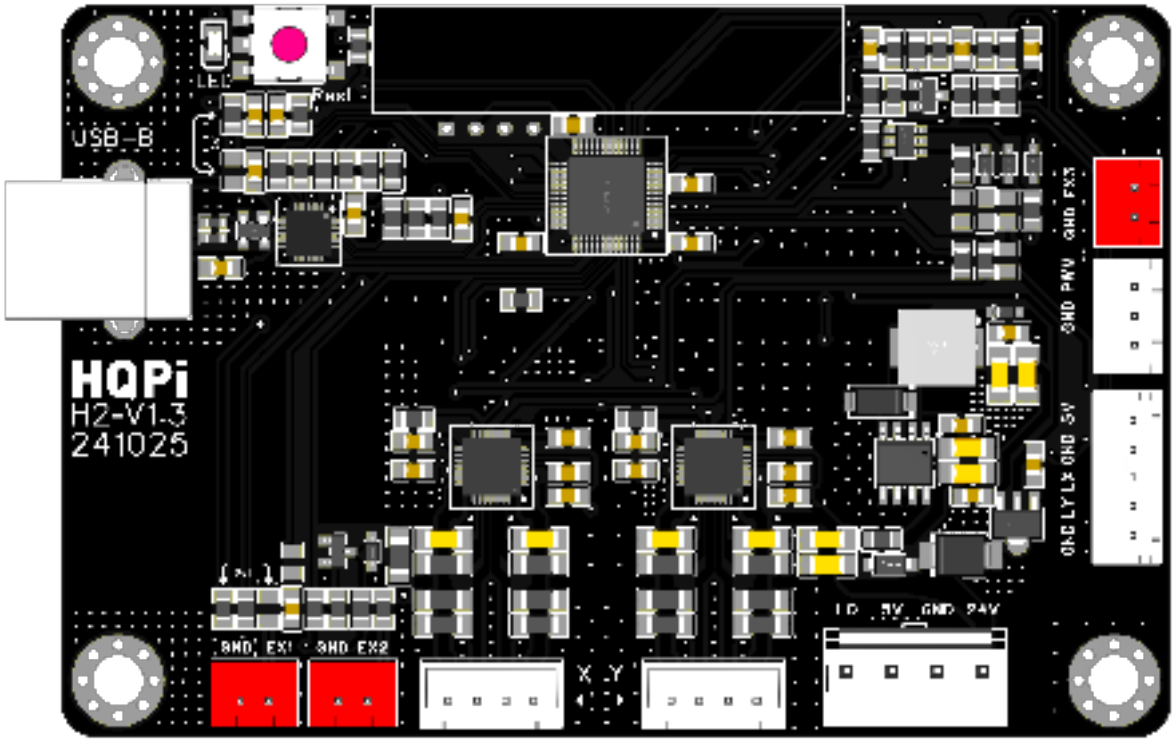
HQPi-H2 Motherboard Manual



Before using this product, please read the hardware manual of this product carefully to help you better use this product.

