for Engraving Mode:
In engraving mode, clockwise rotation increases the airflow, while counterclockwise rotation decreases it.

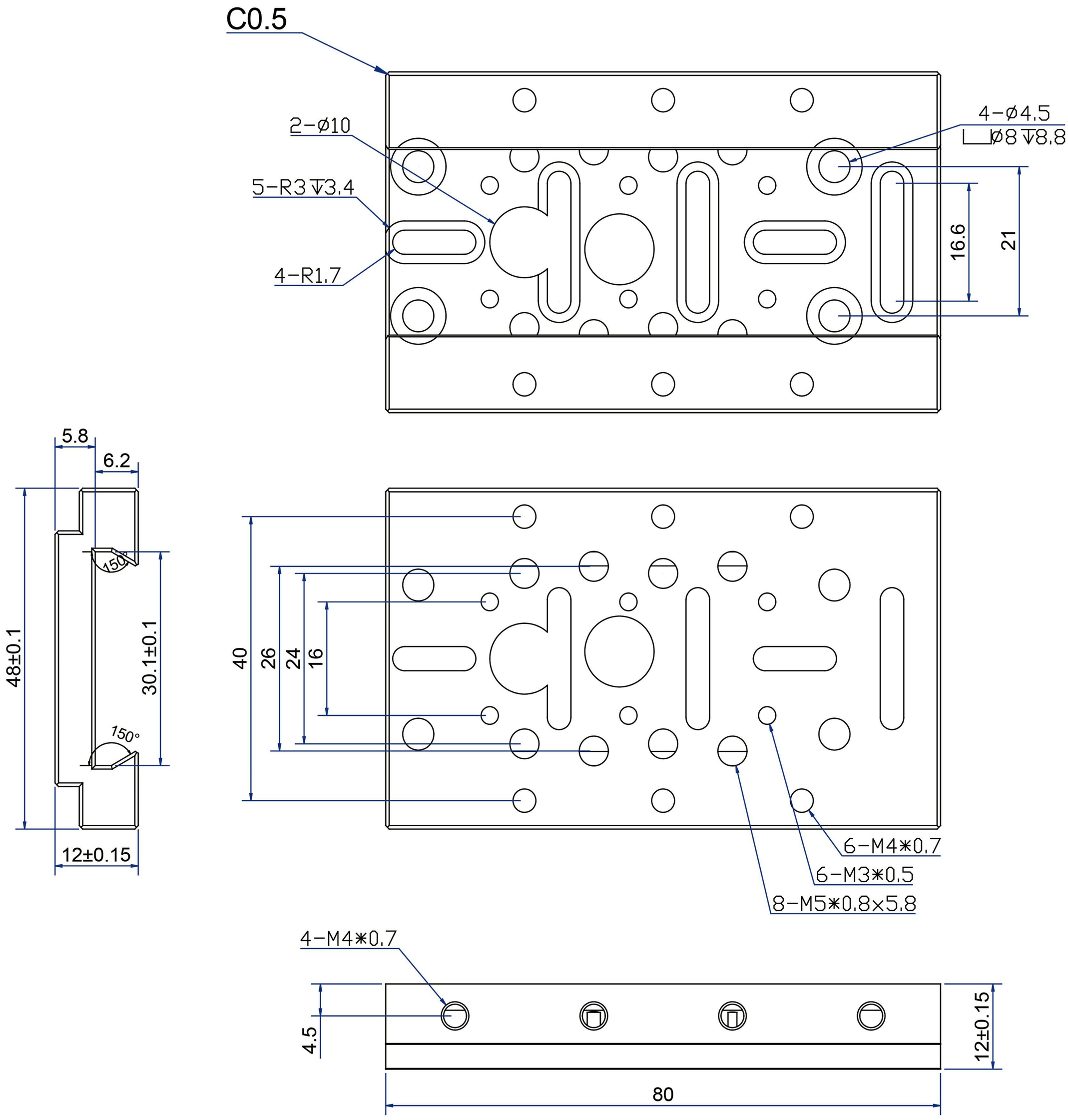
⑬ Mode Switch & Manual Mode Switching
When the engraving module is operating in B2 mode, use the adapter board's mode switch to select automatic or manual control.

Switch to the AMS position (Automatic Mode)	Switch to the Manual position (Manual Mode)
The module's cutting/engraving mode is automatically controlled by the Air (AMS) signal—no manual switching required.	Press and hold the "Manual Mode Switching" button for about 2 seconds to manually toggle between engraving and cutting modes.

