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MCC3721 User guide V1.0.106

A-CUTTER
Email: info@a-cutter.com
Web: www.a-cutter.com

1. Product Overview

SC1000 CNC system is a new generation CNC system which is specially developed towards fiber laser cutting field. It has enough external devices and powerful function.

2. CNC system diagram
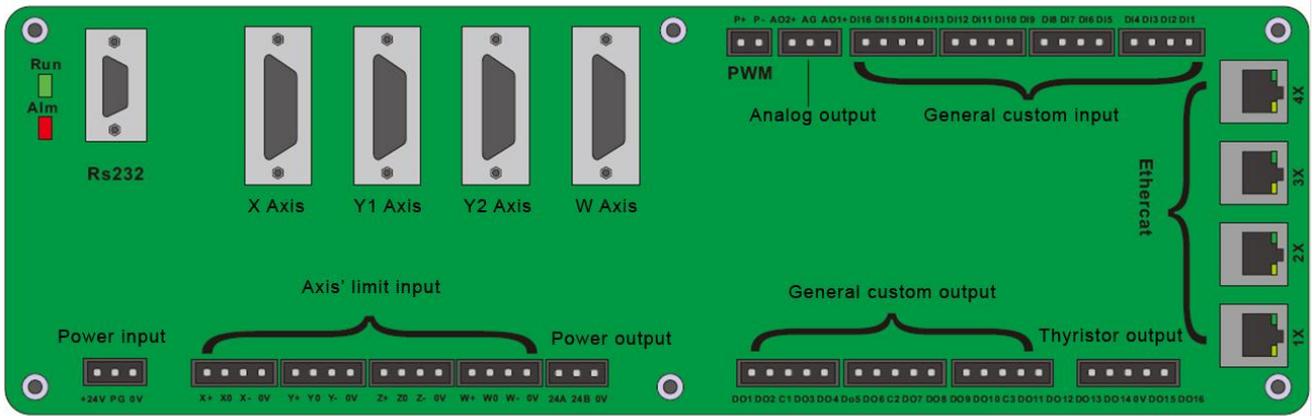
The explanations for each port:

ports		function	remark
Power input	+24V	DC24V input + end	24V/10A DC
	PG	protective ground	
	0V	DC input - end，power GND	Recommend to use DC 24V/10A power supply
Axis' limit input	X+	X Axis' positive limit input，special signal，low-level propagation is effective.	X Axis' limit input
	X0	X Axis' origin signal，special signal，low-level propagation is effective.	
	X-	X Axis' negative limit input，special signal，low-level propagation is effective.	
	0V	GND, X Axis' limit signal COM port	
	Y+	Y Axis' positive limit input，special signal，low-level propagation is effective.	Y Axis' limit input

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	Y0	Y Axis' origin signal，special signal，low-level propagation is effective.	
	Y-	Y Axis' negative limit input，special signal，low-level propagation is effective.	
	0V	GND, Y Axis' limit signal COM port	
	Z+	Z Axis' positive limit input，special signal，low-level propagation is effective.	Z Axis (standby) input
	Z0	Z Axis' origin signal，special signal，low-level propagation is effective.	
	Z-	Z Axis' negative limit input，special signal，low-level propagation is effective.	
	0V	GND, Z Axis' limit signal COM port	
	W+	W Axis' positive limit input，special signal，low-level propagation is effective.	W Axis(Rotation Axis / standby) input
	W0	WAxis' origin signal，W	
	W-	W Axis' negative limit input，special signal，low-level propagation is effective.	
	0V	GND, W Axis' limit signal COM port	
Axis' controlling ports	X	X Axis' controlling signal	DB15female
	Y1	Y1 Axis' controlling signal	
	Y2(Z)	Y2（Z）Axis' controlling signal	If Y Axis is set up as dual - drive mode, it is Y2Axis; if Y Axis is set up as single drive mode, it is Z Axis' controlling port(standby).
	W	W Axis' controlling signal	Rotation Axis(standby)
General custom output	DO1	DO1 general output port	
	DO2	DO2 general output port	
	COM1	general output COM port	
	DO3	DO3 general output port	
	DO4	DO4 general output port	The function of output port can be set up arbitrarily by software. Passive output port has the same output TTL with COM port.
	DO5	DO5 general output port	
	DO6	DO6 general output port	
	COM2	general output COM port	
	DO7	DO7 general output port	
	DO8	DO8 general output port	
	DO9	DO9 general output port	
	DO10	DO10 general output port	
	COM3	General output COM port	

