Medium Power Fiber Laser Cutting Control System

User Manual----RDC6333F

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Chapter 1 The Structure of Fiber Laser Cutting Control System

RDC6333F, is one set of cost-effective control system dedicated for fiber laser. This system includes below accessories:

（1） 5.6-inch TFT TrueColor operation panel.

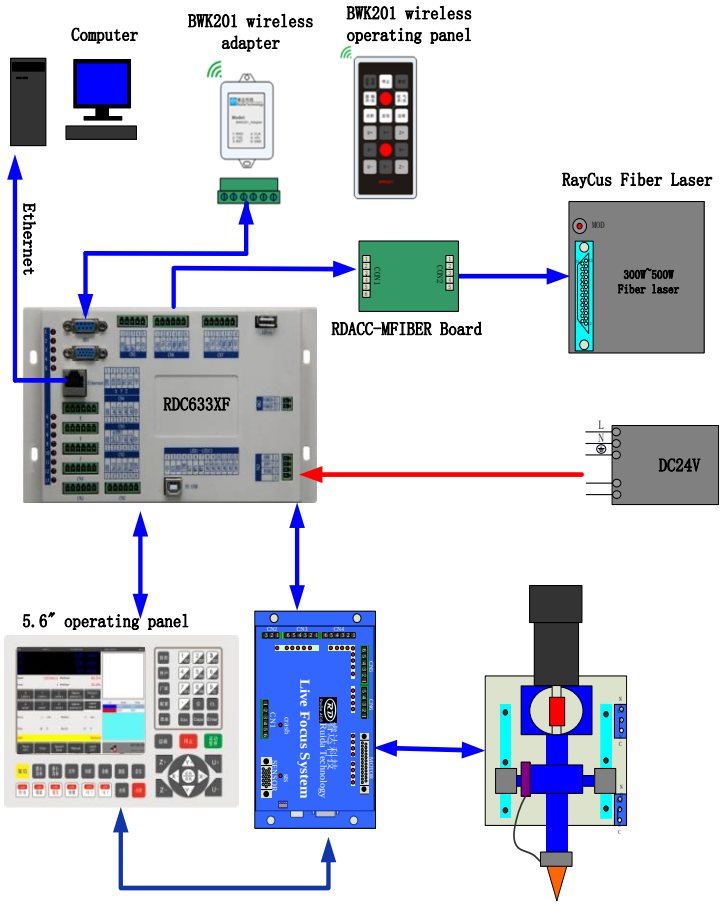
（2） RDC6333F controller

（3） Wireless operational panel and adapter

（4） Fiber laser conversion terminal

（5） LFS, sensor

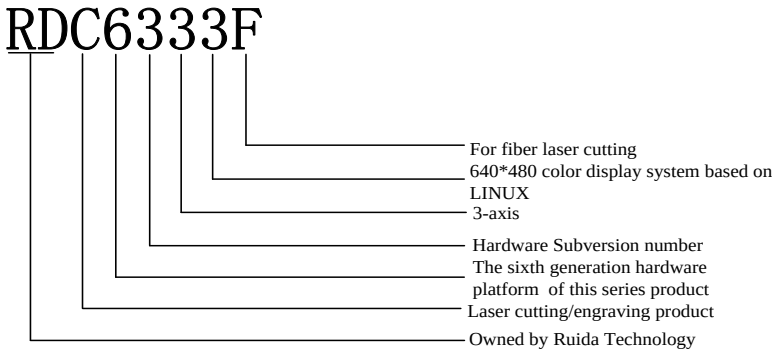
The structure drawing of RDC6333F is showed as below, here taking RayCus 300W fiber laser as example:



Chapter 2 RDC6333F Controller

2.1 Introduction

RDC6333F system is the latest laser cutting control system developed by Ruida Technology; this control system has better stable hardware with antistatic, resistance to high pressure. The human-machine operation system based on LINUX, has better operation interface and power functions. Excellent motion control functions, high-capacity memory, 2-way independent digital/analog laser power control interface, strong compatible U disk drive program, multiple ways general/dedicated IO control. Integrated dedicated time system supporting hardware encryption algorithm, supporting connect to PC through Ethernet communication or USB communication.



2.2 Controller interface description

2.2.1 Main power supply interface CN1

SN	Symbol	Definition
1	OGND	24V power-（input）
2	+24V	24V power +（input）
3	PGND	Reserved for GND, or NC
4	NC	NC

注意	24V power supply for control system, 24V/2A is recommended for keeping a certain margin. Meanwhile, this control system is compatible with 36V power supply, that is, can use the driver 36V power directly connects to main power supply interface, but this method is not recommended.

