LMCDYN User Manual

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Beijing JCZ Technology CO. LTD

Catalog

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Safety During Installation And Operation

Please read these operating instruction completely before you proceed with installing and operating this product. If there are any questions regarding the contents of this manual, please contact BJJCZ.

1. Steps For Safe Operation
   - Carefully check your application program before running it. Programming errors can cause a break down of the system. In this case neither the laser nor the scan head can be controlled.
   - Protect the board from humidity, dust, corrosive vapors and mechanical stress.
   - For storage and operation, avoid electromagnetic fields and static electricity. These can damage the electronics on the product. For storage, always use the antistatic bag.
   - The allowed operating temperature range is 25℃ ± 10℃.
   - The storage temperature should be between –20℃ and +60℃.
2. Laser Safety
   - This product is intended for controlling a laser scan system. Therefore all relevant laser safety directives must be known and applied before installation and operation. The customer is solely responsible for ensuring the laser safety of the entire system.
   - All applicable laser safety directives must be adhered to. Safety regulation may differ from country to country. It is the responsibility of the customer to comply with all local regulations.
   - Please observe all laser safety instructions as described in you scan head or scan module manual, and this manual.
   - **Always turn on the power of this product and the power supply for the scan head first before turning on the laser. Otherwise there is the danger of uncontrolled deflection of the laser beam.**
     We recommend the use of a shutter to prevent uncontrolled emission of laser radiation.

I. LMCDYN Hardware manual

Dynamic focus control board（LMCDYN）is developed for 3-dimensions dynamic focus function, shown in figure 1.

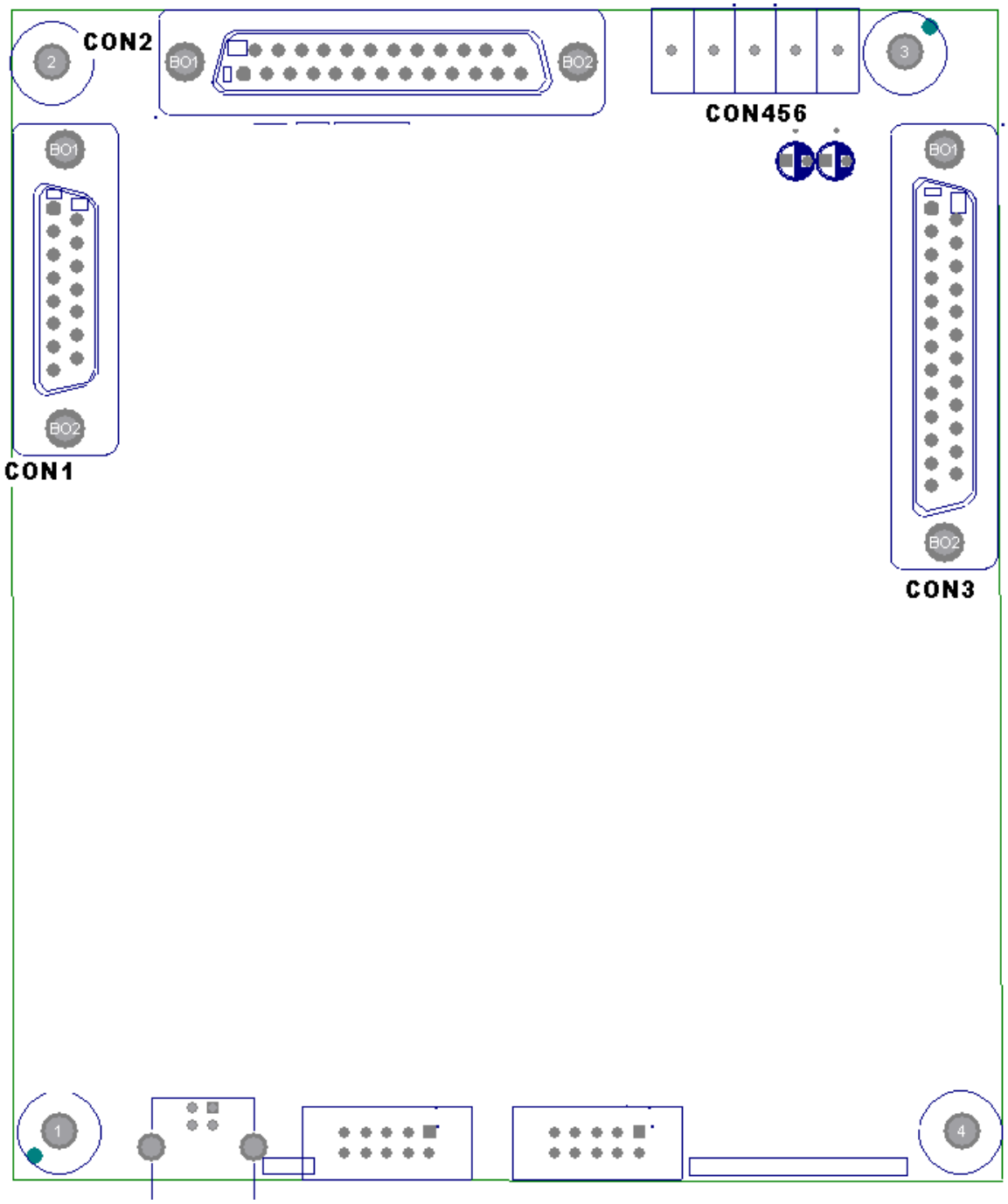

Figure 1 LMCDYN board

Note: to use LMCDYN normally, you must use the new version software and driver:

- USB driver of **Driver_20080125** or later;
- **EzCad2.0.13 Unicode**（**20080222**）or later.

Interface definition

There are 4 groups interface on LMCDYN board. CON1 is digital galvanometer interface, CON2 is power and laser control interface, CON3 is IPG laser interface, CON4~CON6 are protect interface for IPG laser.