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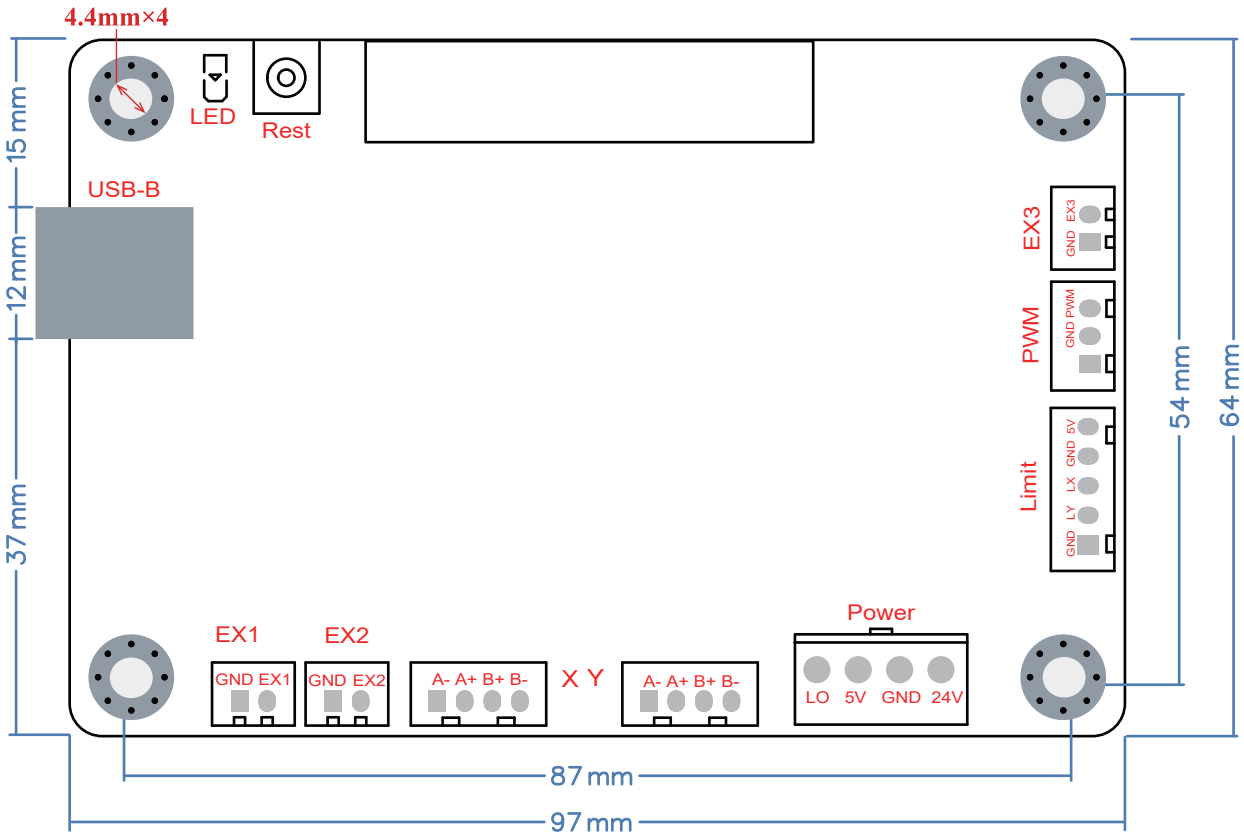

Mainboard size and pin diagram

Motherboard name	HQPi-H2
Motherboard size	97mm*64mm*14mm
Applicable models	CO2 laser 3020, 6040
Number of axes supported	2-axis (X Y)
Applicable software	Lightburn, LaserGrbl, etc.
Applicable system	Windows, Linux, Mac
Communication interface	USB-Type B
Stepper motor drive	4988
Supported stepper motor	2-phase NEMA17 (1A-2A)
Working voltage	24V
Function	Engraving, cutting, rotating processing

Interface Detail

Power:power interface, interface model: VH3.96-4P

Pin definition details:

L0: Laser switch control pin, turn on the laser at 0V, turn off the laser at 5V.

5V: Idle interface, not used

GND: Negative power supply of the control board.

24V: Positive pole of the main power input port of the mainboard, standard input 24V, supporting voltage range 12-32V.

Limit:limit switch interface, interface model: XH2.54-5P, support limit switch types: mechanical limit switch,NPN limit switch, PNP limit switch

Pin definition details:

GND: negative pole of Y-axis limit switch, GND pin of NPN and PNP switch or C pin of mechanical switch

YL: signal pin of Y-axis limit switch, signal pin of NPN and PNP switch or NC/NO pin of mechanical switch

XL: signal pin of X-axis limit switch, signal pin of NPN and PNP switch or NC/NO pin of mechanical switch

GND: negative pole of X-axis limit switch, GND pin of NPN and PNP switch or C pin of mechanical switch

5V: for NPN limit switch, for NPN limit switch, PNP limit switch power supply, connect XY axis limit switch VCC

PWM:laser power control interface, interface model: XH2.54-3P

Pin definition details:

PWM:laser power control pin, controls the laser strength, control type PWM, PWM voltage is 5V, high level is effective.

GND: control signal negative pole

X Y:stepper motor interface, interface model: XH2.54-4P

Pin definition details:

A+: A phase coil positive pole

A-: A phase coil negative pole

B+: B phase coil positive pole

B-: B phase coil negative pole

EX1, EX2, EX3:expansion interface, interface model: XH2.54-2P

Pin definition details:

EX1: signal interface	EX2: signal interface	EX3: signal interface
GND: signal negative pole	GND: signal negative pole	GND: signal negative pole

USB-B:communication interface, use data cable to connect control board and computer

Functional Description

Rest Motherboard restart button, short press and long press modes

Short press: motherboard restart

Long press: press for 3 seconds and release, GRBL parameters restore factory parameters

LED motherboard indicator

Always on: motherboard is in standby state

Slow flash: flash once per second, the machine is in operation state

Fast flash: flash 5 times per second, the motherboard is in abnormal state

GBRL configuration parameter modification

For how to adjust GRBL configuration parameters, please refer to the GRBL parameter adjustment instructions. Do not adjust parameters unless necessary. If you modify GRBL parameters by mistake,

When the motherboard is powered on, press and hold the red button Rest for 3 seconds to reset the motherboard's factory GRBL parameters. You can also enter the code $RST=$ in the software to reset the GRBL parameters

*Limit switch support types and settings

After connecting the limit according to the Limit interface pin definition, different limit switch types are set by adjusting GRBL parameters $5 and $7. If you are not sure about the limit switch type, the easiest way is to test the following four parameters to see which parameter can trigger the limit switch normally. The following are the limit switch types corresponding to different parameters. Green is the default parameter.

