LMC_FIBER_CUH_V4(0)

Fiber Card User Manual

Pulse fiber series for laser

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Version record

Version number	Update date	Updater	Update description
V4-E	2015-07-08		Board hardware and performance improvements, support for IPG-E lasers. YLP/YLPM series lasers compatible with Type B/D type interfaces at the same time;

Safety instructions

Please read this section carefully before installing and using the LMCV4-FIBER-E control card. If you have any questions about this document, please contact BJJCZ.

1. Safe operation steps

- Observe all safety instructions for lasers (including but not limited to those described in lasers, galvanometers, and related sections of this document)
- Turn on the laser power at any time after turning on the computer power, LMCFIBERV4 control card power, and galvanometer power. Otherwise, it may cause damage due to an uncontrollable laser beam.

We recommend that you use a shutter to avoid damage from uncontrolled lasers.

2. The security part of the customer's responsibility

- LMCV4-FIBER-E is designed to control a laser scanning system. Therefore, all safety instructions for the laser system should be understood and implemented by the customer. The customer must strictly comply with the relevant safety instructions and be solely responsible for the safety of the laser system used.
- Security rules may vary from country to country. It is the customer's responsibility to comply with all local regulations.
- Please check carefully before running the software. A software error may cause the system to stop responding. In this case, the galvanometer and laser are uncontrollable.
- Please avoid damage to the board caused by moisture, dust, corrosives and foreign objects.
- When storing and using the board, please avoid electromagnetic field and static electricity damage. They can damage the electronics on the board. Use an ESD bag to store the card; wear a well-grounded ESD-preventive glove contact card.
- Please ensure that the board is stored in an environment of -20°C to+60°C. The permissible operating ambient temperature is 25°C±10°C.

1、Overview

The LMCV4-FIBER-E dedicated marking control card is a control card specially developed for marking machines using pulsed fiber lasers. It is connected to a PC via a USB interface.

1.1 How to identify the LMCV4-FIBER-E control card

The words "MODEL:LMCFIBER" and "REV:20141022" are printed on the upper left of the board, as shown in Figure 1-1.

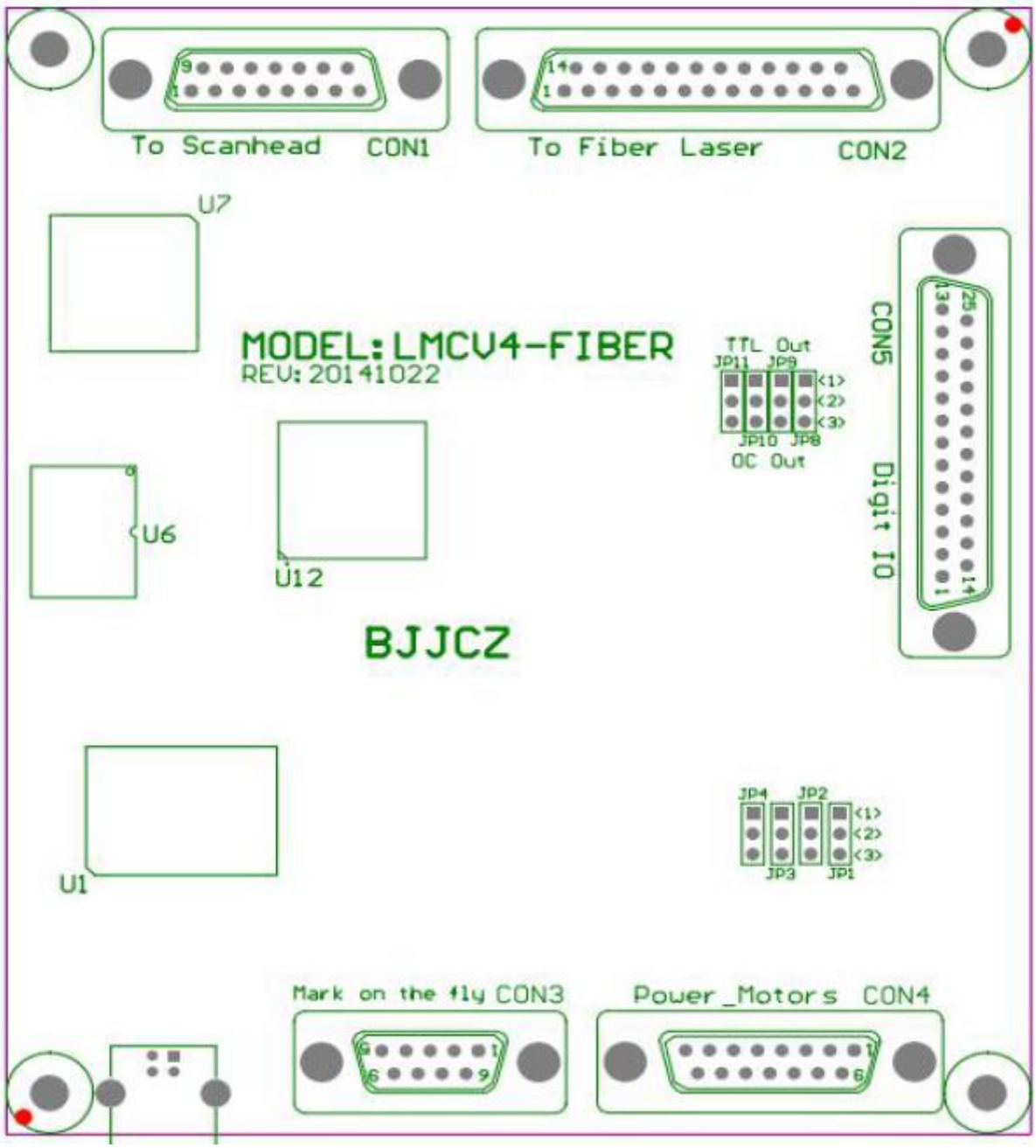


Figure 1-1 LMC2015 Fiber-E control card

among them,

CON1: galvanometer (SCANHEAD) control interface, DB15 socket

CON2: DB25 control interface of IPG YLP series lasers;

CON3: Mark on fly interface for connecting the encoder, DB9 socket;

CON4: IO interface for connecting power and extended axis control signals, DB15 socket.