2.2.2 Display panel power interface CN 0

SN	Symbol	Definition
1	P+	+5V
2	P-	Reference Ground

注意	CN0 interface, only provides power for 320*240 color display panel, must not for other purpose. The controller P+ connects to display panel P+, controller P- connects to display panel P-.

2.2.3 Display panel data cable interface HDI

HDI is standard DB15 interface, the controller connects to 320*240 color display panel through the dedicated twisted shielded cable.

2.2.4 HMI

HMI is the wireless panel adapter interface, more details please refer to the concerned user manual.

2.2.5 Udisk

Udisk is USB-AM interface for controller visiting Udisk.

2.2.6 USB interface

USB is USB-BM interface for controller and PC access via USB2.0.

2.2.7 Ethernet interface

The controller and PC can communicate at 10/100MHZ via Ethernet interface

	Please use Ethernet parallel lines with PIN to PIN.

2.2.8 General/dedicated output CN2

The definition of general/dedicated output（6Pin, 3.81 mm spacing）

PIN	Symbol	Definition
1	OGND	External Reference Ground (output)
2	Out4	General output 4, reserved
3	Out3	General output 3, reserved
4	Out2	Dedicated output 2, working state signal port. If this port connects to relay, the relay coil conducted when working, and no influence when paused; the relay coil will be off when finished work or artificial cancelled.
5	Wind	Dedicated output 1, when enable fan control, this port output fan control signal, otherwise, other dedicated control signal. When connecting and enable the fan control, can set the fan switch in each layer, if connects to relay, the relay coil will be conducted when the fan working, and vice versa.
6	O 24V	External power output (If 24V power for main power interface, the pin is 24V, if 36V, the pin is 36V.)

	All photoelectric coupling isolation output signal. OC gate output, the max. drive capability is 500mA, can drive 6V/24V relay.

2.2.9 3-axis limit and dedicated input port CN3/CN4

Z-axis limit and dedicated input port CN3 (6Pin, 3.81mm spacing)

PIN	Symbol	Definition
1	OGND	External Reference Ground (output)
2	DrProc	Dedicated input 2, protect port input (cover protection, if the machine should work in the specific status (such as cover protection, the protect signal input from this pin. This pin can enable and disable, when the pin is disable, this signal cannot be inquired by controller; if this pin is enable, and the input is high level or port NC, the machine is protected, the on-going work should be suspended, and the laser will be off.
3	FootSW	Dedicated input 1, foot switch input port. The connection way: when hit the foot switch, input low level signal to this port; when leave the foot plate, cut off the connection or input high level to this port; the time of hit the foot plate is not less than 100ms, if the machine is in idle state at present, the machine will start work; if the machine is in working, it will be paused; if the machine is paused, the paused work will be restart. That means the foot switch function is the same as “start/pause” keys. If the hitting foot switch time interval is less 1.5seconds, the second hitting action is invalid for controller.
4	LmtZ-	Z-, the limit when Z axis moves to 0 coordinate
5	LmtZ+	Z+, the limit when Z axis moves to the max. coordinate
6	O 5V	External power +5V (output)

X/Y axis limit input port CN4 (6Pin, 3.81mm spacing)

PIN	Symbol	Definition
1	OGND	External Reference Ground (output)
2	LmtY-	Y-, Y moves to the limit of 0 coordinate
3	LmtY+	Y+, Y moves to the limit of the maximum coordinate
4	LmtX-	X-, X moves to the limit of 0 coordinate
5	LmtX+	X+, X moves to the limit of the maximum coordinate
6	O 5V	External power +5V (output)

The limit polarity is selectable, if the motion axis moves to limit position, one low level signal will be triggered, and the corresponding LED of each limit (under the shell) will be on; when the motion axis moves away from limit position, will trigger high level signal or cut off the limit signal connection, the limit indicator will be off, at this time, the limit polarity is negative; otherwise, when the motion axis closes to limit, the indicator will be off, when leaving the indicator light will be on, at this time, the limit polarity is positive. The limit polarity setting wrong will lead to the axis crash due to the limit cannot be tested when system reset.

2.2.10 X/Y/Z axis driver port

All the three motion axis ports are the same (6Pin, 3.81mm spacing), taking X port as example.

PIN	Symbol	Definition
1	OGND	Internal Reference Ground (output, only for driver common cathode connection)
2	xDir+	Direction signal differential positive
3	xDir-	Direction signal differential negative
4	xPulse-	pulse signal differential negative (if using common anode connection, and pulse rising edge valid, this pin connects to driver pulse end)
5	xPulse+	pulse signal differential positive (if using common anode connection, and pulse falling edge valid, this pin connects to driver pulse end)
6	+5V	Internal 5V power+ (output, only for driver common anode connection)

The direction signal polarity of driver pulse signal can be set. When one axis reset, the axis moves to the negative direction of machine origin, that means the axis direction signal polarity is wrong, at this time, cut off the connection of this axis and motor driver (Otherwise, the controller cannot find the limit, which will cause this axis crash.). Until the axis resetting, the direction signal polarity can be corrected, and then press “reset” key to reset the controller.