⑭ Status Indicator	• AMS	Solid blue indicates focus adjustment in AMS mode.
	• Power	Solid red indicates successful connection to the power signal.
	• PWM	Solid green indicates that a PWM signal is being received.
	• Auto Mode	Solid blue indicates the module is in AMS mode.
	• Manual Mode	Solid blue indicates the module is in manual mode.
	• Engraving Mode	Solid blue indicates the module is in engraving mode.
	• Cutting Mode	Solid blue indicates the module is in cutting mode.

6.3 Sliding Plate Outline Dimension

Unit: mm



7. Instructions for Use

7.1 Cable Connection Guide

① Laser Module Connection

Use an XT60 cable to connect the adapter board "Output" port to the input port on top of the module.

② Air Pump Connection

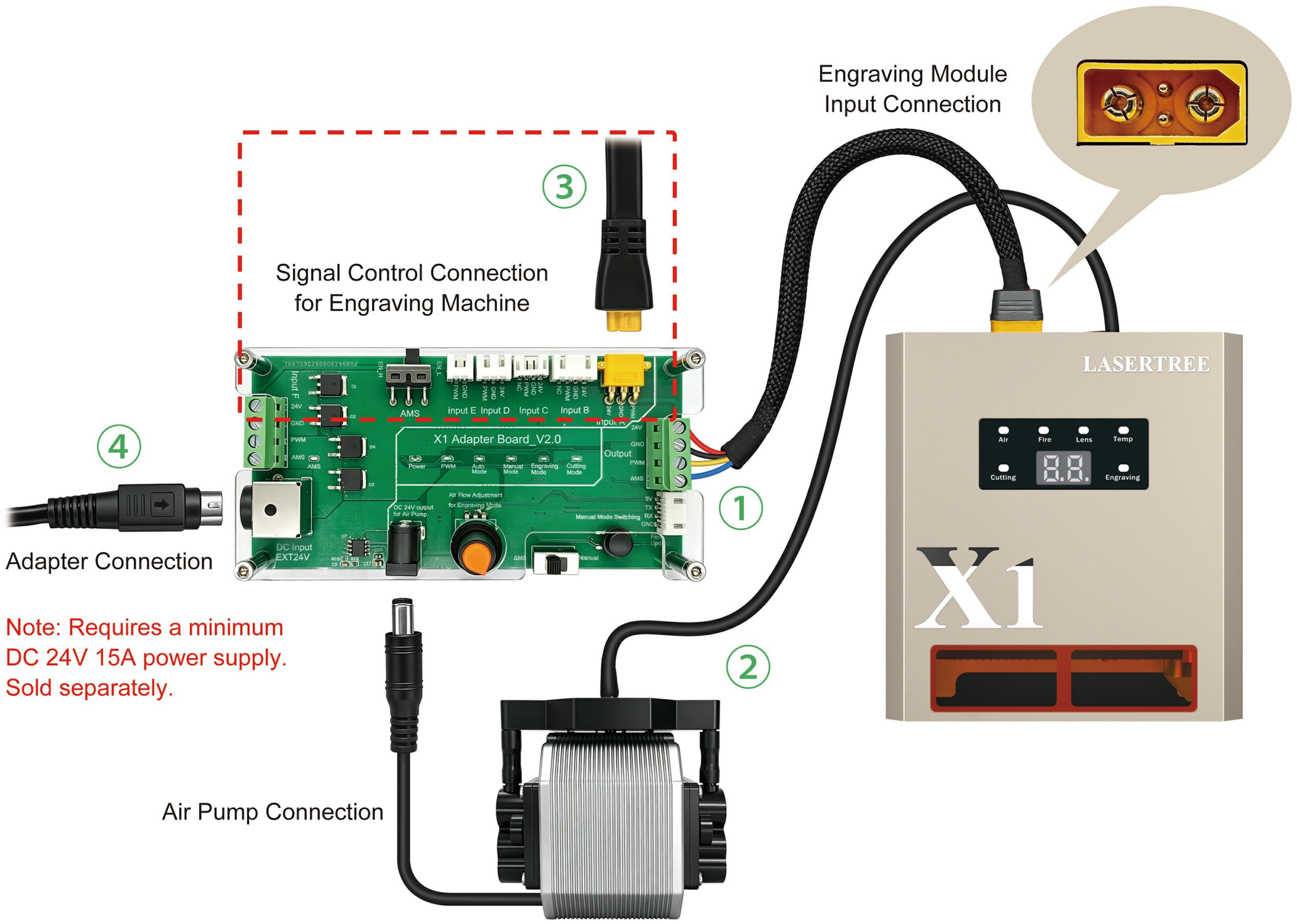
Connect the air pump power cable to the "Output for Air Pump"port on the adapter board, and attach the air hose to the top of the module.