CON1: Digital Galvo interface

CON1 can be connected to digital galvo directly with **DB15** connector**.** Also we provide a transfer board, which can be used to transfer the digital signal to analog signal that can be connected to the analog galvo.

Note: to use digital galvo, we need to connect the input signal NO. 3 (Pin17 of CON2) to GND, otherwise the signal can not be identified correctly by digital galvo.

The pin definition of CON1 is shown in figure 2.

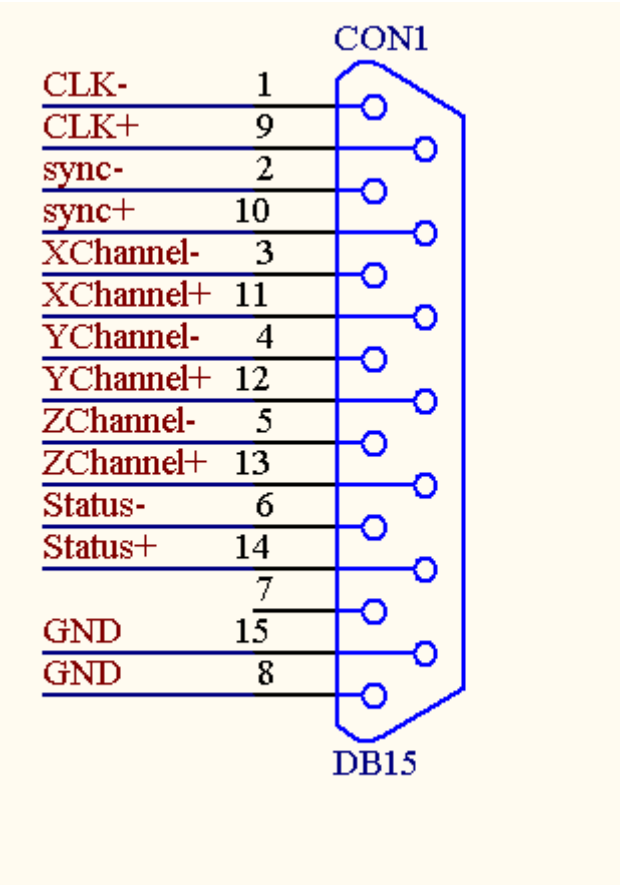

Figure 2 Pin definition of CON1

NO.	Signal name	Comment
1，9	CLK-/CLK+	Clock signal; differential output.

2，10	SYNC-/ SYNC+	Synchronize signal; differential output
3，11	XChannel-/ XChannel+	Data signal of channel X; differential output
4，12	YChannel-/ YChannel+	Data signal of channel Y; differential output
5，13	ZChannel-/ ZChannel+	Data signal of channel Z; differential output
6，14	Status-/ Status+	Status signal of galvo; differential input
8，15	GND	Ground

5 groups signal (10 signals) should be connected: CLK，SYNC，XChannel，YChannel and ZChannel. Status signal is reserved.

CON2：Power and Laser control interface

As shown in figure 3.

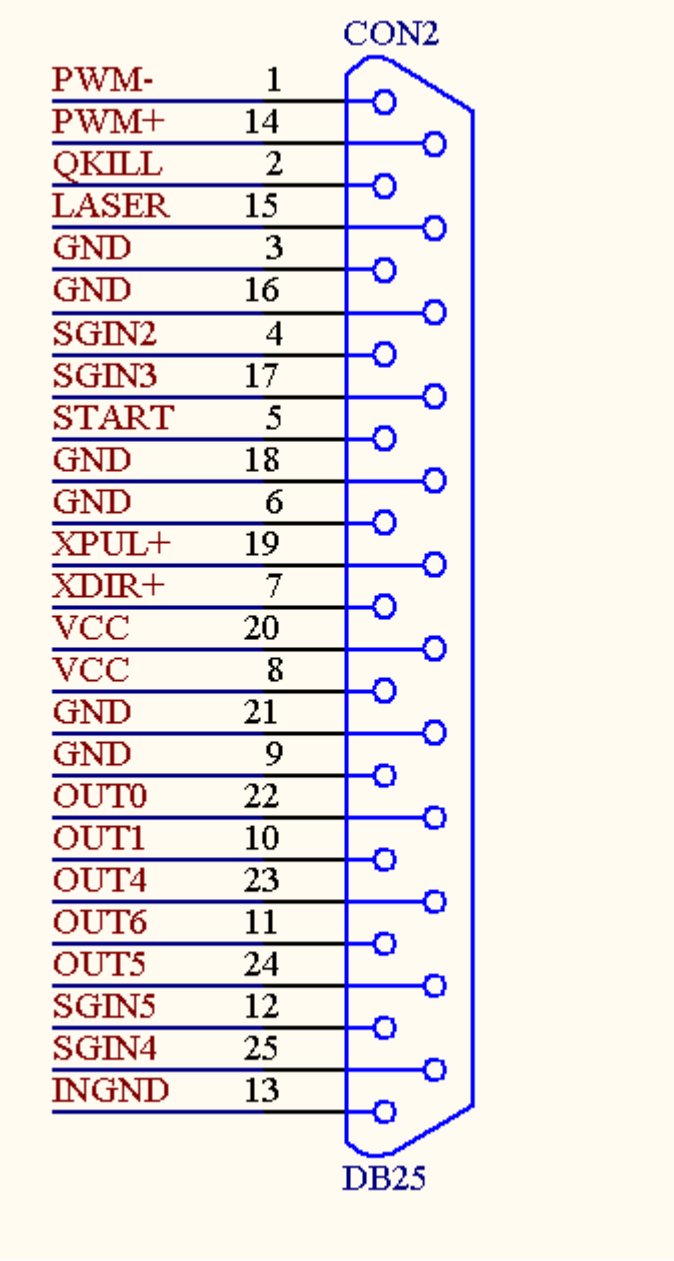

Figure 3 Pin definition of CON2

PIN No.	Signals	Illustrations
1，14	PWM-/PWM+	Differential output. For CO2 laser, this signal is used to set laser power and also as output of Tickle signal; for Yag laser, this signal is used for Q-driver as repeat frequency signal. In addition, **PWM+/ Ground**(pin25) can form a high level active output; **PWM-/Ground (**pin25**)** can form a lower level active output.
2	QKILL	First Pulse Killer signal. TTL output. Reference Ground signal is GND.
3,6,9,16, 18,21	GND	The reference Ground, also the reference Ground of 5V input power.