	DO11	DO11 general output port	
	DO12	DO12 general output port	
Thyristor output	DO13	DO13 Thyristor output port	DCV output : 24V, Drive Current: 1A
	DO14	DO14 Thyristor output port	
	COM4	Thyristor output COM port	
	DO15	DO15 Thyristor output port	
	DO16	DO16 Thyristor output port	
Power output	24A	The first DC24V output + end	It can be used as Axis' limit switch/general output port can supply standard TTL.
	24B	The second DC24V output + end	
	0V	The GND for DC24V output	
PWM output	P+	PWM signal output + end	The TTL of PWM output is 24V/5, which can be configured by the jumper nearby.
	p-	PWM signal output - end	
Analog output	AO1+	AO1analog output port+ end	The voltage of analog output is from 0V to 10V, which can be configured by software.
	AG	The GND for analog output	
	AO2+	AO2 analog output port + end	
	AI	Analog input	
General input	DI1	DI1 general input port, low-level propagation is effective(Default).	
	DI2	DI2 general input port, low-level propagation is effective(Default).	
	DI3	DI3 general input port, low-level propagation is effective(Default).	
	DI4	DI4 general input port, low-level propagation is effective(Default).	
	DI5	DI5 general input port, low-level propagation is effective(Default).	
	DI6	DI6 general input port, low-level propagation is effective(Default).	
	DI7	DI7 general input port, low-level propagation is effective(Default).	
	DI8	DI8 general input port, low-level propagation is effective(Default).	
	DI9	DI9 general input port, low-level propagation is effective(Default).	
	DI10	DI10 general input port, low-level propagation is effective(Default).	
	DI11	DI11 general input port, low-level propagation is effective(Default).	
	DI12	DI12 general input port, low-level propagation is effective(Default).	
	DI13	DI13 general input port, low-level propagation is effective(Default).	
	DI14	DI14 general input port, low-level	

		propagation is effective(Default).	
	DI15	DI15 general input port, low-level propagation is effective(Default).	
	0V	Signal input public port	
EtherNet	1X	1X industrial Ethernet interface	These four ports can be arbitrarily configured
	2X	2X industrial Ethernet interface	
	3X	3X industrial Ethernet interface	
	4X	4X industrial Ethernet interface	
General serial port	RS232	RS232serial port	It can butt-joint with laser