③ Machine Signal Connection

Connect the output cable from the engraving machine to the corresponding input port on the adapter board.

④ Power Connection

Finally, connect the adapter to the adapter board and supply power to complete the setup.



7.2 Auto Mode Switching and LightBurn Setup Guide

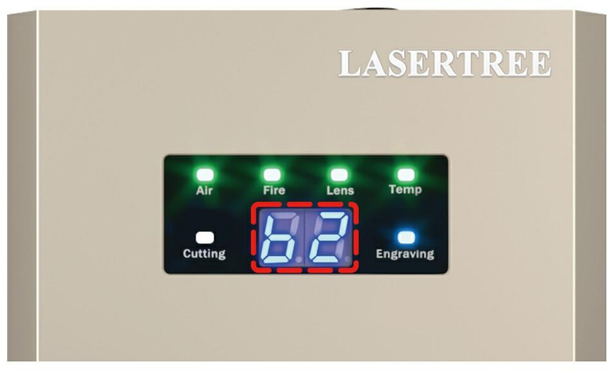
AMS autofocus function description: The adapter board detects the external input signal and reads the voltage between the AMS port and the GND port to switch the autofocus mode:

- When the input voltage is 0V, it switches to engraving mode.
- When the input voltage is 24V, it switches to cutting mode.

Note：This function is only available on machines that support LightBurn's air pump control feature.

7.2.1 Signal Connection

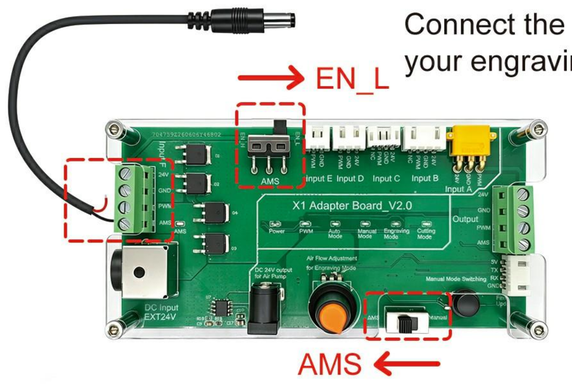
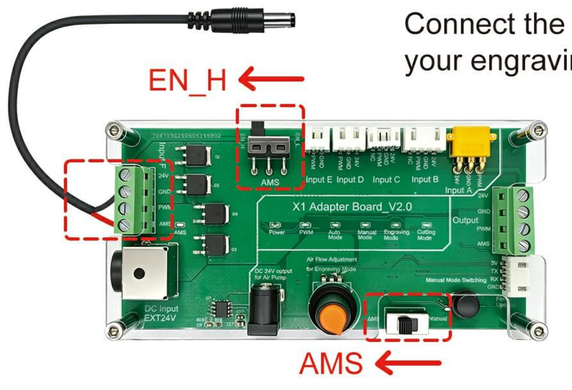
① Ensure that the X1 engraving module is set to B2 mode, and that both the Power and AMS indicator are sold green.





② Plug the DC end of the supplied AMS signal cable into the “Air” port on your engraving machine’s mainboard. The other end has two wires (red and black) that connect to the “Input F” terminal block on the X1 adapter board.