CON5: IO interface for input and output digital signals, DB25 socket

1.2 main feature

- Use the DB25 socket to output the laser control signal and connect it directly to the pulsed fiber laser through a 25-pin cable.
- The galvanometer control signal is a digital signal, which can be directly connected to the internationally accepted digital galvanometer.
- Flight marking: It can be connected to the rotary encoder to detect the speed of the pipeline in real time and ensure high-speed marking.
- Support single-machine multi-card working mode. One computer can simultaneously control 8 sets of LMCFIBER marking control cards for parallel operation. 8 sets of control cards can process different content. [Note: Requires computer USB channel support]
- Extended axis (stepper motor/servo motor) output: It can output the direction/pulse signal of two channels to control the stepper motor (or servo motor), which can be used for shaft rotation or splicing.
- 16 universal input digital signals (TTL compatible). IN0~IN13, XORG0(IN14), YORG0(IN15). Among them, IN0~IN3 are designated as laser state input signals are introduced by CON2 (LaserST0~LaserST3).
- 8 general-purpose output digital signals (TTL compatible). Out0-7 is output from the CON5 socket. Among them, Out0~Out3 are TTL outputs; Out4-7 can be set to OC or TTL output by jumpers.
- LaserErr signal, output when the laser status is wrong, is the OC output, can be connected to the relay.
- ReMark (repeated engraving of the cached content) Signal: used for marking the same content and requiring high-speed marking. (If the marking content contains variable text, or if the marking content is too large to be saved in the board, it must be connected to the general-purpose input signal.)
- Compatible with USB2.0.

1.1 Release notes

The upper left corner of the board is labeled “REV:20141022”, a new version introduced in

2014 that can control the laser of the D-type interface and is also compatible with the laser of the B-type interface.

Control card /Laser	B-type interface laser	D-type interface laser	Remarks
Version REV:20070716-2	Support	Not Support	Old Version
Version REV: 20080425-3	Support	Support	USBLMC
Version REV: 20100511	Support	Support	2010 New Version
Version REV: 20101221	Support	Support	2010 New Version

Note: At present, the mainland is mainly a B-type interface laser.

2、Electrical connections

2.1 Interface Description

2.1.1 power supply

■ The control card requires a 5V DC power supply. A 5V/3A DC power supply is recommended. The power is connected from the 4/5/12/13 pin of the CON4 socket.

Pin CON4	Name	Description
4、5	VCC	+5V. Positive power supply
12、13	GND	GND. Negative power supply

2.1.2 CON1 : DB15 galvanometer control

The galvanometer control signal is a digital signal that can be directly connected to the digital galvanometer. Since the digital signal transmission protocol used by the digital galvanometer is not exactly the same, it is necessary to confirm which transmission protocol is used by the digital galvanometer. Our company also provides a digital to analog adapter board, which can also be converted into an analog signal output by connecting the conversion board to an analog galvanometer.

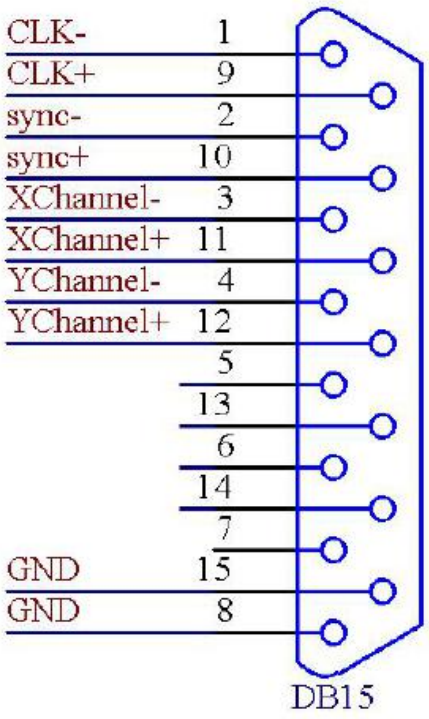


Figure 2-1 Schematic diagram of CON1 socket pin definition

Pin	Name	Description
1、9	CLK－/CLK＋	Clock signal -/clock signal +
2、10	SYNC－/SYNC＋	Sync signal -/sync signal +
3、11	X Channel－/X Channel＋	Galvanometer X signal -/galvanometer X signal +
4、12	Y Channel－/Y Channel＋	Galvanometer Y signal -/galvanometer Y signal +
5、13	NULL	Reserved
6、14	NULL	Reserved
7	NULL	Reserved
8、15	GND	Ground

Digital signals are recommended for twisted pair connections with shields.

2.1.3 CON2 : DB25 Laser Control

The CON2 socket is directly docked to the 25-pin socket of the fiber laser via a 25-pin cable.