2.2.11 Laser control ports CN6/CN7

This control system has 2-way independent laser control ports. The two ways signal meaning and order are the same, here taking the first way port CN6 as an example (6Pin，3.81 mm spacing，the second

way laser port is CN7）：

PIN	Symbol	Definition
1	LGND	Reference Ground
2	L-On1-	Laser control port
3	L-On1+	Laser control port
4	LPWM1+	Laser control port
5	LPWM1-	Laser control port
6	L-AN1	Analog voltage, connecting to laser power control terminal

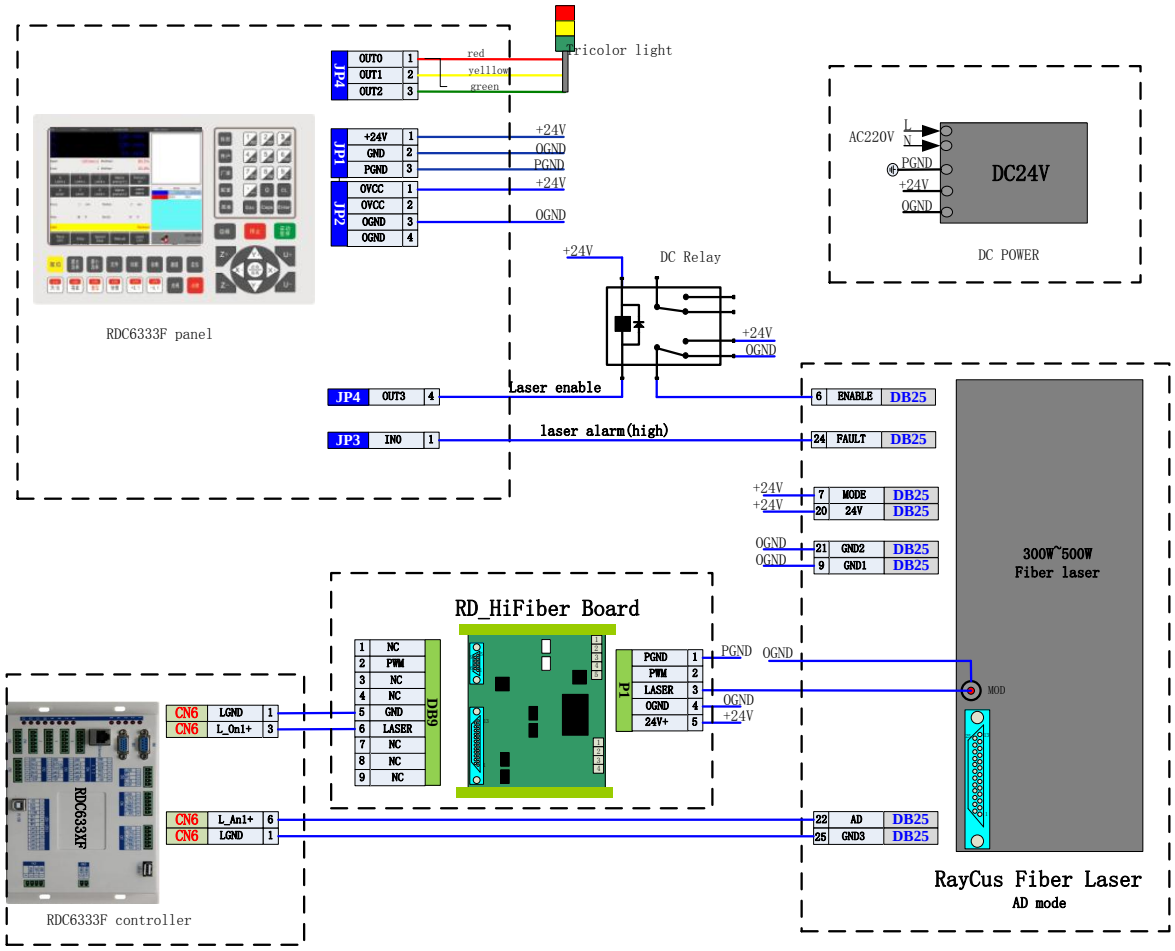
2.2.12 Water protection input port CN5

Water protection input port（5pin，3.81mm）

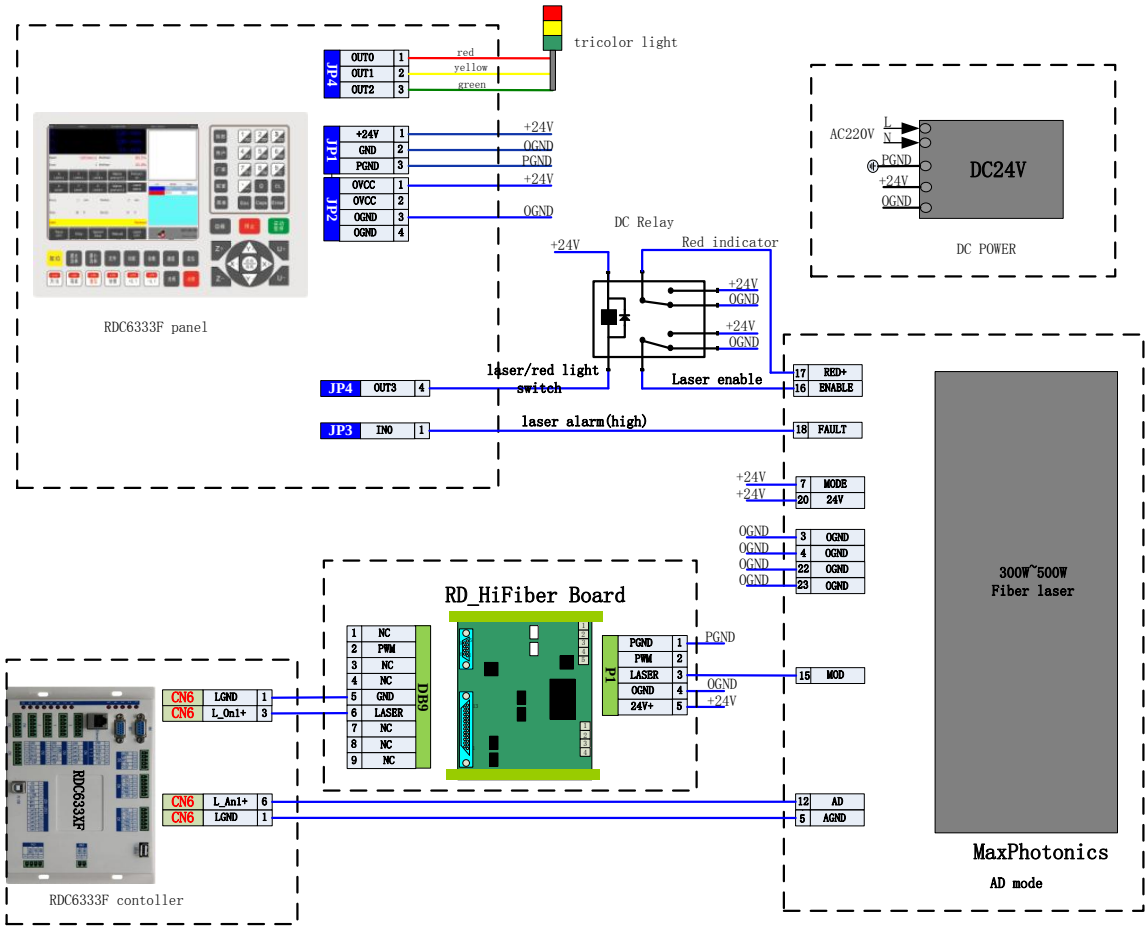
PIN	Symbol	Definition
1	LGND	Laser power 5V ground (output)
2	L-On1-	The first laser power water protection state input port. When enable water protection 1, the controller will test it , if this port is low level, which means it is in normal state; if this port is high level, the controller will force-close laser, and stop the processing, and the system will be alarmed. If water protection 1 cannot be enabled, the controller cannot test water protection 1 input port, user cannot connect water protection1.
3	L-On1+	The second laser power water protection state input port. When enable water protection 2, the controller will test it, if this port is low level, which means it is in normal state; if this port is high level, the controller will force-close laser, and stop the processing, and the system will be alarmed. If water protection 2 cannot be enabled, the controller cannot test water protection 2 input port, user cannot connect water protection2.
4	LPWM1+	General input 3, reserved.
5	L5V	Laser power 5V+ (output, usage mode please refer to Chapter 5.3)