5	START	Start signal, which forms a return circuit with GND signal. To use this signal, just connect it with the GND signal respectively to different end of the switch (Normal open). This is an input signal.
4	SGIN2	Common input signals 2, which form a return circuit with GND signal. To use this signal, just connect it and the GND signal respectively to different end of the switch (Normal open). This is an input signal.
17	SGIN3	Input signal NO. 3 is used to set the protocol of digital signal. **To use digital galvo, connect it to GND**; to use custom protocol, leave it open.
12，25	SGIN4 ， SGIN5	Anode terminal of common input signals 4 and 5. With an internal current-limited resistance of 330 Ω. External current-limited resistance is recommended if voltage is over 12V.
13	INGND	Cathode terminal of common input signals 4 and 5.
7，19	XDIR+/ XDIR-	Direction signal of extend axis X (step motor or servo motor). The output can be set as differential output or level output (TTL output). This is an output signal.
10，11 22，23	OUT0，OUT4 OUT5，OUT6	Common output signals 0,4,5 and 6. With GND signal as reference Ground. This is an output signal. TTL output.
8，20	VCC	5V power supply of control card, with GND signal (pin8) as reference Ground.

CON3~CON6：IPG Laser interface

CON3~CON6 can be used to connect to the IPG YLP serial laser. CON3 is DB25 socket, which can be connected directly to the laser module. The pins definition is shown in figure 4.

Pins	Signal name	Illustrations
1——8	P0——P7	Laser power. TTL output.
9	PLATCH	Power latch signal. TTL output.
10，11，12，13，14，15，24	Gnd	Control card’s Ground
16，21	SGIN0，SGIN1	Laser status input.
17	Vcc	5V power output of control card.
18	MO	Master Oscillator switch. TTL output
19	AP	Power amplifier. TTL output.
20	PRR	Repeat pulse power signal. TTL output.
22	Out2	Laser’s red light indication signal. TTL output.
23	EMSTOP	Emergency stop signal. TTL output.
25		NC

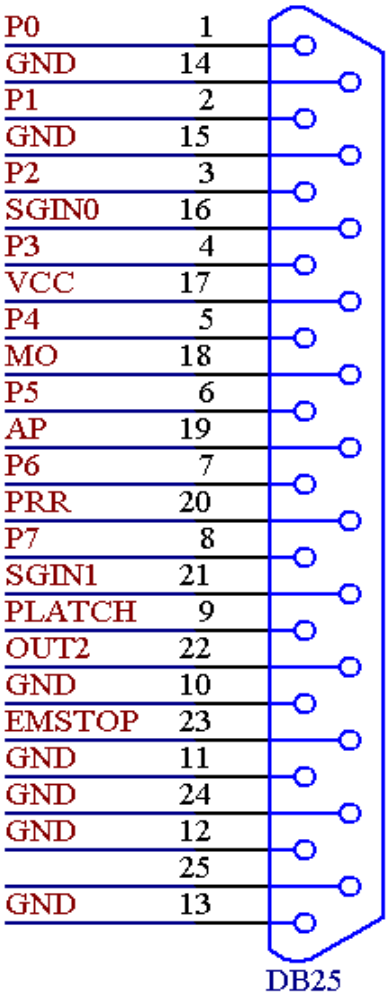

Figure 4 Pin definition of CON3

For convenience, there are 3 sockets CON4, CON5 and CON6 that is used to connect the control signals of IPG YLP serial laser.

EMSTOP：Emergency stop signal, which form a return circuit with GND signal (Pin 1 of CON6). To use this signal, just connect it and the GND signal respectively to different end of a Normal opened switch. When the switch is pressed down, it means that some emergency things occur, then the board and software must stop work immediately. It is an input signal.

POW_BTN： Power switch signal of the laser's main power supply, which form a return circuit with GND signal (Pin 1 of CON6). To use this signal, just connect it and the GND signal respectively to different end of a Normal opened switch. When the switch is pressed down, the laser's main power supply is connected.

POW_CON， **POW_CON1**：Connector terminal of the power relay. Connect the POW_CON to the anode of the power relay, and POW_CON1 to the cathode of the power relay. When the POW_BTN switch is pressed down, the POW_CON and POW_CON1 is connected.