$5	$7	Applicable limit type	Switch status
0	0	PNP	Normal closed/NC
0	1	Mechanical/PNP	Normal open/NC
1	0	PNP	Normal open/NC
1	1	Mechanical/PNP	Normal closed/NC

*Axis movement direction reversal

If the X-axis or Y-axis movement direction is incorrect, adjust the GRBL parameter $3. The following is the X and Y movement direction corresponding to the $3 parameter.

The simplest adjustment method is to test all four parameters 0, 1, 2, and 3 to see which parameter is the correct movement direction. The green parameter is the default parameter.

$3=	X axis	Y axis
0	Forward	Forward
1	Forward	Reverse
2	Reverse	Forward
3	Reverse	Reverse

*Reset direction setting

Please adjust the X-axis and Y-axis movement directions first, and then adjust the reset direction. The simplest adjustment method is to test the four parameters 0 1 2 3 to see which parameter is the correct reset direction. Note: When testing the reset direction, if the reset direction is incorrect, turn off the machine power immediately to prevent the machine from running continuously due to failure to trigger the limit. Green is the default parameter

$23	Reset direction
0	Lower right corner
1	Upper right corner
2	Go down corner
3	Upper left corner

*X Y axis motion parameters

Regarding the GRBL parameter configuration adjustment of the step rate, maximum speed, acceleration, and maximum stroke of the X Y axis, do not adjust the step rate, maximum speed, acceleration, and maximum stroke parameters unless necessary.

$100 $101 X Y axis step rate parameters. If the actual engraving size is smaller than the design size of the drawing, adjust the step rate parameter to a smaller value. If the actual engraving size is larger than the design size of the drawing, adjust the step rate parameter to a larger value.

$110 $111 X Y axis maximum operating speed. Generally, no adjustment is required.

$120 $121 X Y axis acceleration parameters. Generally, no adjustment is required. If the mechanical structure is not stable enough, please appropriately reduce the acceleration parameter. The adjustment range is 1000-7000. Because the Y axis load is heavy, it is not recommended to increase the Y axis acceleration. The Y axis acceleration should not exceed 2000mm/s^2.

$130 $131 X Y axis maximum stroke. This parameter is mainly used for soft limit triggering. Generally, no adjustment is required. It can also be adjusted according to the actual stroke of the machine.

$100=157.500	X-axis step rate, unit: steps/mm
$101=157.500	Y-axis step rate, unit: steps/mm
$110=18000.000	X-axis maximum speed, unit: mm/min
$111=18000.000	Y-axis maximum speed, unit: mm/min
$120=6000.000	X-axis acceleration, unit: mm/s^2
$121=2000.000	Y-axis acceleration, unit: mm/s^2
$130=300.000	X-axis maximum travel, unit: mm
$131=200.000	Y-axis maximum travel, unit: mm

*X Y axis drive current adjustment

$45=0.450, 0.450 is the X axis drive current, the unit is A, because the Y axis load is larger than the X axis, the Y axis drive current and the X axis drive current are in a fixed ratio, the ratio is X:Y=1:1.3, if the X axis current is set to $45=0.450, then the X axis current is 0.450A, the Y axis current is 0.585A, the current adjustment range is 0.2-1.0A, please do not adjust the drive current significantly, it may cause the motherboard to burn out

*Reset rebound distance adjustment $27=3.000, the default reset rebound is 3mm. If you need to adjust the reset rebound distance, adjust the $27 parameter. The distance unit is mm

* Common motherboard commands For how to use the commands, please refer to the GRBL parameter adjustment instructions $$: Query GRBL configuration parameters