Chapter 3 Laser Control Wiring Diagram

3.1 Raycus 300W Fiber laser wiring diagram

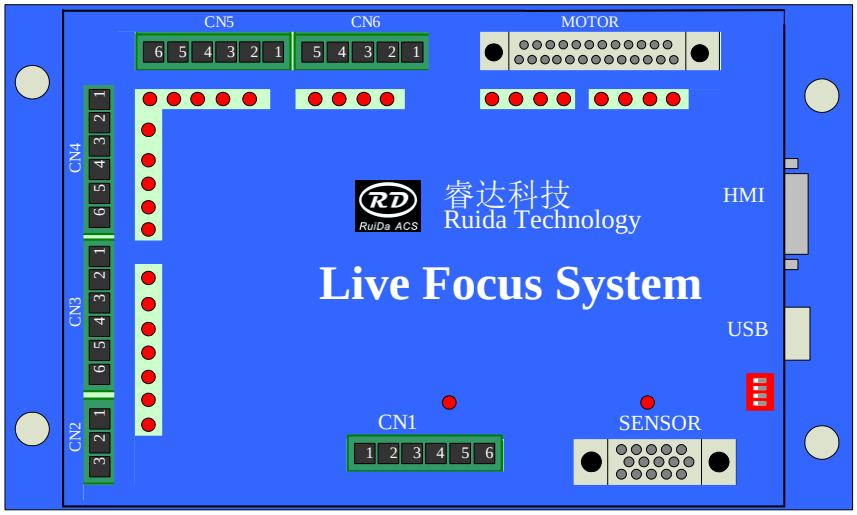


3.2 Maxphotonics 300W Fiber laser wiring diagram



Chapter 4 LFS

4.1 LFS wiring instruction



4.1.1 Dial switch

Dial switch is used for LFS system upgrade, all the dial switches are in OFF when in normal use. When LFS is upgrading, the dial switch 1 is in ON; when LFS power-on again, the LFS system can be upgraded.

4.1.2 Sensor amplifier interface

Sensor port is digital amplifier interface, this port is not available when using the analog amplifier. This port connects to digital amplifier via DB15 cable.

4.1.3 CN1 is the analog amplifier interface

Including capacitive sensor detection input, and temperature compensation input interface.

PIN	SIGNAL	DEFINITION	DESCRIPTION
PIN1	VCC	Amplifier power source	+12V output, output ability 200mA
PIN2	ALM	Crash alarm output	Output 0V when there is no alarm. Output 24V when alarmed.
PIN3	CT	Capacitive sensor input	Input : 0~10V (reserved)
PIN4	Ain	Analog detection input	Input : 0~5V(reserved)
PIN5	NTC	Temperature sensor input	Temperature sensor interface
PIN6	GND	GND	Reference ground

4.1.4 CN2 is power input interface

PIN	SIGNAL	DEFINITION	DESCRIPTION
PIN1	+24V	LFS power source	+24V output, drive ability above 2A
PIN2	GND	GND	Reference ground
PIN3	PGND	External shielded grounding	Generally connect to earth

4.1.5 CN3 is the interface between LFS and controller

PIN	SIGNAL	DEFINITION	DESCRIPTION
PIN1	Trace	Trace signal Input	When low level, the LFS will control the laser head to trace down and follow; when high level or open, the LFS will rise up with laser head.
PIN2	Punch	drilling signal input	Board drilling signal, low level when drilling
PIN3	WrkOk	Working finished signal input	Working status signal input, which indicate the current work finish or not. When finished, the LFS will move to the highest point.
PIN4	UpOk	Rising up in-position signal output	LSF rises up in position, output low level
PIN5	DnOk	Going down in-position signal output	LSF goes down in position, output low level
PIN6	AlmOut	Crash alarm output	When the laser head crash into the metal plate, the alarm signal output is 24V.

4.1.6 CN4 External Input Interface

PIN	SIGNAL	DEFINITION	DESCRIPTION
PIN1	Lmt+	Upper limit switch input	Upper limit switch input, support normally open/close connection.
PIN2	Lmt-	Lower limit switch input	Lower limit switch input, support normally open/close connection,
PIN3	EmStp	low-voltage signal input	low-voltage protection signal input
PIN4	FocSwt	Reserved	Reserved
PIN5	ModeSwt	Reserved	Reserved
PIN6	GND	Signal reference ground	reference ground

4.1.7 CN5 External output interface

PIN	SIGNAL	DEFINITION	DESCRIPTION
PIN1	LowP	Low pressure O2 control output	To control the relay to control the magnetic valve directly. Notice: Add high-speed FWD next to the relay contact when use 24V DC.
PIN2	HighP	High pressure O2 control output	To control the relay to control the magnetic valve directly. Notice: Add high-speed FWD next to the relay contact when use 24V DC.
PIN3	ModeOut	Reserved output	Reserved
PIN4	wrkSts	Working status indicator	Output low level during cut processing. When finished, high level output, can drive relay to connect the LED tricolor indicator.
PIN5	Fault	System fault output, can drive relay	When LFS goes wrong, low level output, and can drive the relay directly.
PIN6	GND	Signal reference ground	