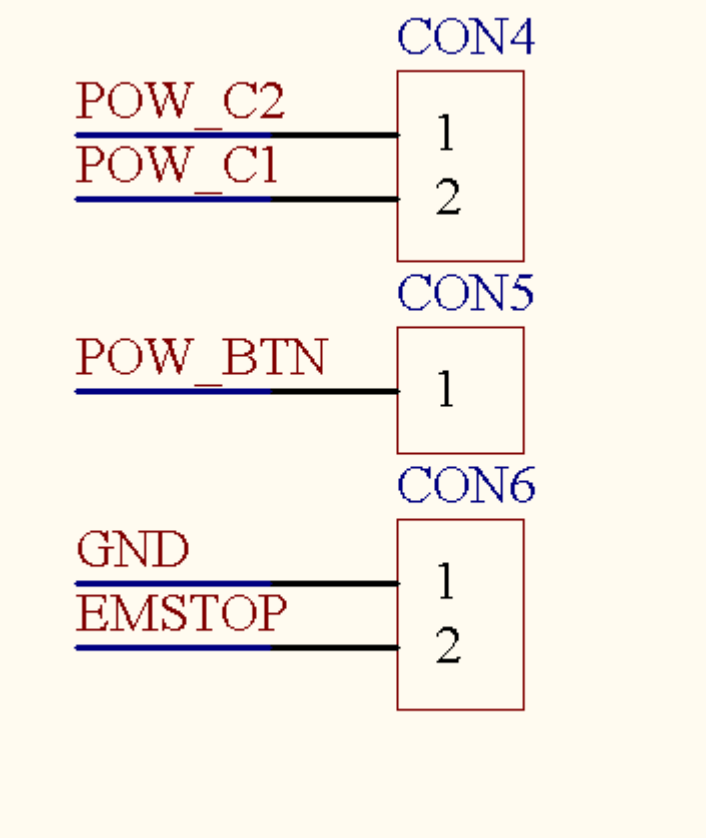

Figure 5 CON4~CON6

Hardware connection

Connect CON4~6 to the IPG YLP serial laser

The recommended wiring of power supply is shown as figure 6.

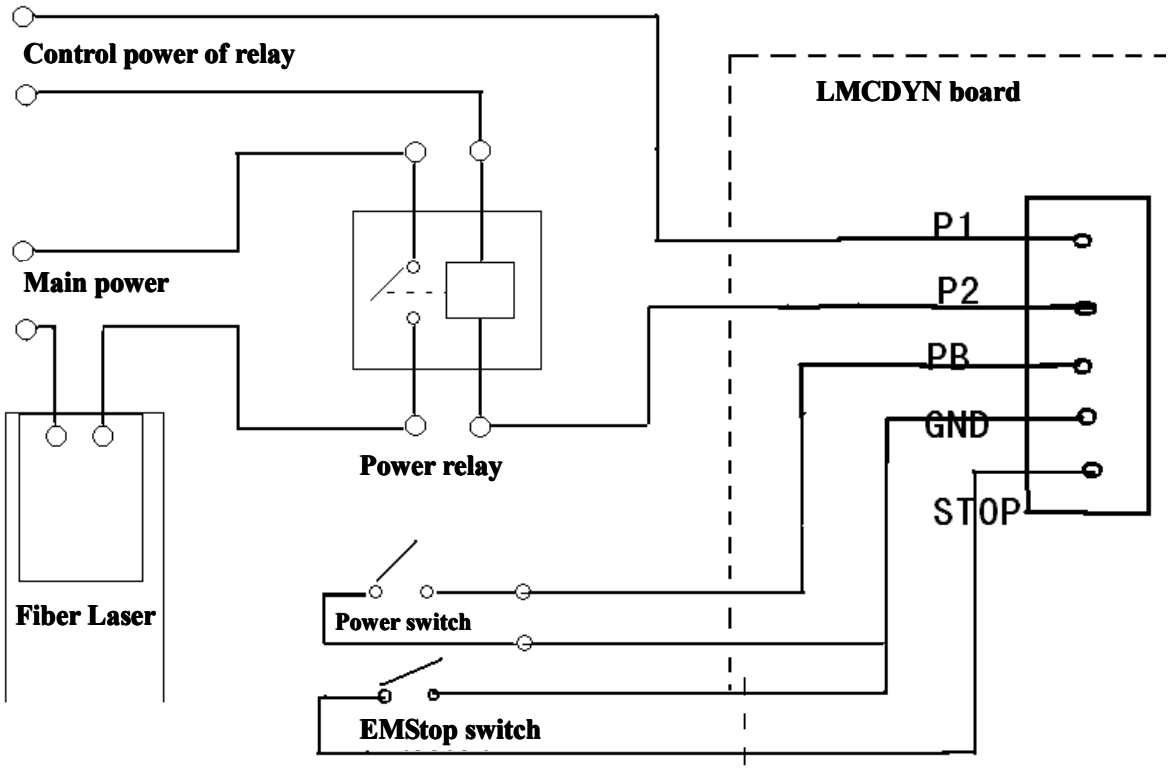

Figure 6 recommend connection

When user press down the power switch, P1 and P2 is connected, the power relay works. Then the main power is connected into the fiber laser. The allowed maximum current of POW_CON and POW_CON1 is 500 mA.

IO interface

Common input signal IN4，IN5

Interface circuit and recommended connection of input signal IN4 and IN5 are shown in figure 7

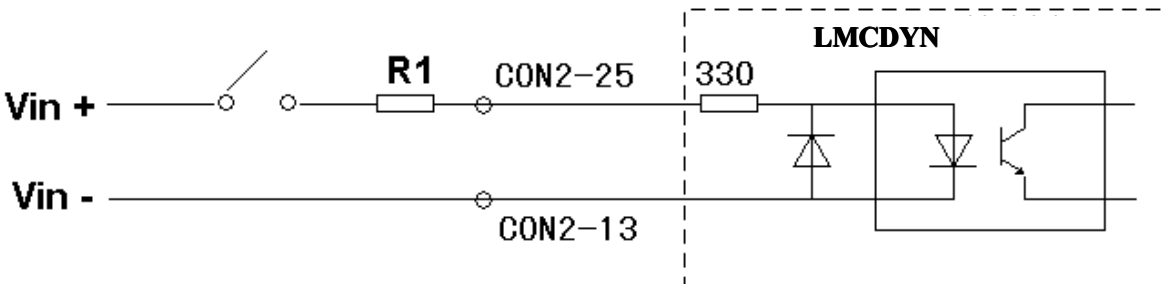

Figure 7 In4 and In5

Proper input voltage should be choose for the external power in order to ensure the input current is between 10mA ~ 15mA. If the input voltage is greater than 12V, a current-limit resistor R1 is recommended. Its value is calculated by following formula:

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

Common input signal IN2

Interface circuit and recommended connect way of input signal IN2 are shown in figure 8.