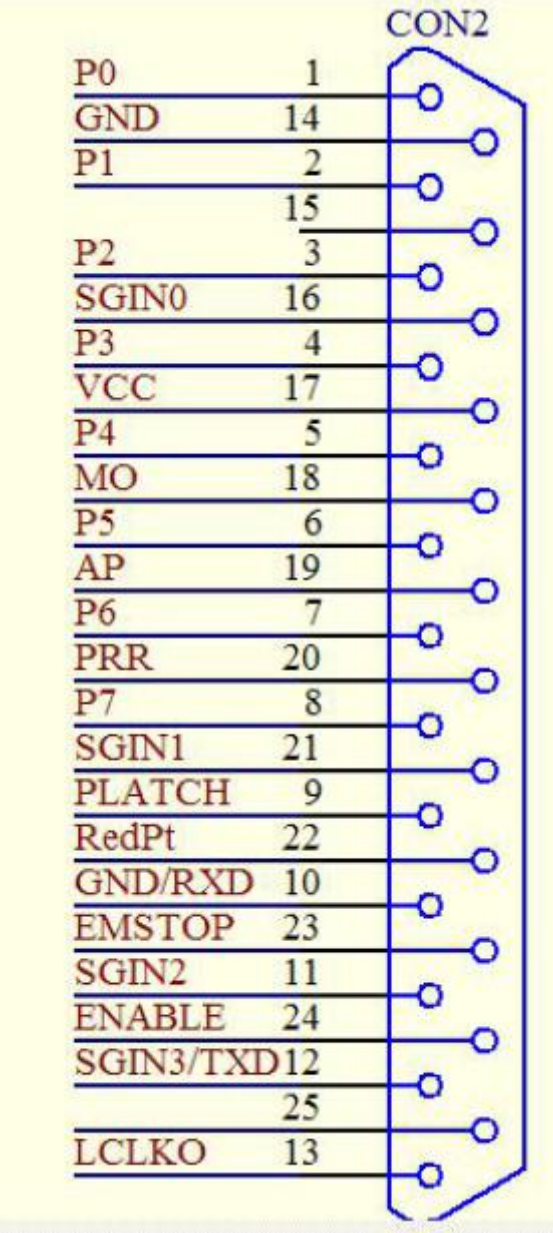


Figure 2-2 Schematic diagram of CON2 socket pin definition

Pin No.	Signal Name	Description
1—8	P0—P7	Laser power. TTL output.
9	PLATCH	Power latch signal. TTL output.
14	GND	The reference ground of the control card.
10	GND/RXD	The laser types are IPG-YLP and YLPM: Pin 10 is ground.. In the laser type IPG-YLP-E: Pin 10 of the board is the serial data output signal.

16、21、11	LASERST0~2	Laser status input.
12	LASERST0~3	The laser types are IPG-YLP and YLPM: the 12th is the foot laser state input 3. In the laser type IPG-YLP-E: The 12th pin of the board is the serial data input signal.
17	VCC	Control card's 5V power output.
18	MO	Main oscillator switch signal. TTL output.
19	AP	Power amplifier switching signal. TTL output.
20	PRR	Repeat the pulse frequency signal. TTL output.
22	RedPt	The red light of the laser indicates the signal. TTL output.
23	EMSTOP	Emergency stop switch signal. TTL output.
13	CLOCK	In the laser type IPG-YLP and YLPM: the 13th foot is left unconnected. In the laser type IPG-YLP-E: The 13th pin of the board is the serial clock signal.
24	ENABLE	In the laser type IPG-YLP and YLPM: pin 24 is left floating and not connected. In the laser type IPG-YLP-E: the 24th pin of the board is the enable signal.
25		This foot is floating and not connected.

2.1.4 CON3 : DB9 flying standard interface

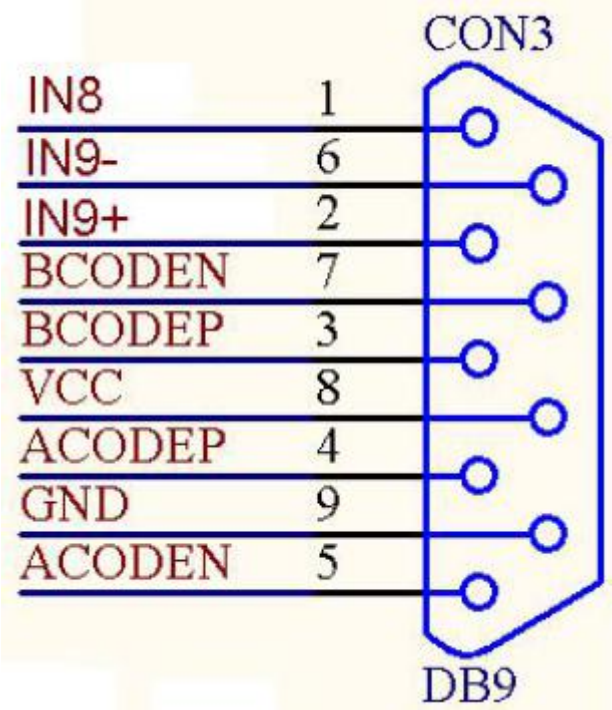


Figure 2-3 Schematic diagram of CON3 socket pin definition

Pin No.	Signal Name	Description	Remarks
1	IN8	Input port 8	Form a loop with GND
2、6	IN9+、IN9-	Input port 9	There is a 1K current limiting resistor inside IN9; if the voltage is higher than 12V, an external current limiting resistor is recommended.
3、7	BCODEP/ BCODEN	Encoder input B+/B-	
4、5	ACODEP/ACODEN	Encoder input A+/A-	
8	VCC	+5V output	Form a loop with 9 feet
9	GND	Ground	