4.1.8 CN6 External output interface

PIN	SIGNAL	DEFINITION	DESCRIPTION
PIN1	LmtP+_out	Upper limit signal output	Low level output when triggered, when don't trigger, high level output. This pin output state and external limit switch state are synchronized, reserved for external other controller.
PIN2	LmtN_out	Lower limit signal output	Low level output when triggered, when don't trigger, high level output. This pin output state and external limit switch state are synchronized, reserved for external other controller.
PIN3	OUT0	Air switch controls signal output	To control the electromagnetic valve
PIN4	OUT1	RESERVED	Can control relay directly
PIN5	GND	Signal reference ground	

4.1.9 MOTOR Control Interface

PIN(wire colors)	SIGNAL	DEFINITION	DESCRIPTION
PIN1(yellow black)	GND	GND	
PIN2(blue black)	ALM	Motor alarm output	When the pin is 0V, alarm is invalid; when in high level or off, alarm is valid.
PIN3(orange)	SON	Motor enable	When the pin is 0V, servo enable
PIN4(light green)	A-	Encoder A-	Encoder input
PIN5(brown)	B-	Encoder B-	Encoder input
PIN6(red)	C-	Encoder C-	Encoder input
PIN7(white black)	+5V	+5V output	
PIN8(green)	SPEED	speed command	+/-10V output
PIN9(gray)	DIR+	Direction signal differential positive end output	TTL level
PIN10(green black)	GND	Signal reference ground	
PIN11(orange black)	PULSE-	Pulse signal differential negative end output	TTL level
PIN12	NC	N.C	

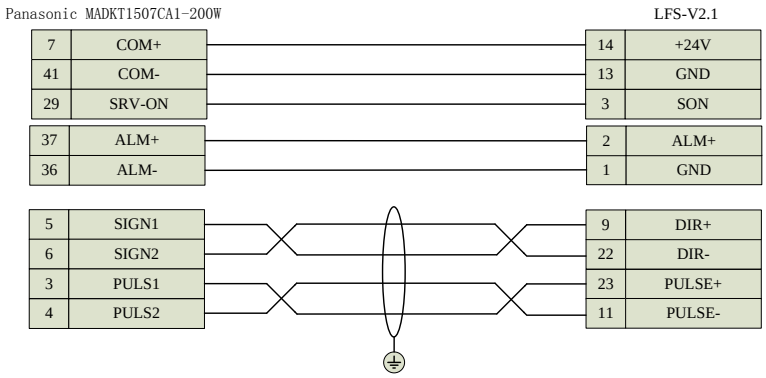
PIN13	GND	Reference ground	
PIN14(red black)	24V	+24V output	
PIN15(brown black)	CLR	Servo clear signal output	Clear servo alarm
PIN16(purple)	SMODE	Servo mode switch output	Switch the servo position and speed mode
PIN17(pink)	A+	Encoder A+	Encoder input
PIN18(white)	B+	Encoder B+	Encoder input
PIN19(black)	C+	Encoder C+	Encoder input
PIN20(shielding layer)	GND	Reference ground	
PIN21	GND	Reference ground	
PIN22(blue)	DIR-	Direction signal differential negative output	TTL level
PIN23(gray black)	PULSE+	PULSE signal differential positive output	TTL level
PIN24(yellow)	GND	Reference ground	
PIN25	NC	NC	

1) If connects to step motor, differential connection and common anode connection are available. The wiring method can be determined by step motor driver, the differential connection is recommended.

2) If connects to servo motor, please connection as the corresponding wiring method and servo driver model, and set the right parameters.

- Set the servo driver as position mode
- Direction and pulse polarity setting
- Set the pulse command number of motor rotating one circle
- Motor rotation direction setting

Note: If need to use high speed pulse signal, you should open high speed pulse method.



Panasonic A5 series servo wiring diagram

Panasonic A5 series servo parameters setting

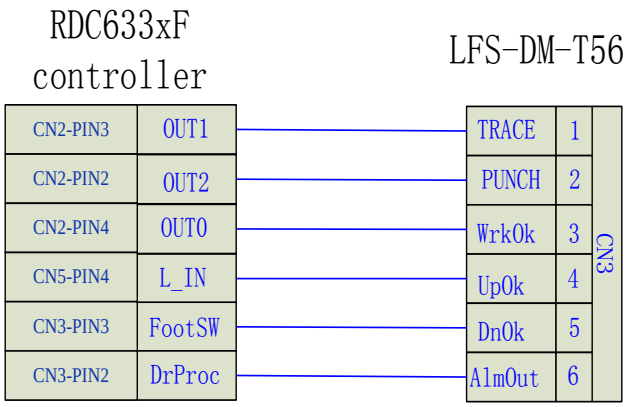
Parameter type	Recommended value	Description
Pr0.00	0	direction of rotation
Pr0.01	0	position mode setting
Pr0.02	3	real-time auto-adjust setting
Pr0.06	0	command pulse polarity setting
Pr0.07	3	command pulse input mode setting
Pr0.08	5000	pulse command number of motor rotating one circle