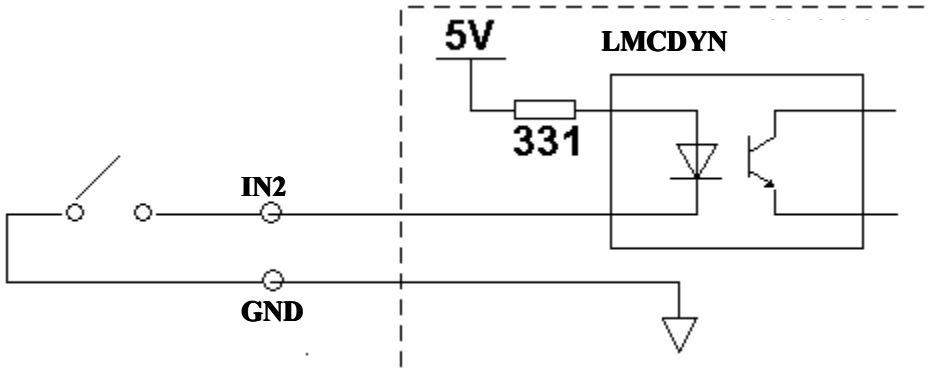

Figure 8 IN2

Only one switch (Normal opened) needs to be connected between terminal IN2 and ground. The contact resistance of the switch should be less than 100 ohm.

II. DA transfer board

The DA transfer board can transfer the custom digital signals to analog signals. It has following features:

External power supply ±（12～15）V / 500 mA.

Receives 3 routes digital signals, and outputs 3 routes analog signals (±5V).

Outline dimensions: 74X67X34mm

The outline is shown in figure 9.

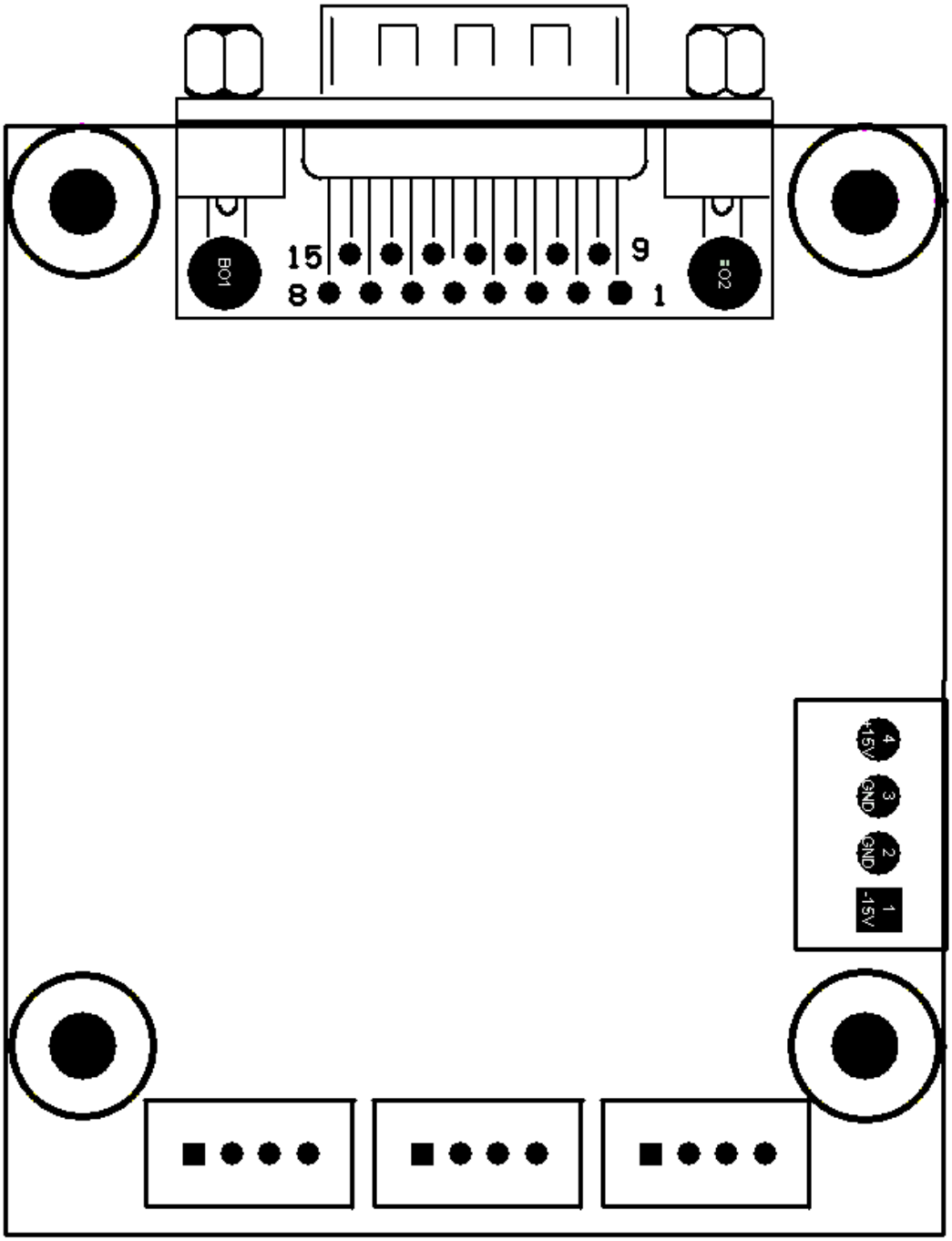

Figure 9 DA transfer board

Interface comment

CON1：Digital signals input socket

This socket is used to receive the digital signal of galvo. BTW, user must set the

digital protocol to custom (setup the jumper), please refer to the boards' manual. For LMCDYN, leave the Pin17 of CON2 open.