2.1.5 CON4: DB15 Power / Expansion Axis / IO Socket

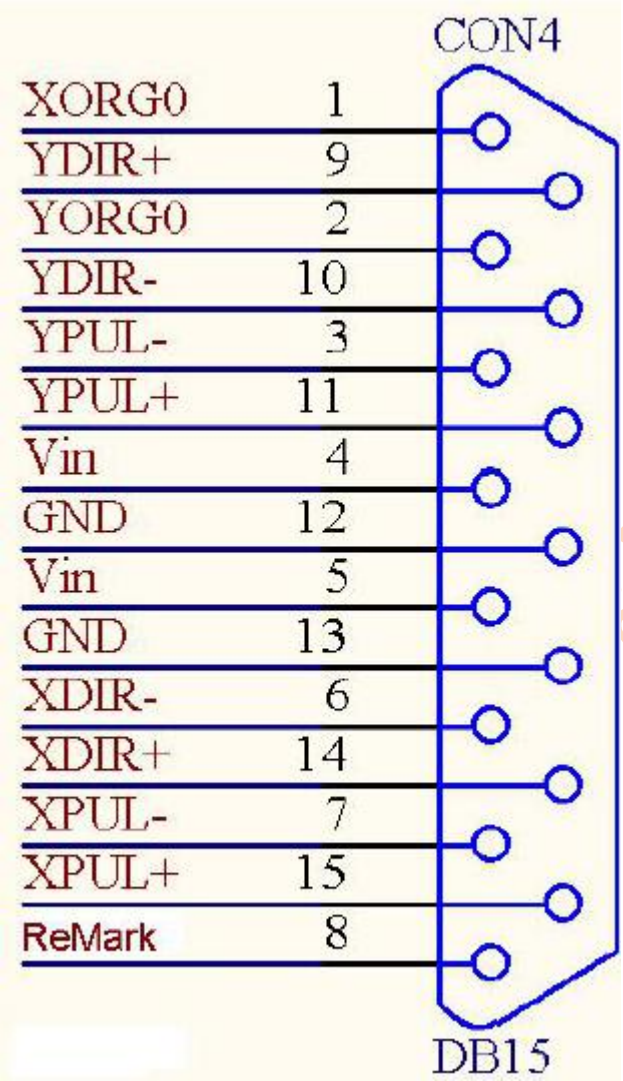


Figure 2-4 Schematic diagram of CON4 socket pin definition

Pin No.	Signal Name	Description
1	XORG0	Extends the axis X origin signal. Form a loop with the ground of the control card (12, 13 feet). When using this signal, connect this signal to ground at both ends of the switch. This signal is an input signal.
2	YORG0	Expand the axis Y origin signal. Form a loop with the ground of the control card (12, 13 feet). When using this signal, connect this

		signal to ground at both ends of the switch. This signal is an input signal.
3、11	YPUL-/YPUL+	Expand the pulse signal of axis Y. The output mode can be set to differential output or common anode output (TTL output). This signal is the output signal. Common anode output, using VCC and YPUL+ signals, VCC is the anode signal.
4、5	Vin	The positive side of the 5V input supply. This signal is an input signal.
12、13	GND	The negative terminal (ground signal) of the 5V input power supply, that is, the ground signal of the control card. This signal is an input signal.
6、14	XDIR-/XDIR+	Extends the direction signal of axis X. The output mode can be set to differential output or common anode output (TTL output). This signal is the output signal. Common anode output, using VCC and XDIR+ signals, VCC is the anode signal.
7、15	XPUL-/XPUL+	The pulse signal of the extended axis X can be set to a differential output or a common anode output (TTL output). This signal is the output signal. Common anode output, using VCC and XPUL+ signals, VCC is the anode signal.
8	ReMark	Repeat the marking signal. Form a loop with the Gnd signal, and connect this signal to the ground to the two ends of the switch. When

		this signal is used, the control card marks what was left in the cache when it was last marked. This signal is an input signal.
9、10	YDIR-/YDIR+	Extends the direction signal of axis Y. The output mode can be set to differential output or common anode output (TTL output). This signal is the output signal. Common anode output, using VCC and YPUL+ signals, VCC is the anode signal.

2.1.6 CON5: DB25 socket - digital input and output

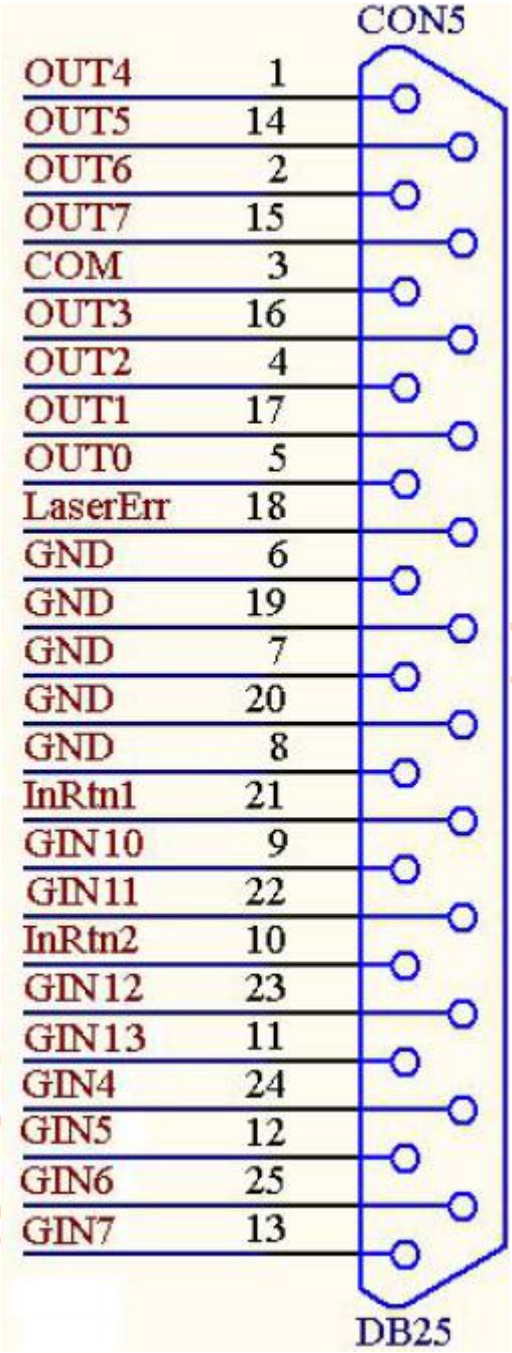


Figure 2-5 Schematic diagram of CON5 socket pin definition

Pin No.	Signal Name	Description
5、17、4、16、1、14、2、15	Out0—Out7	General purpose output signal. TTL compatible. Form a loop with the Gnd signal. Among them, Out4/5/6/7 can be set to the collector open drain (OC) output by jumper JP8/9/10/11.

3	COM	When the output signal uses the OC output, connect this pin to the positive terminal of the pull-up power supply (for example, 24V) to prevent inductive loads (such as inductive relays) from damaging the output circuit.
6、7、8、19、20	GND	Ground
9、22	GIN10、GIN11	The positive terminal of the input of the universal input signal 10/11 forms a loop with NRTN1.
21	INTRN1	The input terminal of the universal input signal 10/11 is negative.
10	INTRN2	The input terminal of the universal input signal 12/13 is negative.
23、11	GIN12、GIN13	The positive terminal of the input of the universal input signal 12/13 forms a loop with INRTN2.
24、12、25、13	GIN4/5/6/7	The positive terminal of the input terminal of the general-purpose input signal 4/5/6/7 forms a loop with GND.
18	LaserErr	The laser fault output indicates that the laser is in an error state. OC output. This signal is pulled down to the GND signal when the laser fails.