$V: Query the motherboard firmware version number

$X: Unlock the motherboard

?: Check the motherboard status

$RST=$: Restore GRBL parameters to factory parameters

$RST=S: Save current parameters as user parameters

$RST=U: Restore user parameters

Precautions

1. Before connecting the motherboard, make sure the machine is powered off. Do not insert the connecting wire into the control board interface when the machine is powered on! Before powering on the machine, make sure that the limit switch is not in the triggered state. If it has been powered on in the triggered state, please turn off the power and move the X and Y axes away from the limit switch detection range before powering on.
2. When powering the motherboard, make sure that the motherboard base is in a suspended state to prevent the motherboard base from contacting the conductor (metal, human body...)!
3. It is recommended to install the motherboard in a fully enclosed manner, so that dust, smoke, water vapor, etc. can be completely eliminated!
4. Do not connect the motherboard interface to a voltage and current that exceeds the limit, which will burn the motherboard!
5. Before connecting the motherboard, make sure that the line sequence of the connecting wire is consistent with the pin definition of the motherboard interface. Pay special attention to whether the power interface and PWM interface wiring are correct. Incorrect wiring may burn the motherboard!
6. If the data cable is directly connected to the motherboard USB interface, please place the motherboard in a place that is not easily accessible to prevent collision, pulling, etc. from causing impact damage to the motherboard USB interface!
7. Frequent start and stop of the laser power supply will cause transient interference to the motherboard. Please use a USB data cable with a shielding layer!
8. Do not frequently plug and unplug the motherboard interface cable violently. Good usage habits will extend the life of the motherboard!
9. The motherboard cannot be powered by the USB interface. It can only be connected to the motherboard on the computer when the motherboard is powered by the machine power interface!
10. If you do not understand the meaning of the motherboard configuration parameters, do not adjust the motherboard configuration parameters, which may cause the motherboard to fail to work properly!
11. The motherboard port can only be connected by one software at a time. If there is already a software connected to the motherboard, you will no longer be able to use other software to connect to the motherboard. Please disconnect other software before changing the engraving software!
12. Before installing the motherboard, please confirm that the motherboard installation holes are consistent with the machine installation holes. If they are inconsistent, do not install violently!
13. Do not use sharp tools to touch the motherboard. The lines on the circuit board will be cut by sharp tools, causing the motherboard to fail to work properly!
14. Do not adjust or replace any components on the motherboard at will!
15. The motherboard firmware is a dedicated firmware and cannot be burned with any other firmware. If you need other special functions, please contact the supplier!
16. If you purchase a single motherboard, please check whether the motherboard is intact when you receive it. If the packaging or motherboard shell is damaged,
please contact the supplier immediately to confirm whether the motherboard can be used!

Frequently asked questions

1. Problem: The computer cannot connect to the motherboard.
Reason: Confirm whether the motherboard is powered on. The motherboard can only be connected to the computer when it is powered on (make sure the power is powered on normally).
Please use a data cable with a shielded layer.
Make sure the data cable is plugged in to the bottom.
Make sure that the computer has successfully installed the motherboard driver and the COM port corresponding to the motherboard can be viewed in the device manager.
Make sure that the COM port connected in the engraving software is the port corresponding to the motherboard.
Make sure that no other software is connected to the motherboard port.
2. Problem: When operating the machine to move, the X-axis or Y-axis runs abnormally (a single axis does not work, the direction is incorrect, and the operation is stuck). Reason:
Check whether the stepper motor connection line is well connected to the motherboard.
The line sequence of the machine stepper motor connection line does not match the motherboard interface definition, and the line sequence of the stepper motor connection line needs to be adjusted.
If the motherboard stepper motor driver chip is burned, you can swap the X and Y wiring sockets on the motherboard to verify whether it is a motherboard problem.
If the direction of movement is incorrect, please adjust the GRBL parameter $3/$23
If the operation is stuck, you can try to increase or decrease the motor drive current and adjust the GRBL parameter $60
The machine stepper motor or stepper motor connection line is faulty.
3. Problem: The machine suddenly stops working during the engraving process.
Reason: Check whether the computer is in sleep mode. When the computer is in sleep mode, the machine will stop working. To perform long-term engraving tasks,
it is best to disable system sleep, system sleep, screen saver and other functions.
When the machine is working, make sure that no conductor contacts the motherboard.
4. Problem: During the engraving process, the engraving software pops up abnormal prompts such as "Laser engraving machine detected...".
Reason: It may be a USB communication problem caused by unexpected interference to the motherboard. You can reconnect by re-plugging the data cable or
reconnecting the motherboard with the software. If this problem occurs frequently, please confirm whether the data cable
has anti-interference ability.
5. Problem: The machine is reset in the software, and the reset direction is not the correct direction.
Reason: Adjust the settings of the motherboard configuration parameter $23 line to adjust the direction of the machine reset.
6. Problem: The laser cannot emit light.
Reason: Make sure the software settings are correct and set the laser output power to more than 10% for testing
Check whether the PWM connection line and line sequence are correct and whether the contact is good
If the machine has a laser current adjustment knob, make sure the knob current is turned to the maximum value
Generally, the CO2 engraving machine has cover opening protection and water pump protection, please make sure the machine cover is closed
Confirm whether the water pump is working properly and whether the water inlet and outlet pipes are installed correctly