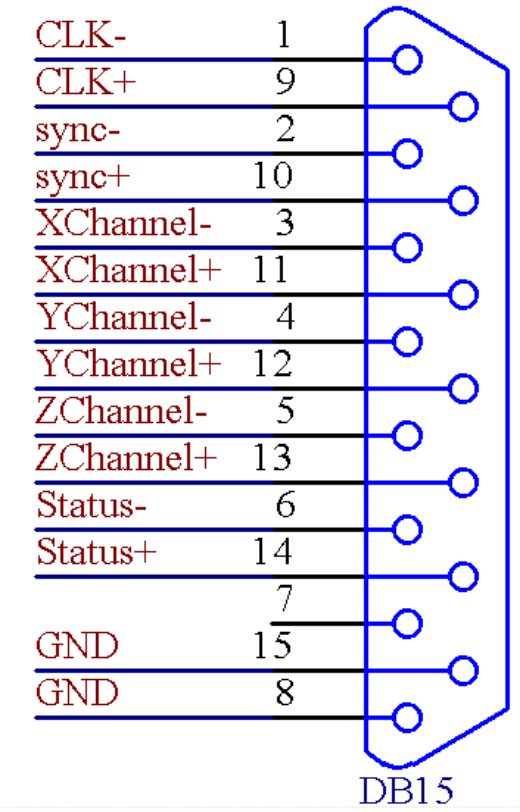

Figure 10 Pin definition of CON1

Pin NO.	Name	Illustrator
1，9	CLK-/CLK+	Clock signal; differential input.
2，10	SYNC-/ SYNC+	Synchronize signal; differential input
3，11	XChannel-/ XChannel+	Data signal of channel X; differential input
4，12	YChannel-/ YChannel+	Data signal of channel Y; differential input
5，13	ZChannel-/ ZChannel+	Data signal of channel Z; differential input
6，14	Status-/ Status+	Reserved
8，15	Gnd	Ground of board

Twisted-pair is strongly recommended to connect the digital signal.

CON2：Power socket

It should be connected to an external power supply. The voltage range of the power is

[±12V～±15V]. As shown in figure 11.