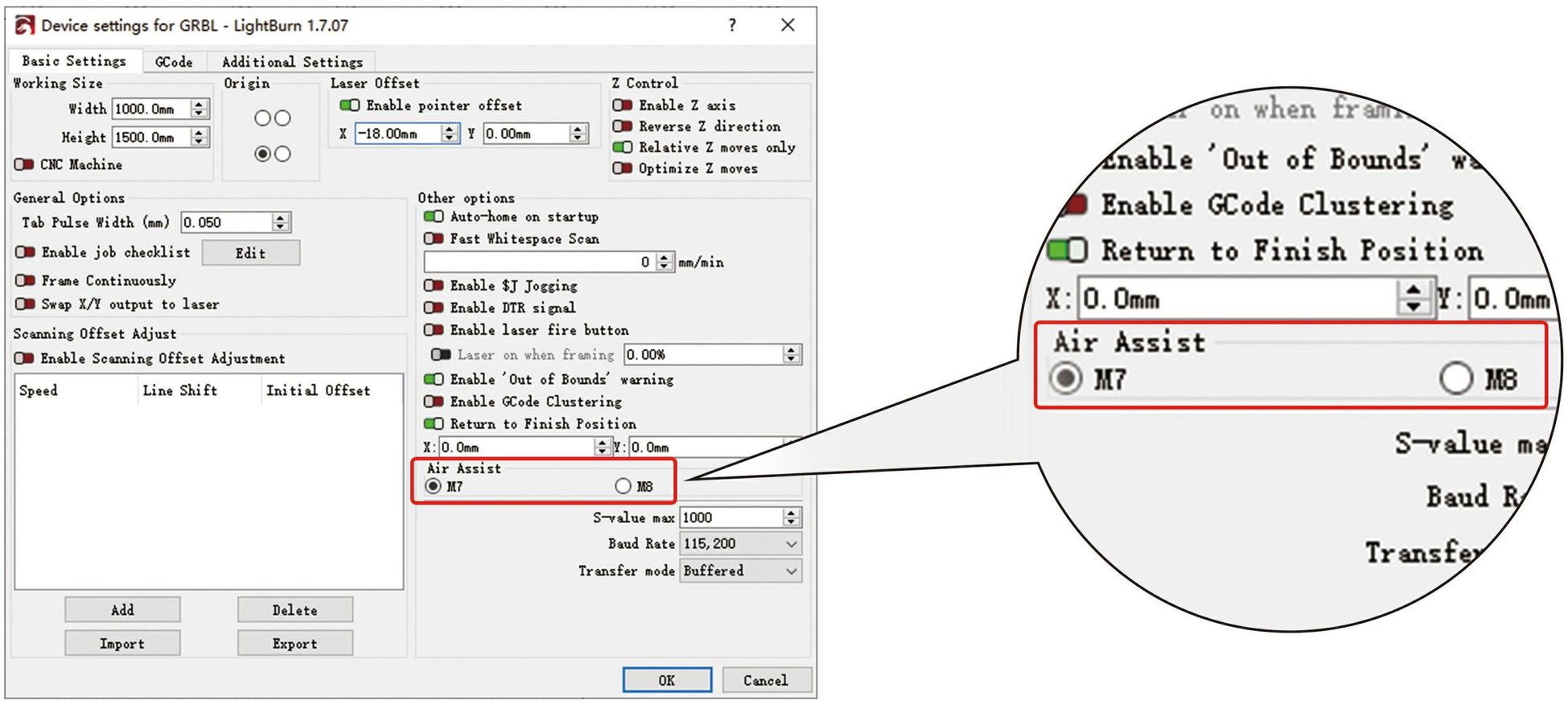
Determine the air pump control type for your machine (most use "low-level control"):

Control Type	Switch	Wiring	Applicable Machines	connection diagram
Low-level	EN_L	Black to AMS, Red floating	e.g., laser machines that support LightBurn's air pump control feature.	Connect the **“Air”** port of your engraving machine EN_L  AMS
High-level	EN_H	Red to AMS, Black to GND	e.g., CNC Machines	Connect the **“Air”** port of your engraving machine EN_H  AMS

7.2.2 LightBurn Setup & Application

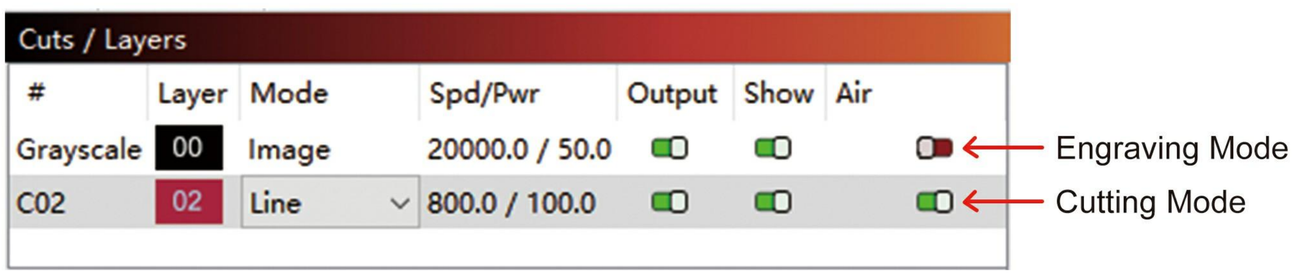
① Open the LightBurn software and navigate to Device Settings. Under Basic Settings, locate the Air Assist option and select M7/M8 as the air pump control signal.