3. Installation and wiring of CNC system

3.1 Wiring diagram of CNC system
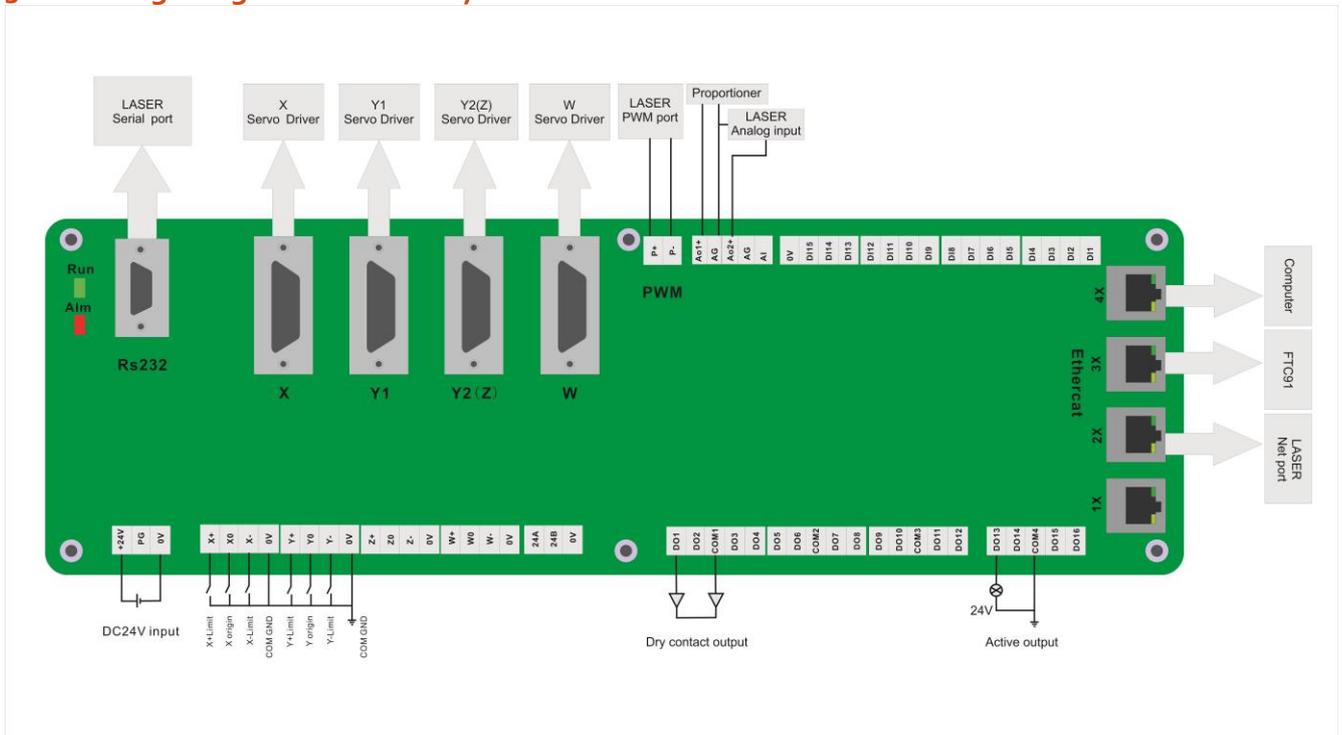
3.2 Installation dimension

SC1000 CNC system supports 35mm's DIN-Rail Mounting,315mm length x 120mm wide.

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3.3 Installation of limit port or other IO port.

limit input.

SC1000 CNC system provides four axis' limit input ports, which are X axis, Y axis, Z axis, W axis. Take X axis as an example, installing axis' limit signal. NPN photoelectric switch's typical wiring shows as below:
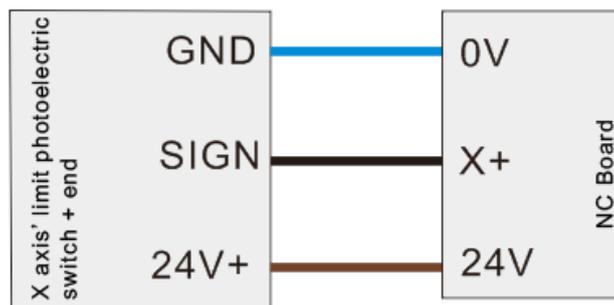
general custom output port:

SC1000 CNC system provides 12 kinds of general custom output ports, and the function of output port can be arbitrarily configured by software. The output port is passive output port. The output mode shows as below:

Thyristor output port:

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SC1000 CNC system provides 4 kinds of Thyristor output ports, and the function of output port can be arbitrarily configured by software. The output port is active output port, and the Maximum of drive capability is 24V/1A, which can directly drive 24V DC solenoid valve.

The output mode shows as below:
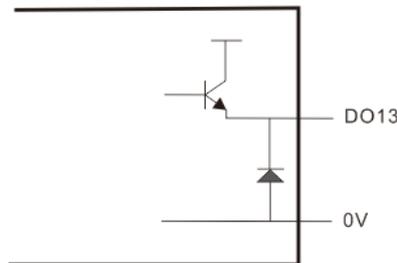
3.4 Connecting X Y axis' servo driver

SC1000 CNC system provides 4 kinds of servo control interfaces, which are X axis, Y1 axis, Y2(Z) axis, W axis. The connector is DB15female. When the system is dual - drive mode, Y1 axis and Y2 axis separately controls Y axis' two kinds of servo drivers. And when it's single drive mode, Y1 axis controls Y axis' servo driver. The definition of these four servo control interfaces are the same, they all adapt the position loop control mode. The definition of each pin shows as below:

axis' servo control interface(DB15 female)			
pin	The name of each signal	pin	The name of each signal
1	PUL+	9	PUL−
2	DIR+	10	DIR−
3	A+	11	A−
4	B+	12	B−
5	Z+	13	Z−
6	SON	14	ALM
7	CLR	15	0V
8	24V		

SC1000 CNC system adapts "pulse + directional signal" to control servo driver, which can support all kinds of servo driver such as "Yaskawa"、"Panasonic"、"Fuji"、"Delta"、"Kymmene"、"Adtech" and so on. The wiring mode shows as below:

Panasonic's A5 low-speed pulse wiring diagram shows as below:

Shielding wire
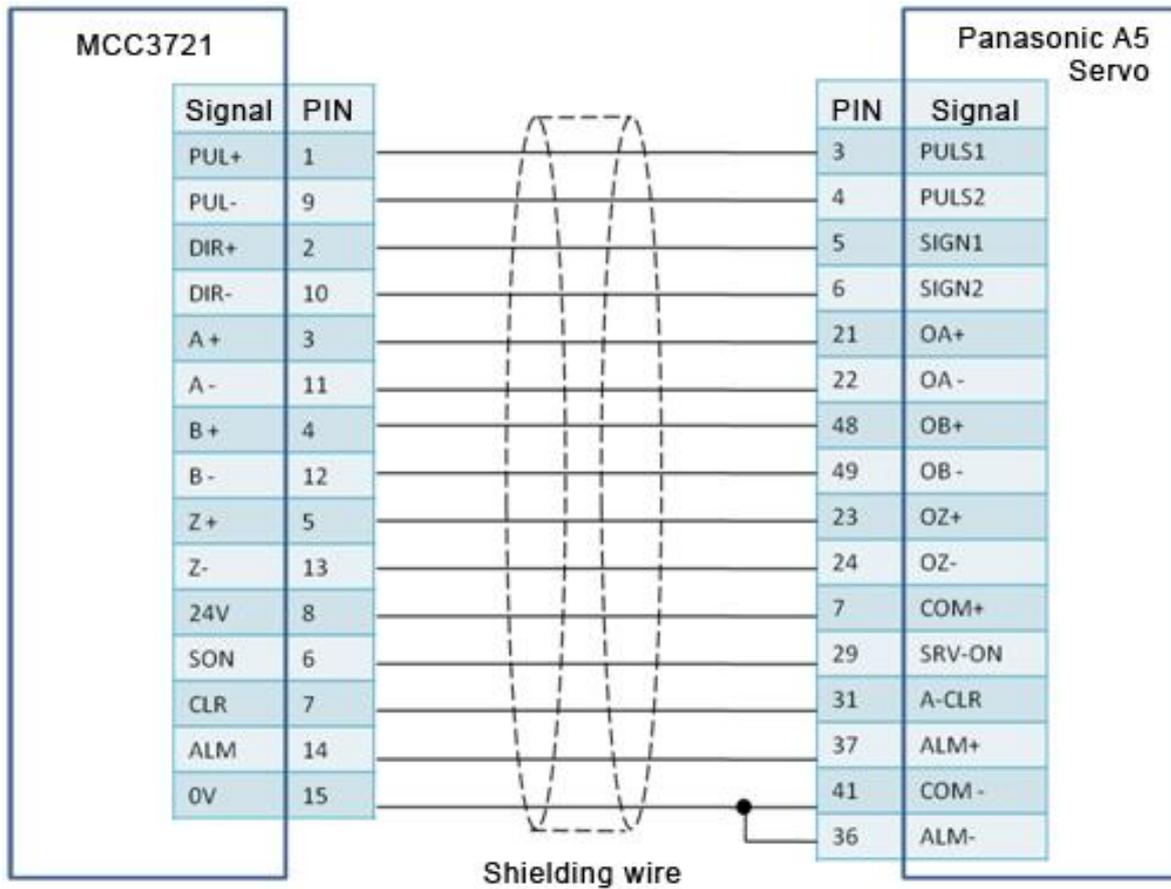
The basic parameter settings of Panasonic'sA5 series.

Parameter	Set	Meaning
PR001	0	Set servo control mode as position mode
PR007	3	Set as "pulse + directional signal" mode
PR005	0	Set pulse frequency as maximum

Yaskawa's Σ—v series wiring diagram shows as below:

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MCC3721 — Yaskawa's ∑-5 Servo wiring diagram

MCC3721 Signal	PIN		PIN	Yaskawa's ∑-5 Servo Signal
PUL+	1		7	PULS
PUL-	9		8	*PULS
DIR+	2		11	SIGN
DIR-	10		12	*SIGN
A +	3		33	PAO
A -	11		34	*PAO
B +	4		35	PBO
B -	12		36	*PBO
Z +	5		19	PCO
Z-	13		20	*PCO
24V	8		47	+24V IN
SON	6		40	/S-ON
CLR	7		44	/ALM-RST
ALM	14		31	ALM+
0V	15		1	SG
			32	ALM-