4.1.10 Indicator Light description

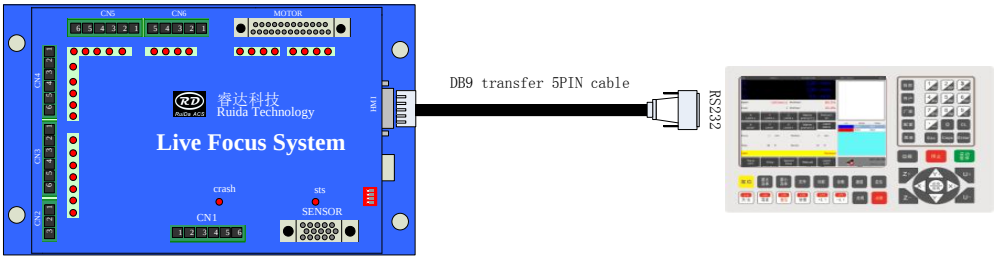
NAME	DESCRIPTION
OVCC	24V power light
AlmOut	Crash alarm signal output, 24V output when crashed; Otherwise, 0V.
DnOk	Going down in-position output, the indicator will be on.
UpOk	Rising up in-position output, the indicator will be on.
WrkOk	Working status input, the light turns off when finished, and turn on when in working.
Punch	Punch indicator, when in punching, the indicator will be on.
Trace	Tracing signal input, the light turns on when tracing control, and turns off when rising up.
ModeSwt	Reserved
FocSwt	Reserved
EmStp	Under-voltage alarm input is low level trigger alarm, the indicator light will be on
Lmt-	connect to normally open contact, triggered when closed, the light will be

	on
Lmt+	connect to normally open contact, triggered when closed, the light will be on
Fault	System fault indicator, the light will be on when errors happened.
WrkSts	System working status output instruction, the light will be on the system working, and turns off when stopped.
ModeOut	Reserved
HignO2	High oxygen pressure output indicator, the light will be on when the relay working
LowO2	Low oxygen pressure output indicator, the light will be on when the relay working
Out	Reserved output
Air	Compressed air control output instruction, the light will be on when the relay working
LmtNO	Lower limit output instruction
LmtPO	Upper limit output instruction
Clr	Zero-speed clamping indicator light
SMode	Servo mode switch output status, using for servo driving, the light will be off when in position mode, and it will be on when in speed mode.
Alm	Servo alarm input, the light will be on when ALM valid.
Son	Servo enable output status
DIR	Direction signal output instructions
PULSE	Pulse signal output instructions
System	System status instruction
Run	System running instruction
CRASH	Crash alarm instruction
Sts	Digital sensor status indicator