- When the M7/M8 signal is output, the module automatically switches to Long Focus Cutting Mode.
- When no M7/M8 signal is present, the module remains in Short Focus Engraving Mode.

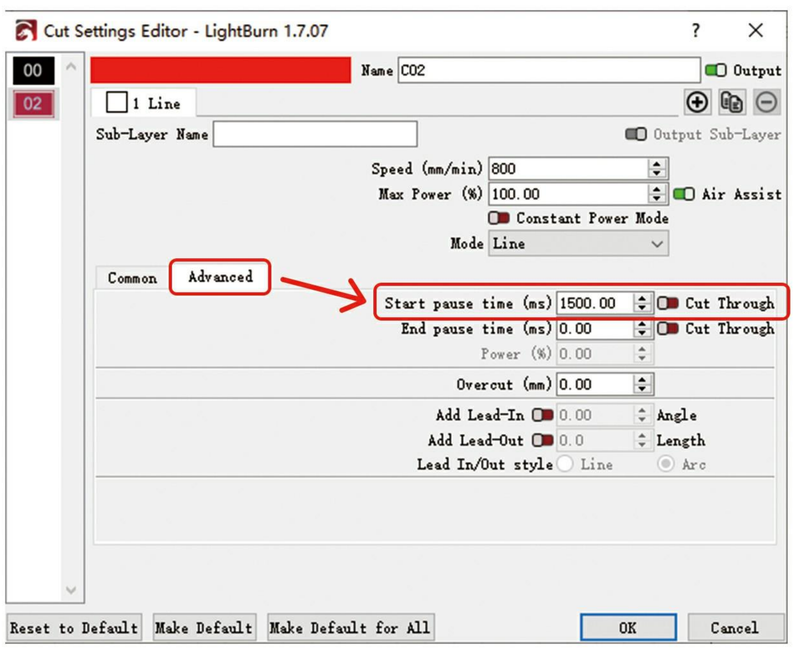


② In LightBurn's Layers interface, configure the appropriate parameters for each layer as needed:

- Disable "Air Assist" in the layer to keep the module in engraving mode. (Fig.1)
- Enable "Air Assist" in the layer to allow the module to automatically switch to cutting mode. (Fig.1)
- When switching to a cutting or engraving mode on the next layer that differs from the current mode, double-click the corresponding layer's toggle area to open the "Cut Settings Editor." Then, under the "Advanced" options, set the "Start Pause Time" to 1500 ms to ensure stable airflow and accurate focus transition between modes. (Fig.2)



(Fig.1)