2.2 Description of Jumpers

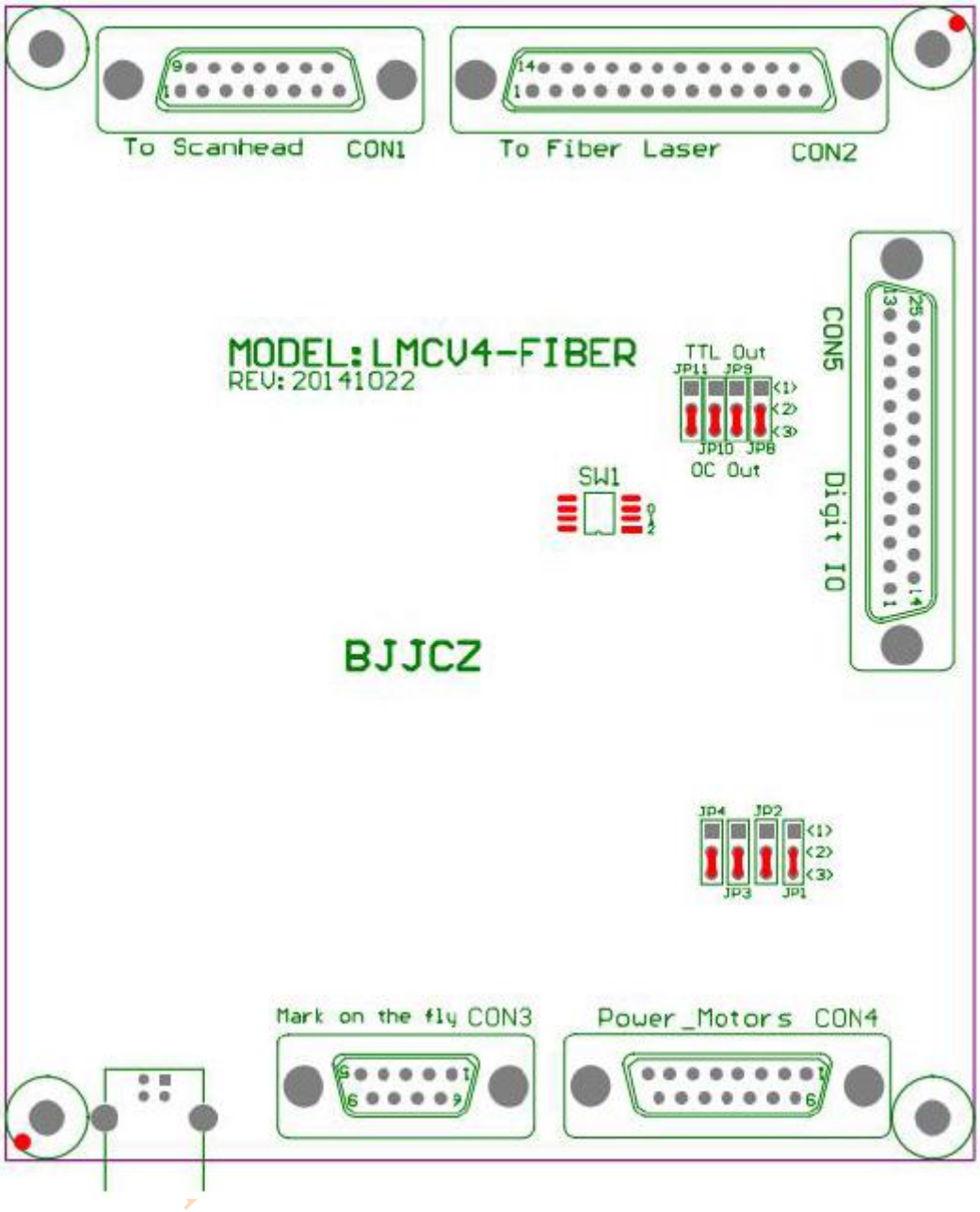


Figure 2-6 Location of the fiber V4 board jumper

Pin No.	Number of pins	Description
JP1、JP2、JP3、JP4	3	Extend the direction of the axis / pulse signal settings. JP1/JP3 sets the direction signal; JP2/JP4 sets the pulse signal. When shorting JUMPER's 2--3 pin, the direction/pulse signal is differential output. Here, the 6-pin XDIR-, 14-pin XDIR+, 7-pin

		XPUL-, 15-pin XPUL+, 9-pin YDIR-, 10-pin YDIR+ of the CON4 socket The 3-pin YPUL- and 11-pin YPUL+ are respectively connected to the DIR-, DIR+, PUL-, and PUL+ of the stepper driver; when the JUMPER 1-1-2 is shorted, the direction/pulse signal is the common anode output. The 4 pin (VCC) of the CON4 socket is connected to the VCC of the stepper drive. 9-pin (YDIR+) or 14-pin (XDIR+), connected to the DIR of the stepper drive. The 11-pin (YPUL+) or 15-pin (XPUL+) corresponds to the PUL connected to the stepper drive. (Note: JP1---JP4 of the card is factory-set to short-circuit 1-2 feet.)
JP8、JP9、JP10、JP11	3	Set the output mode of the general-purpose output Out4/5/6/7. TTL output when shorted to 1-2 pins; open drain output (OC) when shorted to 2-3 pins. Among them, JP8 corresponds to OUT4, JP9 corresponds to OUT5, JP10 corresponds to OUT6, and JP11 corresponds to OUT7.

The factory default settings are:

JP1——JP4: Short-circuit 1-1-2 feet, the direction/pulse signal of the extended axis is output in a common Yang mode.

JP8——JP11: Short-circuit 2-3 feet, the default is open-drain output.

2. 3 DIP switch SW1 Description

In Figure 2-6, there is a SW1 position where a DIP switch is soldered. This DIP switch is the board index number, 0-7. Used to distinguish different boards when multiple cards work at the same

time. The 0, 1, and 2 on the left side of the DIP switch correspond to the binary b2 b1 b0. The position where the position of the DIP switch is turned to the left (ON) indicates that the bit is 0, otherwise it is 1.