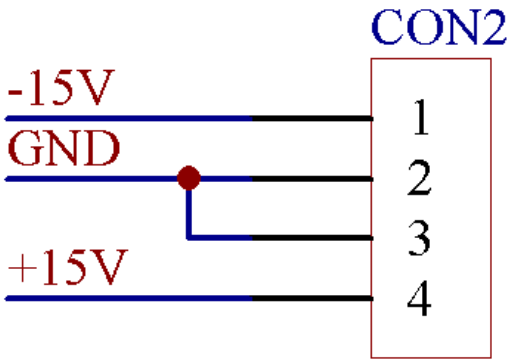

Figure 11 Power supply socket

CON3 / CON4 / CON5： galvo output signals

Analog voltage output. The default voltage range is ±5V (XVOL+ / Gnd)。

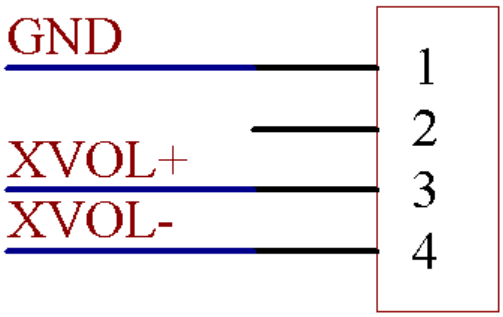

Figure 12 galvo output socket

III. Outline dimensions

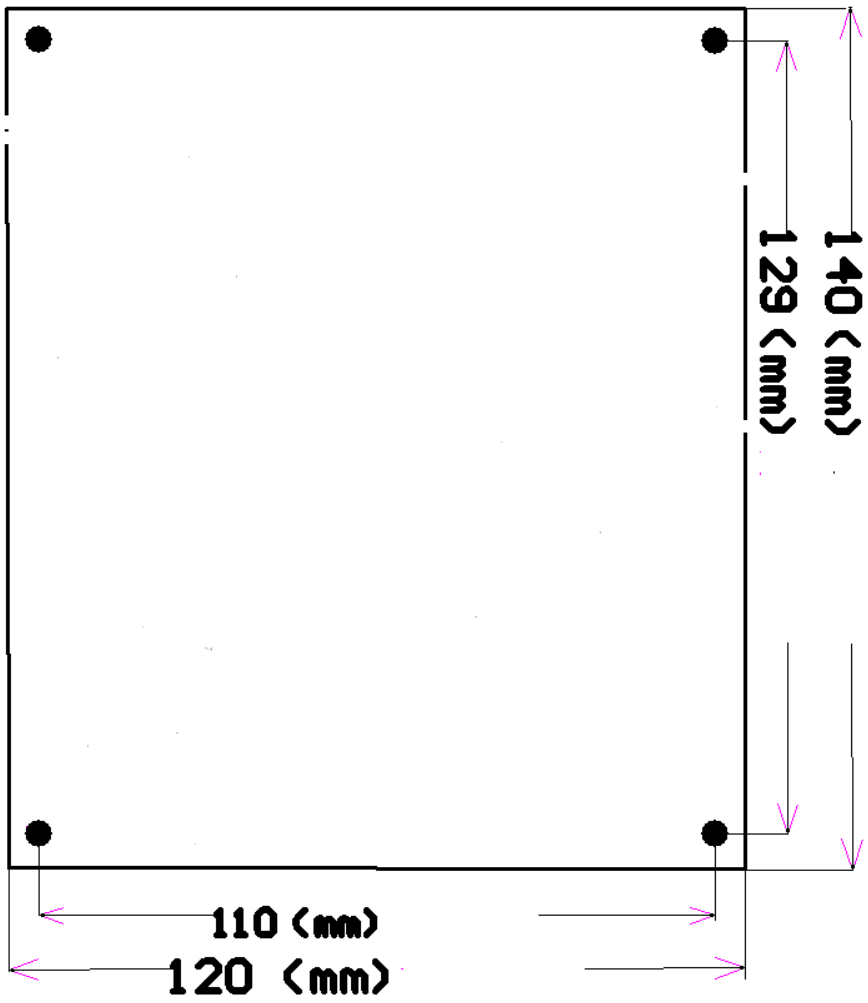

Figure 13 LMCDYN dimension

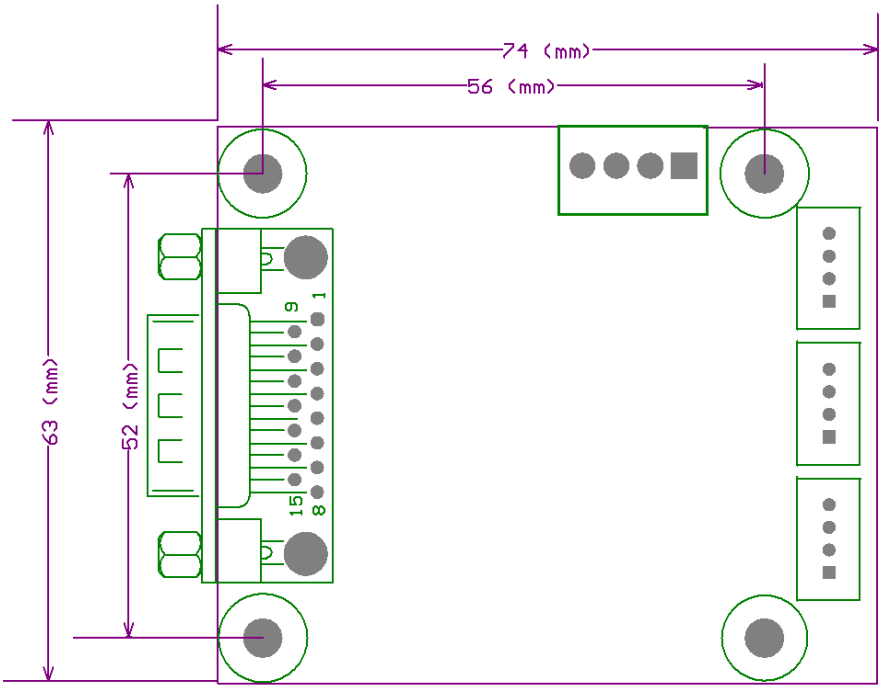

Figure 14 DA transfer board dimension

IV. Software manual

Note: To use dynamic focus function, user must use EzCad2.0.13 UNICODE version (20080222) or later, and the dongle must enable the function.

1. Please refer to the following steps to setup the parameters: the field; distortion adjust; scale adjust; the dynamic focus parameters.

2. If the field parameters are changed, please adjust the dynamic focus parameters again.

- **Parameters setup in EzCad**

EzCad divides the mark field into 10 concentric circles; the round center is the center of the mark field. Each field corresponds a different Z offset value. When marking through different fields, the software output the corresponding Z position automatically.

Run EzCad2.EXE， click “Param(F3)” ——”Dynamic Focus”。 The setup dialog is shown as figure 15. User can setup all Z offset values of the 10 fields, or adjust the Z offset value of one field.

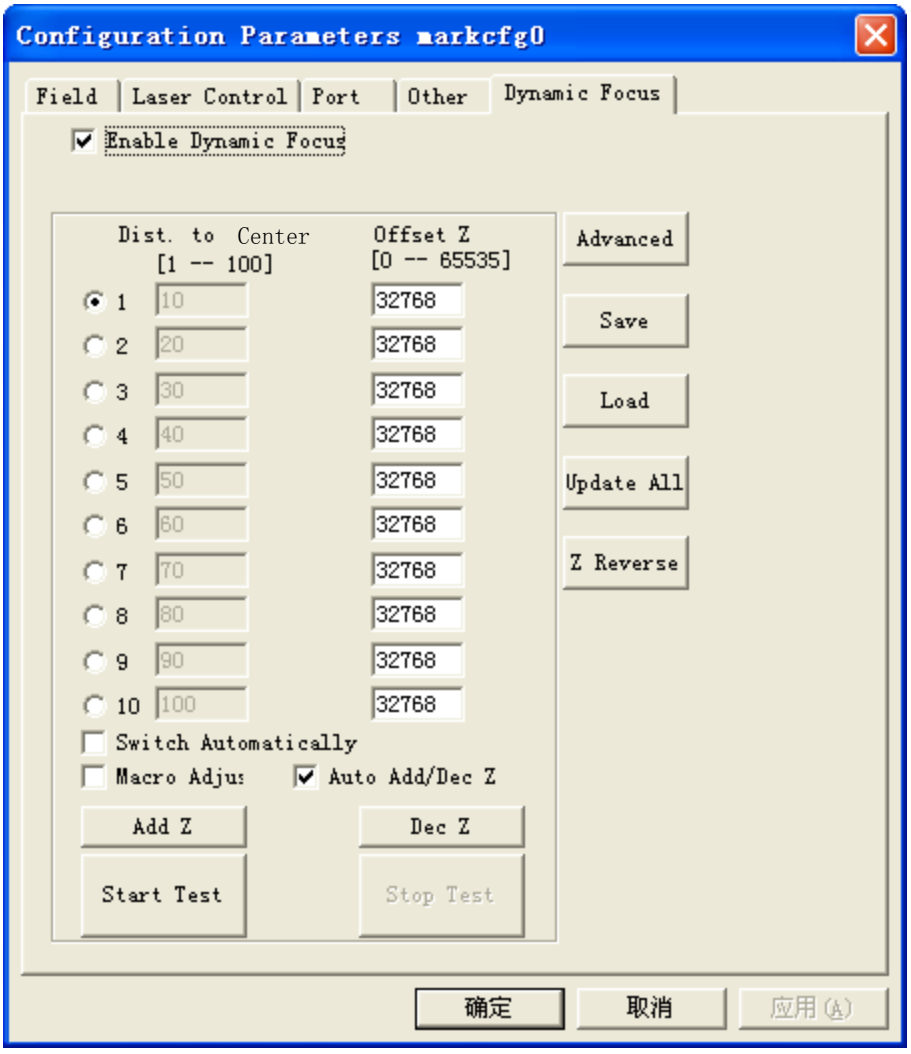

Figure 15 Dynamic Focus Parameters

Enable Dynamic Focus: Check it to enable the function.