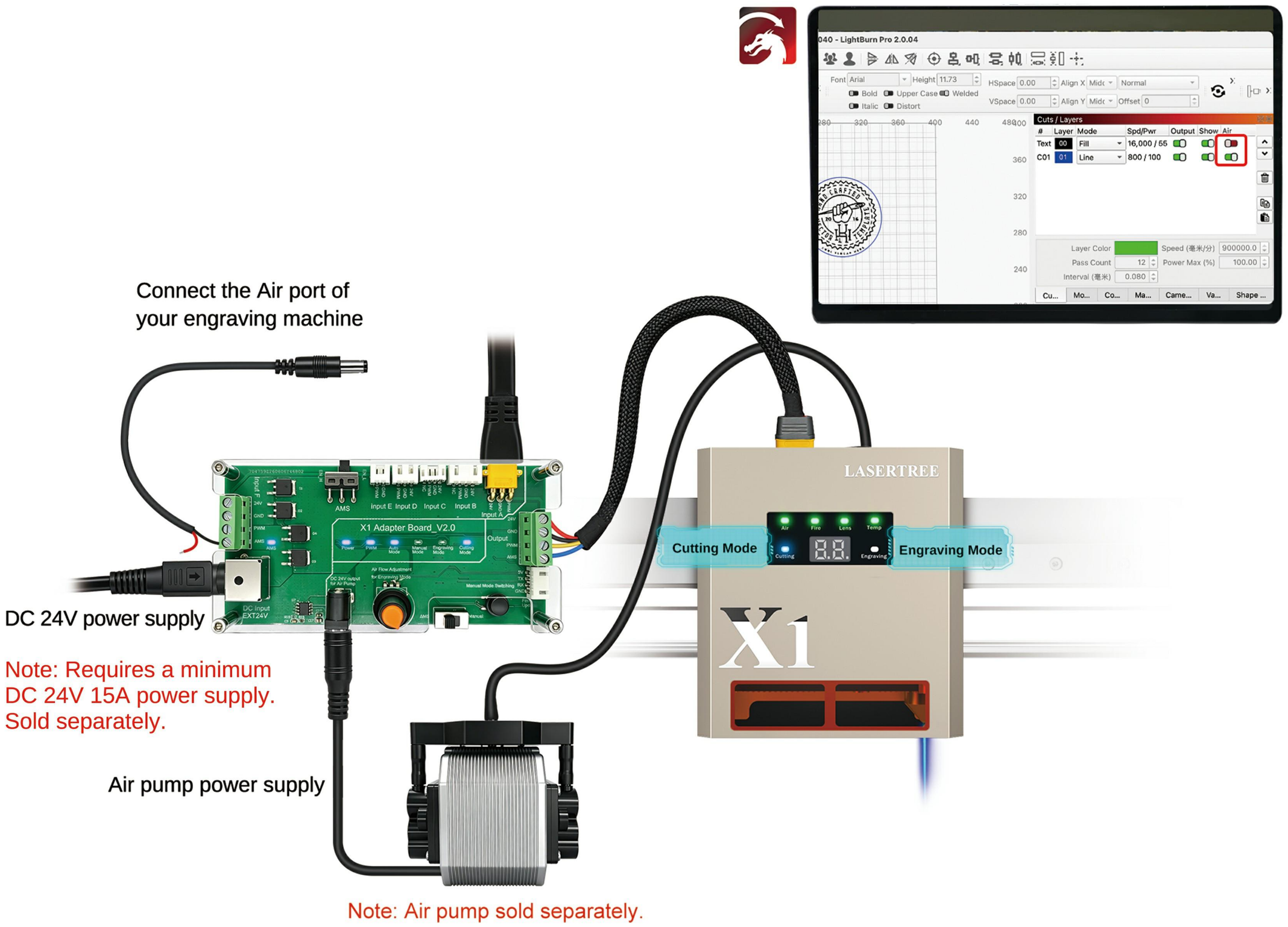
(Fig.2)

7.3 Setup Complete

After completing the setup, the laser module can automatically switch between cutting and engraving modes based on the assigned layers during operation,fulfilling both material cutting and engraving needs in a single process.

Air Pump Airflow Regulation Instructions:

- Engraving Mode: Low airflow, adjustable via the knob on the adapter board.
- Cutting Mode: High airflow, fixed and non-adjustable.