Shielding wire
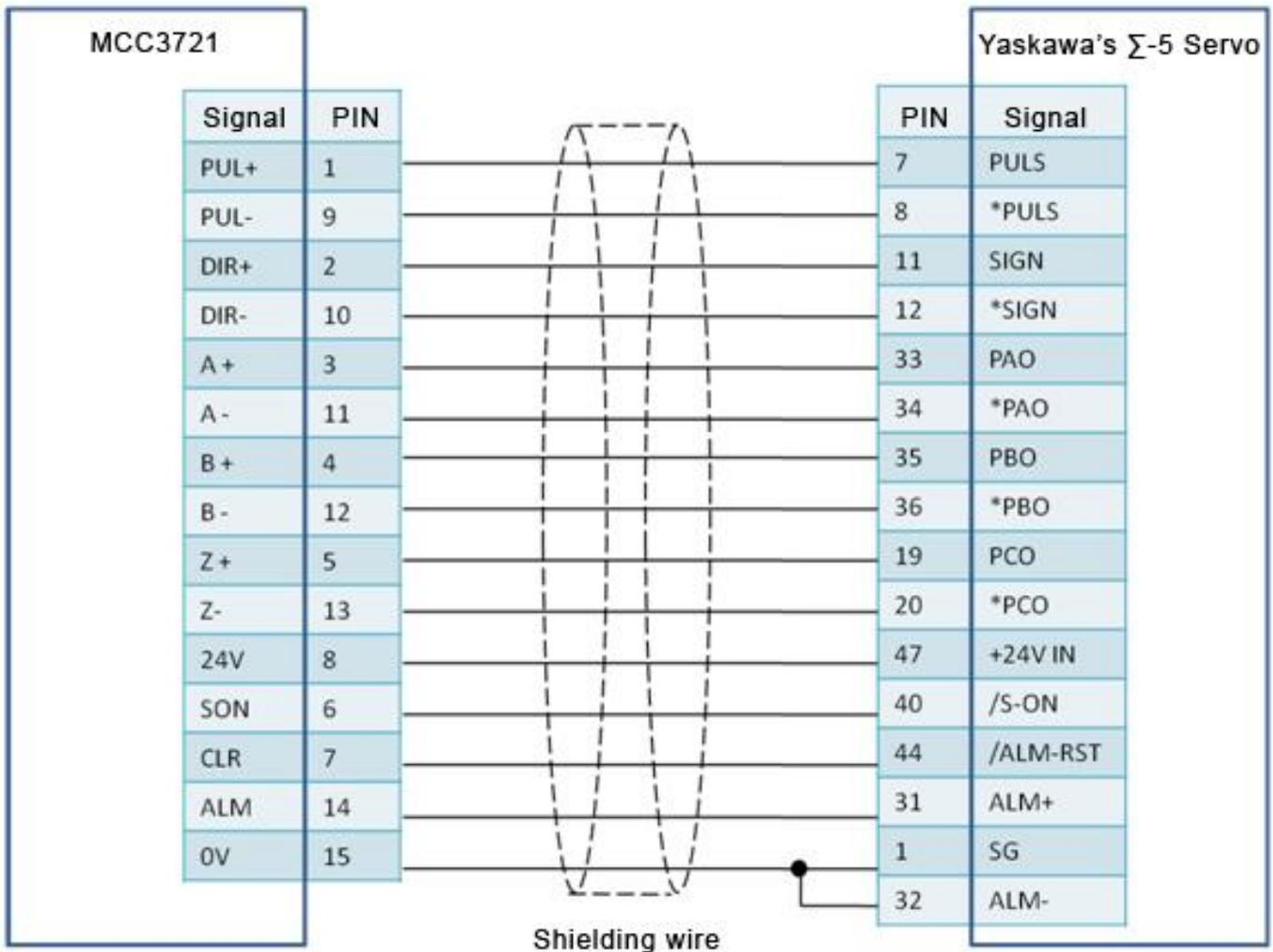
The basic parameter settings of Yaskawa's ∑—ⅴ series.

Parameter	Set	Meaning
Pn000	001X	Set servo control mode as position mode
Pn00B	default	When it has single-phase power input, set it as 0010.
Pn200	2000H	Choose the pulse mode
Pn50A	8100	Clockwise drivable
Pn50B	6548	Un-clockwise drivable

Fuji's A5 series wiring diagram shows as below

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Signal	PIN		PIN	Signal
MCC3721				**Fuji's A5 Servo**
PUL+	1		7	CA
PUL-	9		8	*CA
DIR+	2		20	CB
DIR-	10		21	*CB
A +	3		9	FFA
A -	11		10	*FFA
B +	4		11	FFB
B -	12		12	*FFB
Z +	5		23	FFZ
Z-	13		24	*FFZ
24V	8		1	COMIN
SON	6		2	CONT1
CLR	7		3	CONT2
ALM	14		17	OUT3
0V	15		14	COM OUT