Dist. To center (%): The distance to the center. Shown in percent value of the maximum marking field. Assume that the marking field is 500mm × 500mm, then the maximum radius is 250mm.

The 1st zone (10%): means the circle region with central point of the mark field as the center of circle, and 25mm radius

The 2nd zone (20%): means the ring region, with central point of the mark field as the center, and the radius 25mm – 50mm.

Other zones is analogous。

The 10th field (100%): means the region with central point of the mark field as the center and the radius greater than 225mm.

Offset Z: Offset Z value corresponding to each zone.

Switch Automatically: If user checks this option, the software would mark the test graph one by one in the 10 zones when the “Start Test” button is press down. If un-check the option, graph would be marked only in the specified zone.

Micro adjust Z: Slightly adjust the Z offset value while clicking button “Add Z” and “Sub Z”, or checking “Auto Add/Dec Z”. Add or decrease value is determined by the “Micro increment” in the “Advanced” dialog box. If this option is not checked, the value is determined by “Increment Z”.

Auto Add/Dec Z: Automatically add or decrease Z value, then mark the test graph in specified zone. Note that if we check the “Switch automatically” option, this option would be ignored. In test procedure, if “Add Z” button is pressed, the software would increase the Z value automatically and continue working; if “Dec Z” button is pressed, the software would decrease the Z value automatically and continue working. Once the most suited Z Value is found, you can press “Stop Test” button to stop the test.

Add Z: Increase the Z value, and corresponding output voltage is increased.

Dec Z: Decrease the Z value, and corresponding output voltage is decreased.

Start Test: Start the test procedure. Move the Z axis to appointed position and mark a rectangle there. The rectangle’s size can be set in the “Advanced” dialog box.

Stop Test: Stop the test procedure.

Save: Save the Z values to a file.

Load: Load the Z values from saved file

Update All: Update all of the Z values. The hardware output is not updated when we modify the Z-value manually. In this case we must click this button to refresh the data.

Z Reverse：Reverse the movement direction of Z axis.

Advanced: Click this button, the “Advanced” dialog box is shown, see figure 16.

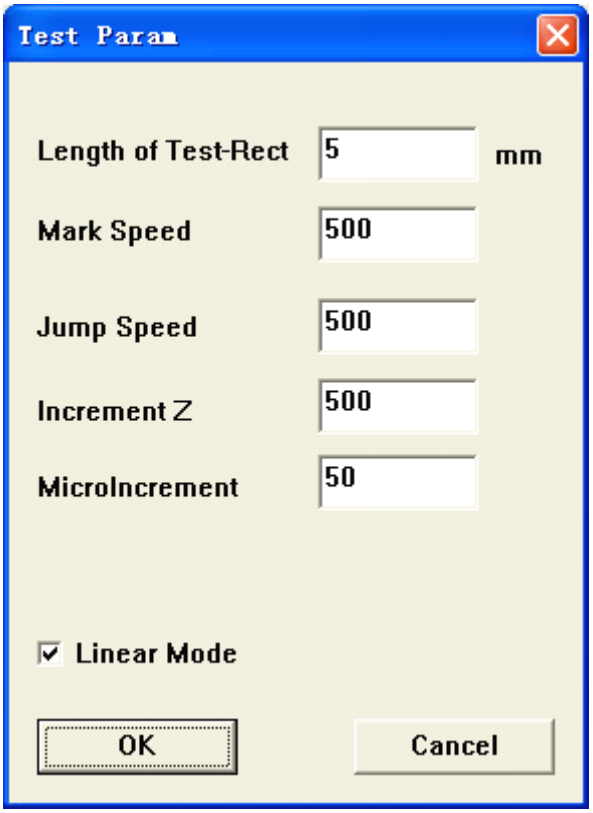

Figure 16 Advanced parameter

Length of Test Rect: The size of the test rectangle that is marked in the appointed zone. Please note that the size should be adapted with the mark field size. Assume that the mark field is 500mm × 500mm. Then the maximum circle radius is 250mm and the gap distance of each ring zone is 25mm. So if we set the length is 30mm or greater, the rectangle would across two or more zones. For mark field greater than 200mm × 200mm, please use the default value 10mm.

Mark Speed, Jump Speed: Set the speed that the software using in marking.

Increment Z, Micro Increment Z: Set the movement value of Z axis in test procedure.

Linear Mode: Whether using the linear interpolation arithmetic to calculate the Z values.

Device Debugging

package:

Two notes:

Make sure the incident light go to the center of the entrance port of the scanhead. Adjust the position of the laser source to make it.

Make sure laser beam go to the center (x,y) position of the scan mirror.

Marking area:

F3(param)-Field, to set the field as you need

F3(param)-dynamic focus, enable the 'dynamic focus', make all 'z' position as 0

Draw a 2mm circle and mark, then up and down the work table to find the focus position.

Draw a rectangle with the same size of the workspace, then mark(no need good quality spot, if can see it will be ok), then measure the marking result to see whether the actual size the same with the goal size.

And we can change the marking size according to the third axis, clockwise rotate will make the size bigger, anticlockwise rotate will make the size smaller.