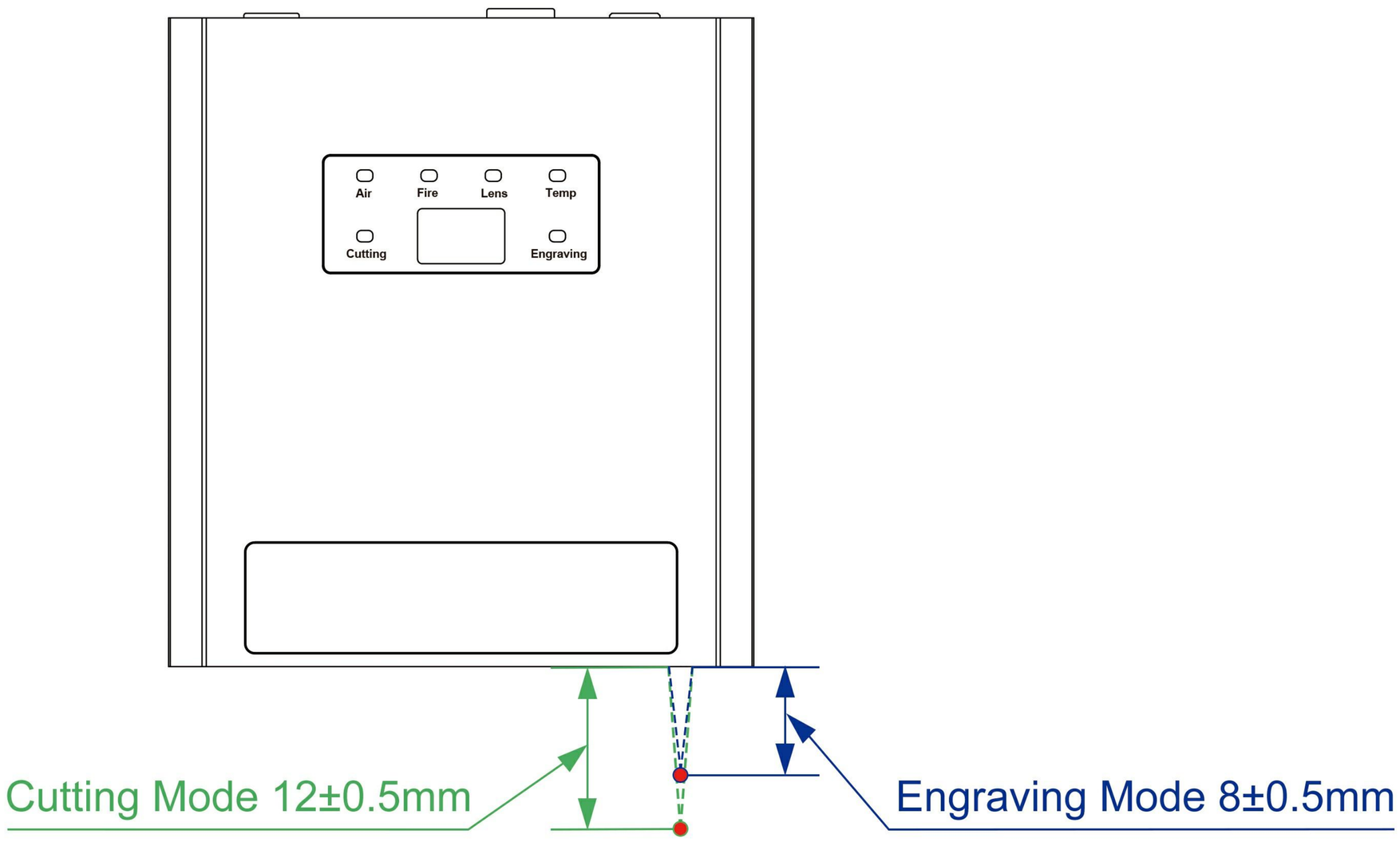
8. Working Distance (Focus) Explanation

The X1 laser module has two fixed optical working distances (focal positions):

- **Engraving mode:** Focus = **8±0.5 mm** (short focus, concentrated energy for fine details)

- **Cutting mode:** Focus = **12±0.5 mm** (long focus, slightly larger spot for thicker materials)

When switching via AMS or manually, the internal lens group moves to change the focal point. **These two focus values are fixed and do not vary with material thickness.**



8.1 How to set the laser module height according to material thickness?

Working Mode	Material Thickness	Focus fixing plate using reference
Engraving Mode	⩽3mm	7mm
Cutting Mode	⩽4-10mm	8mm
	12mm	6mm
	15mm	1mm
	>20mm	1mm

8.2 Cutting Parameters for Various Materials (Reference)

Working Mode	Material	Speed (mm/min)	Max Power (%)	Pass Count
Cutting Mode	10mm Basswood Plywood	550 (Max:700)	100%	1
	20mm Basswood Plywood	220 (Max:280)	100%	1
	10mm Pine Board	600 (Max:750)	100%	1
	20mm Pine Board	220 (Max:280)	100%	1
	9mm MDF	450 (Max:600)	100%	1

8.3 Engraving Parameters for Various Materials (Reference)

Working Mode	Material	Speed (mm/min)	Max Power (%)	Line Interval	Image Mode
Engraving Mode	Basswood Plywood	20000	30%	0.08	Grayscale
	Pine Board	20000	35%	0.08	Grayscale
	Black Acrylic	20000	10%	0.08	Grayscale
	Leather	20000	20%	0.08	Grayscale
	Aluminum Oxide	20000	6%	0.08	Grayscale

- For more material parameters, please visit **lasertree.com** to download the full parameter table, or contact technical support: **lasertree@micost-optotech.com**.