Shielding wire
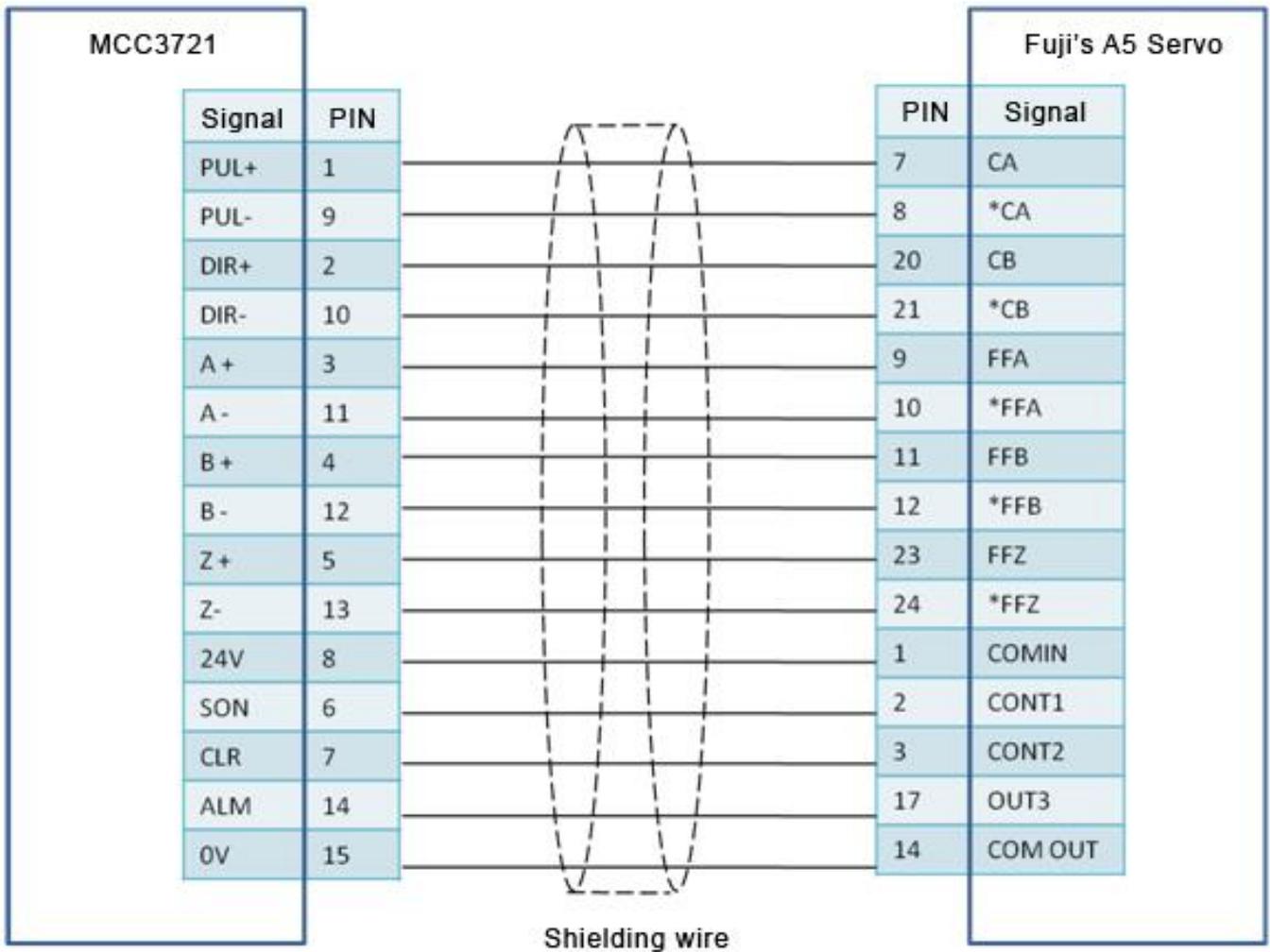
The basic parameter settings of Fuji's A5 series.

Parameter	Set	Meaning
PA-101	0	Set servo control mode as position mode
PA-103	0	Set as "pulse + directional signal" mode

Schneider's Lexium-23D-CN series wiring diagram shows as below:

Shielding wire

The basic parameter settings of Schneider's Lexium-23D-CN .

Parameter	Set	Meaning
P1-00	0100	Choose the pulse mode
P1-01	0000	Position mode
P2-00	Factory default :35	Position controls proportional gain and adjust accordingly.
P2-10	101	Set DI1 port as servo on
P2-14	102	Set DI5 port as alarm clear
P2-15	0000	Set DI6 port as null
P2-16	0000	Set DI7port as null
P2-17	0000	Set DI8 port as null
P2-22	0007	Set DO5 port as servo alarm
P2-68	0001	When L1/L and SON are valid at the same time, motor works. (If not set this parameter, motor can't work.)