2.4 Connection of digital input and output signals

2.4.1 Input signal In4-8、XORG0、YORG0、 Remark

The schematic diagram of the interface circuit of the input signal (In4-8 /XORG0/YORG0/ Reamrk) and the recommended connection scheme are shown in Figure 2-7, 2-8:

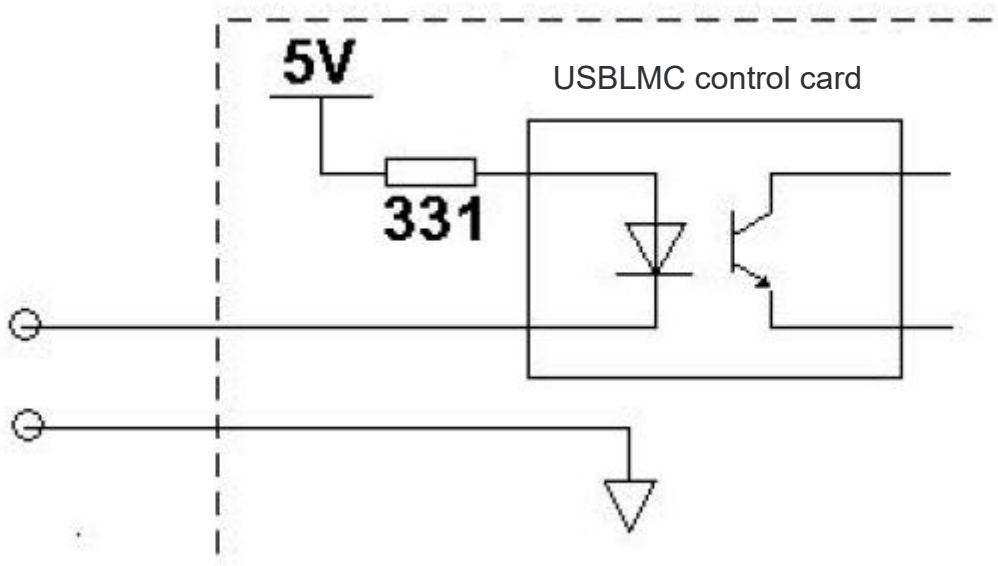


Figure 2-7 Schematic diagram of the interface circuit of the general-purpose input signal (In4-8/XORG0/YORG0 /Remark)

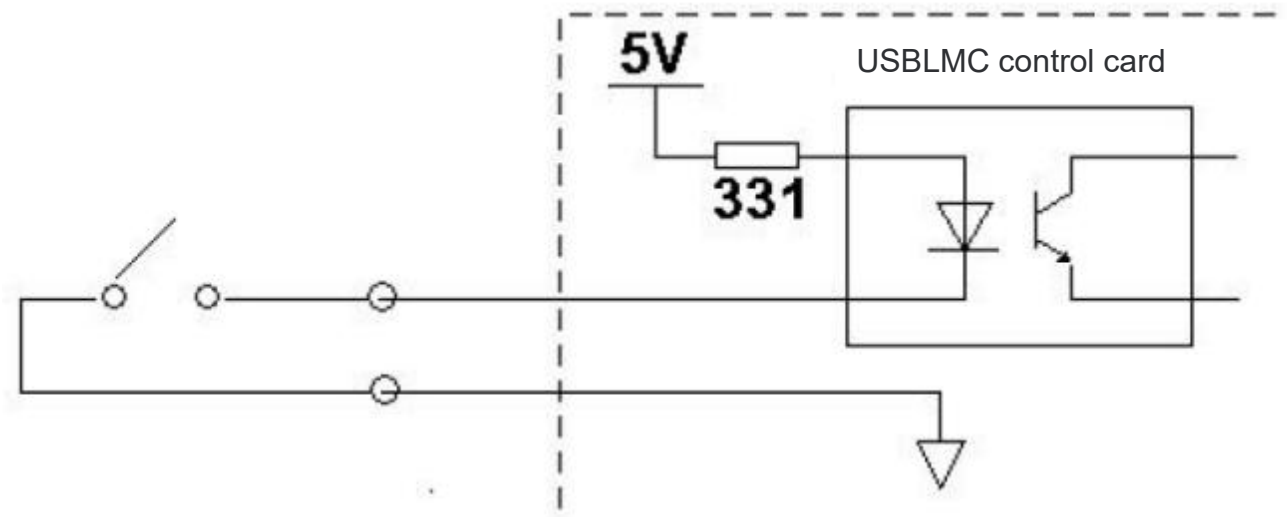


Figure 2-8 Recommended connection scheme for universal input signal (In4-8 /Remark)

For these input signals, it is only necessary to provide a normally open switch externally. The contact resistance of this switch is less than 100 ohms.

2.4.2 Input signal In9-In13

The schematic diagram of the interface circuit of the universal input signal In9-13 and the recommended connection scheme are shown in Figure 2-9 and Figure 2-10:

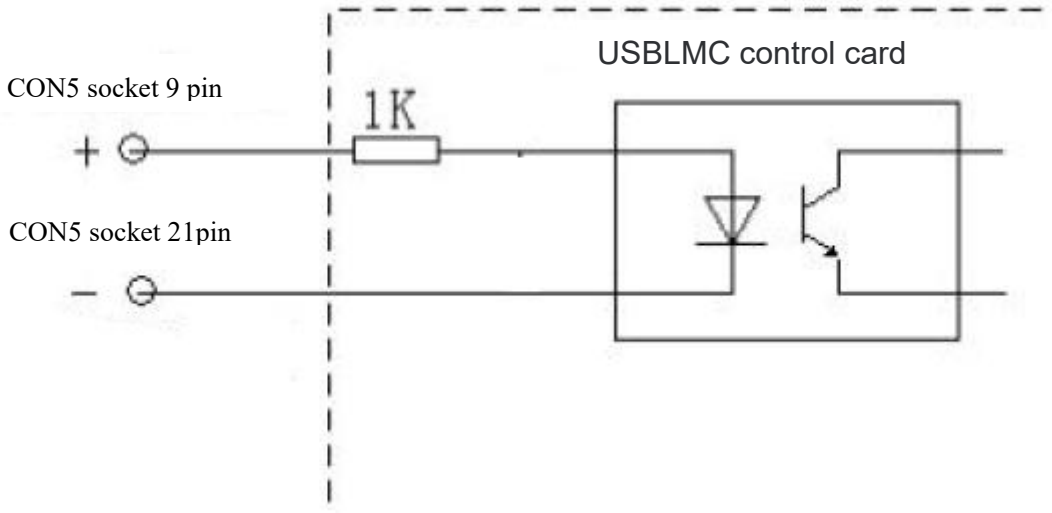


Figure 2-9 Interface circuit of the general-purpose input signal IN9-13

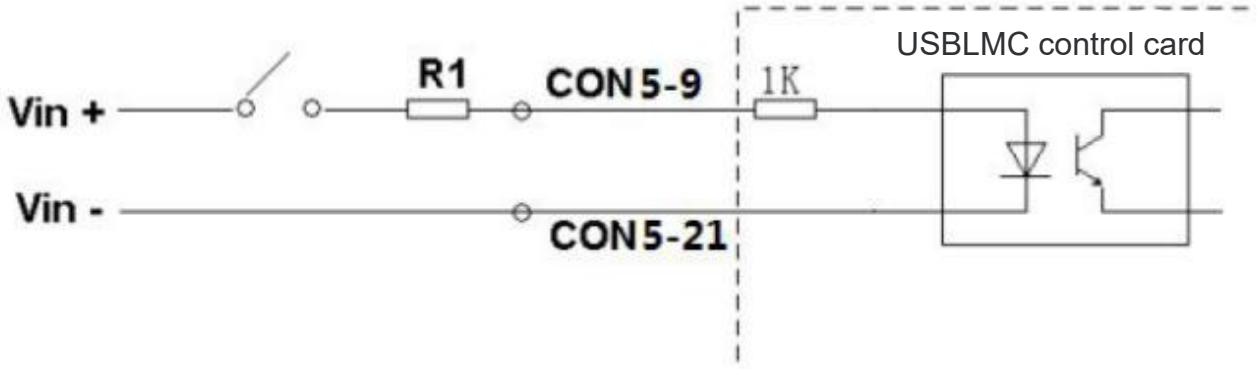


Figure 2-10 Recommended Connection Scheme for Universal Input Signal IN9-13

It is necessary to determine whether the external resistor R1 is based on the actual voltage value of the external power supply Vin to ensure that the input current is between 10mA—15mA. If the input voltage is greater than 12V, it is recommended to connect the current limiting resistor R1 in series with the control card. Assuming the input current is 12mA, the input resistor R1 is calculated as follows:

$$R1 = \left(\frac{Vin}{12} - 1\right) \times 1000\Omega$$

2.4.3 Output Signal Out0——Out7

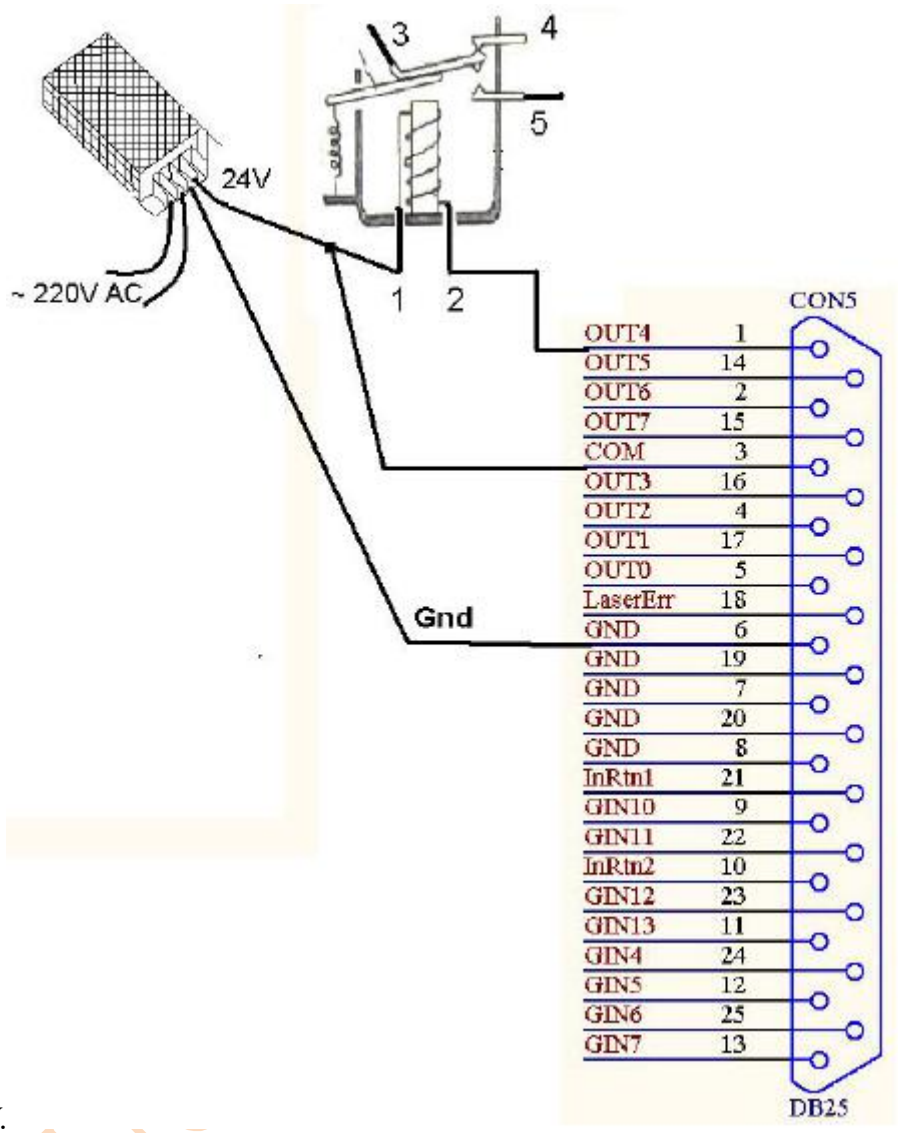
The output signal Out0/1/2/3 is a TTL output, and Out4/5/6/7 can be set to an open-drain (OC) output or a TTL output via jumper JP8/9/10/11.