9. Maintenance

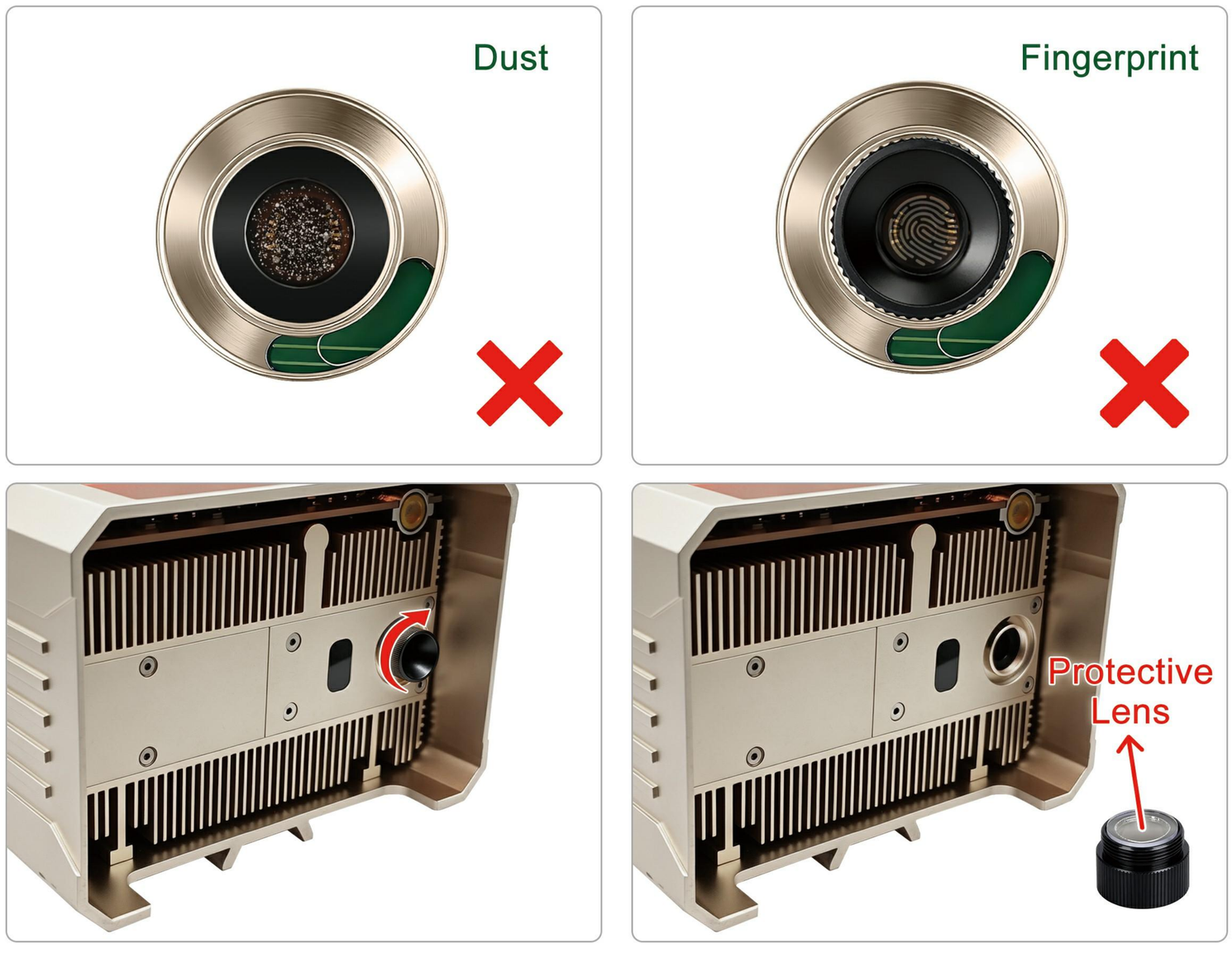
1. When the laser module is not used for a long time, please ensure that the lens is not polluted by dust.

2. Lens Cleaning:

Before each use, Inspect the protective lens of the laser module for cleanliness. If dirt is present, gently wipe it using professional lens cleaning paper and high-purity isopropyl alcohol (IPA) to ensure clarity. If the lens is severely damaged, such as by scratches or burns, replace it immediately to avoid reduced engraving or cutting performance due to contamination.

Caution for lens cleaning:

- Make sure the engraving module is disconnected from the power supply before wiping the lens.
- After wiping, allow the lens to dry naturally for 3 to 5 minutes before use.



Use an alcohol swab to clean the lens, or replace it with a spare protective lens.

- For more information about maintenance, please contact us at lasertree@micost-optotech.com.

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