Kymmene's IS620P series wiring diagram shows as below:

MCC3721			Kymmene's IS620P series	
Signal	**PIN**		**PIN**	**Signal**
PUL+	1		38	HPULSE+
PUL-	9		36	HPULSE-
DIR+	2		42	HSIGN+
DIR-	10		40	HSIGN-
A+	3		21	PAO+
A -	11		22	PAO-
B+	4		25	PBO+
B -	12		23	PBO-
Z+	5		13	PZO+
Z -	13		24	PZO -
24V	8		11	COM+
SON	6		33	DI5
CLS	7		8	DI4
ALM	14		1	DO4+
0V	15		26	DO4-
			29	GND

Shielding wire
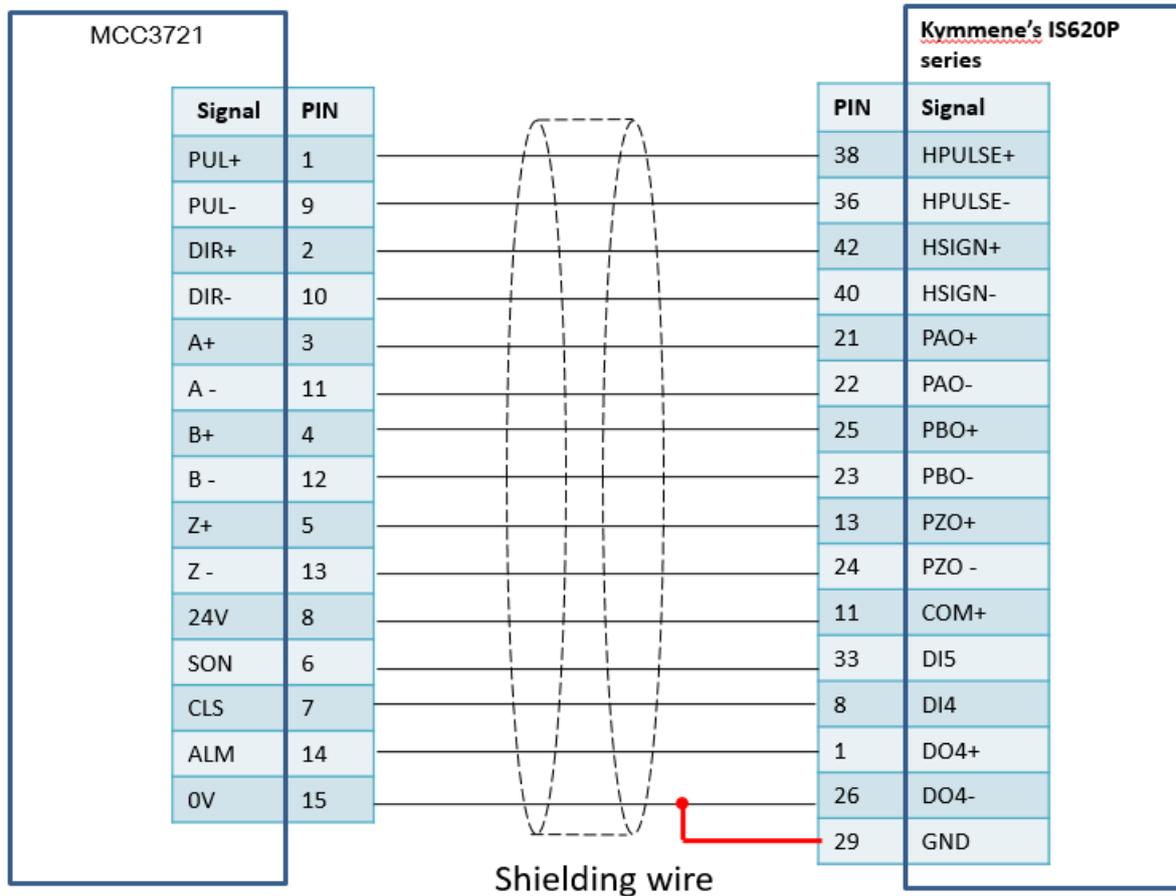
The basic parameter settings of Kymmene's IS620P series：

Parameter	Set	Meaning
H02-00	1—Position mode	Position mode
H02-02	0—Clockwise mode	direction of rotation selection
H02-03	0—Clockwise mode	Pulse's feedback direction selection.
H03-08	2—Fault resetting	DI4 port definition selection
H03-10	1—Servo on	DI5 port definition selection
H04-07	1—Output high-level propagation when it's valid.	DO4 port definition selection
H05-00	0—Pulse command	The source of position command.
H05-01	1—high-speed pulse	High or low speed pulse position command selection.
H09-00	0- Auto-adjustment is invalid，manual operation can adjust gain	Auto-adjustment mode selection