The TTL output must be protected from short circuits or grounding, as this can damage the board. When the output signal is TTL output, the output current is guaranteed to be 5mA.

When using the open drain output, refer to Figure 2-11. In particular, when connecting an inductive load (such as an inductive relay), be sure to connect the COM signal (pin 3) to the positive terminal of the power supply. OC output, which allows a drive current of 250mA and a

24 v power supply

relay



drive voltage of 40V.

Figure 2- 11 Schematic diagram of open-drain output connection relay

2.5 Typical connection

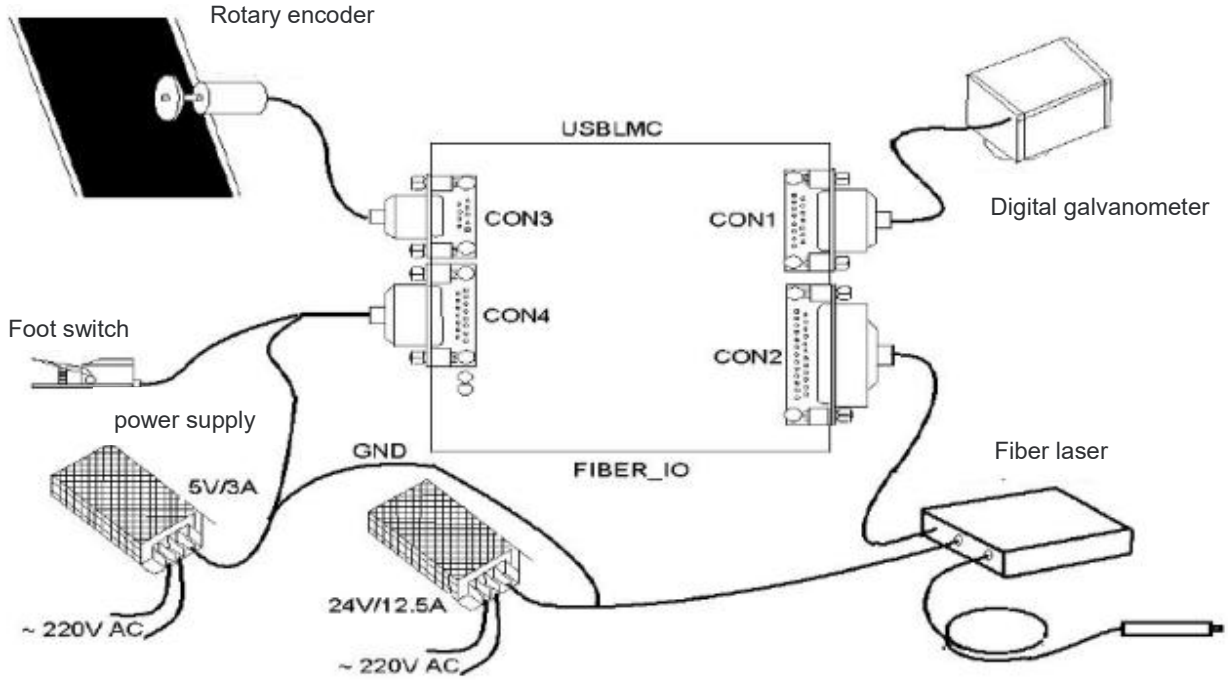


Figure 2-12 Connection diagram of IPG YLP dedicated control card

- In Figure 2-12, only the connection of the power supply, laser, and galvanometer is required.
- The encoder will only be used when using the flight marking function.
- The foot switch decides whether to use it according to the actual situation.

2.6 Board Shell Dimensions:

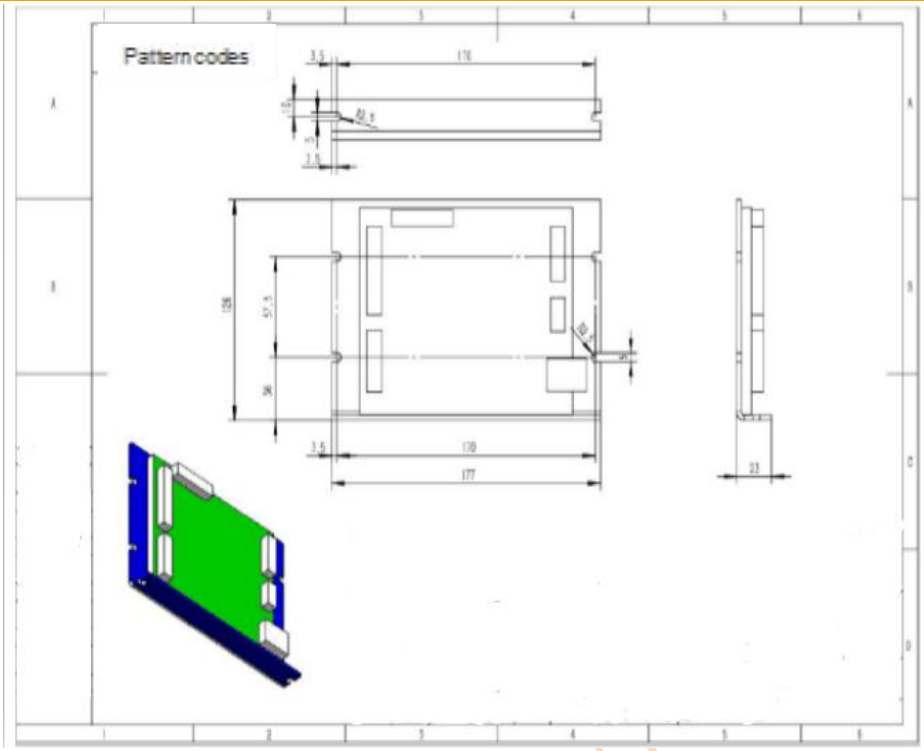


Figure 2- 13 Schematic diagram of the board shell