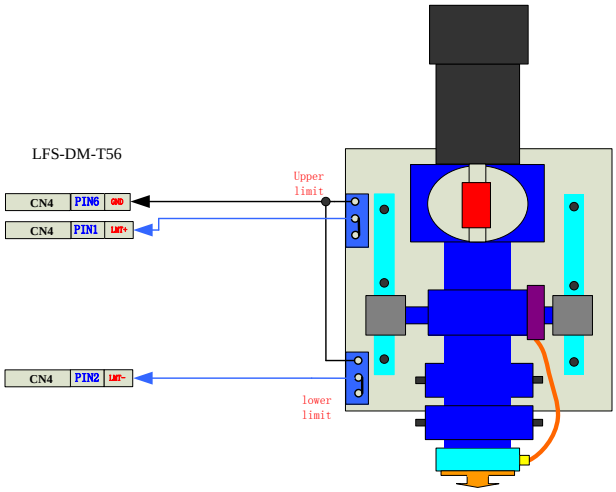
4.1.11 LFS & Controller Wiring



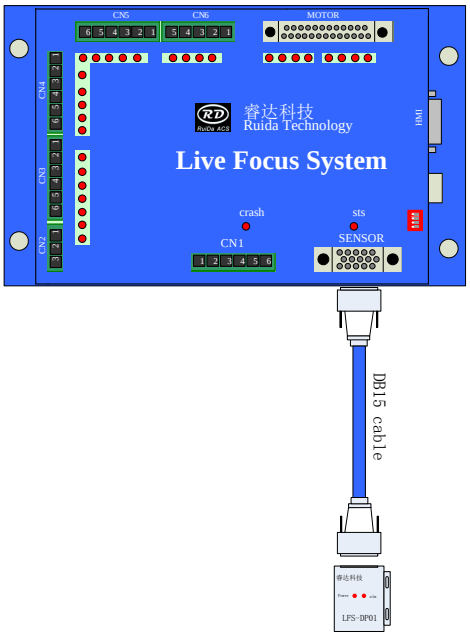
4.1.12 LFS & operation panel wiring



4.1.13 LFS limit wiring



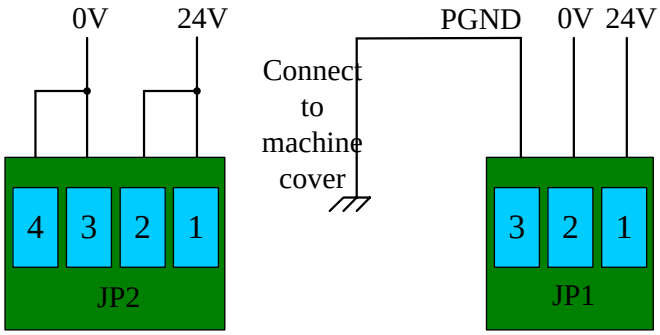
4.1.14 Amplifier installation and wiring



Chapter 5 RDC6333F Operational Panel

5.1 Interface instructions

5.18.1 Power port JP1, JP2



JP1 is the main power supply of 24V，the shell of machine need to connect the ground wire to prevent interference.JP2 is 24V power supply of external I/O port. Pin 1, Pin 2 and pin 3, pin 4 of JP2 are connected in the internal circuit. Users can choose one of ports to connect. In generally.24V power supply can be shared with JP1 and JP2.

	For the stable operating of this system，It is recommended to use 24 v，and the output current is above 2A dc switching power supply

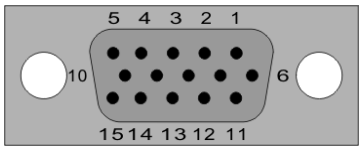
5.18.2 General input port JP3

JP3 can connect travel switch, key switch and alerting signal etc. Pin 6 of JP3 is not connected.

5.18.3 General output port JP4

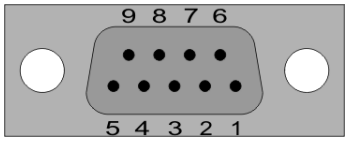
JP4 can drive the relay, buzzer and alarm lamp etc.

5.18.4 To connect the port of main board HDI



This port can connect to the main board through DB15 to realize high speed data communication.

5.18.5 To connect the port of live focus controller RS232



This port can connect to the main board through DB9 to realize high speed data communication.

5.18.6 U disk interface

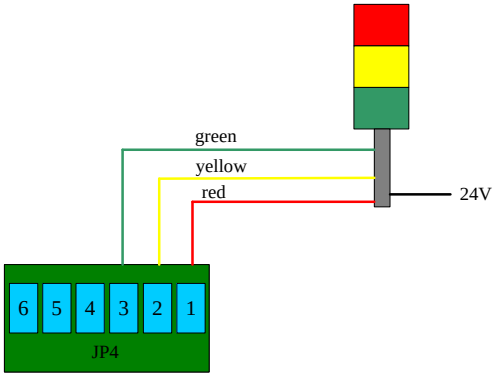
USB1 can connect U disk, support U disk upgrade application.

5.18.7 PC interface

USB2 can connect to PC through USB, and support online upgrading system.

5.2 Wiring instructions

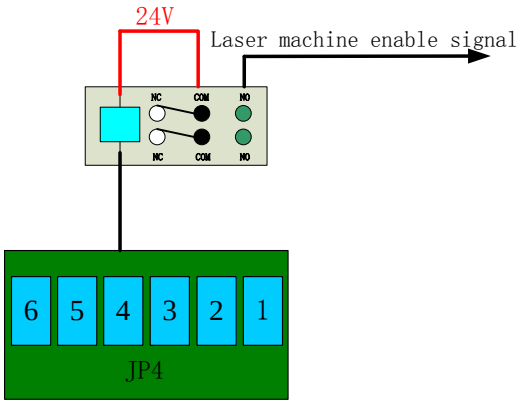
5.2.1 Three-colour alarm lamp wiring



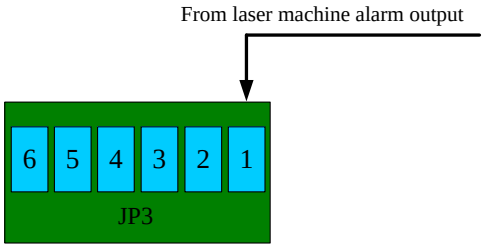
The meaning of alarm lamp:

System status	indicator light
System free/finish	Green light is on
System operation	Green and red light are on
System halt	Yellow light is on
System alarm	Red light is on

5.3 Optical shutter wiring



5.4 Laser alarm import



When enable the laser alarm function, pin 1 of JP3 is high level (24V), the panel will alarm.

	When laser alarm signal is not connected. It is recommended to prohibit the laser alarm function.

Thank you very much for using the product from Shenzhen RuiDa Technology!

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