parameter	

3.5 FTC height control.

SC1000 CNC system can directly connect with torch height control(FTC91) by any internet port, which is convenient and efficient.
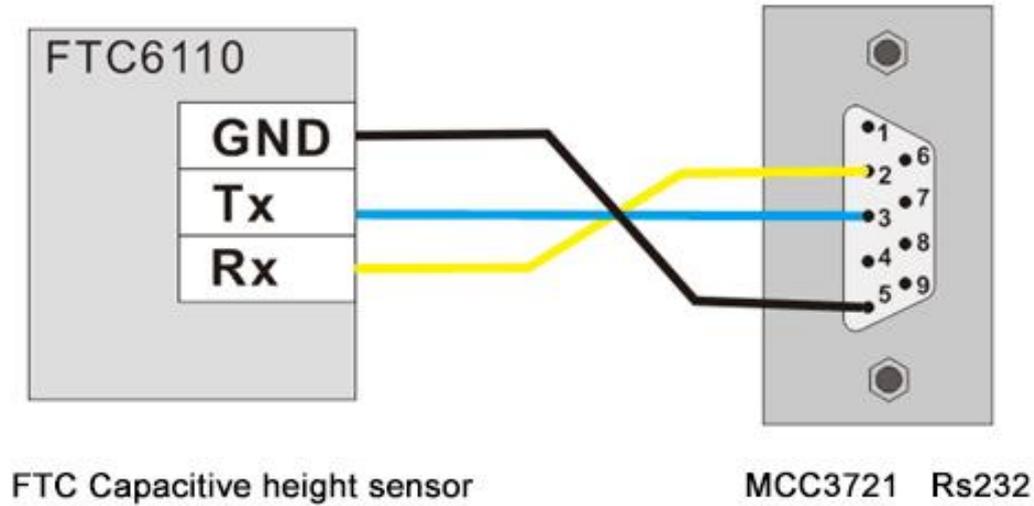
3.6 connecting laser.

SC1000 CNC system can connect with laser by serial port/internet port, or by I/O port signal. It can directly connect with Raycus laser by serial port, and IPG's laser by serial port/internet port(recommend to use internet port).
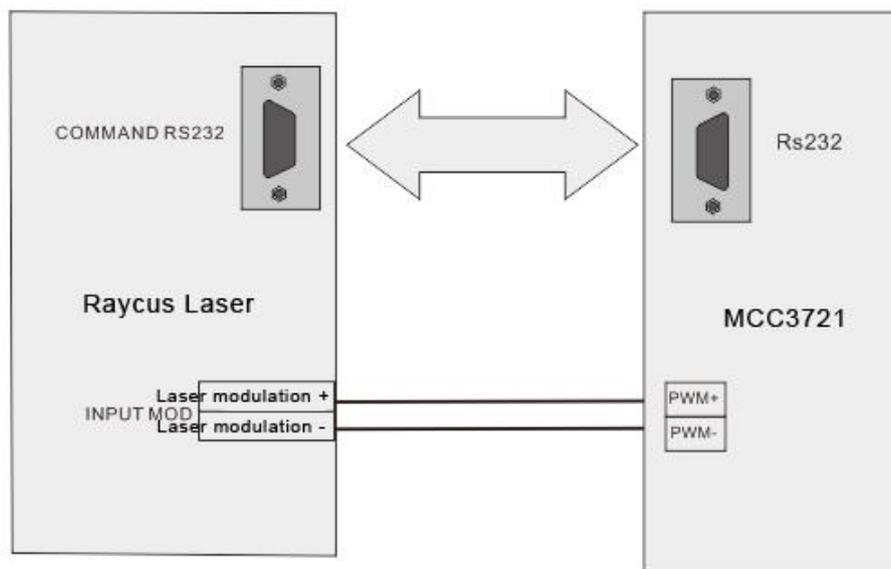
Note: use the RS232 cable provided by Raycus

Maxphotonics laser's wiring diagram shows as below:

MaxPhotonics		MCC3721	
Name		Name	Meaning
Servo on +		DO13	DC24V active output port
Servo on -		0V	The GND for DC24V output
Modulation signal +		P+	PWM+
Modulation signal -		P-	PWM-
0-10V+		AO1+	Analog input port +
0-10V-		AG	The GND for analog output

Note: the connecting way for other lasers(such as Super, Feibo, Cas) can reference Maxphotonics laser.

3.7 connecting computer.
SC1000 CNC system can directly connect with computer(IPC) by any internet port, which is convenient and efficient.

3.8 installing power
When all the external wirings are finished, it needs to provide 24V power for CNC board(suggest to use 24V/10A power). As for the wiring mode, you can take the diagram as reference.

Cabling is finished after everything is done above.

4.Cutting machine parameters

4.1 software setup
Software can be downloaded from our website *www.a-cutter.com*. Unzip it and run mainapp.exe can open the software

4.2 communication setting

SC1000 is designed with industry Ethernet infrastructure. FTC is connected to MCC3721 using Ethernet cable as well as computer is connected to MCC3721 using Ethernet cable.

1、IP setting

click advance on the tabs option, then click IP configuration.
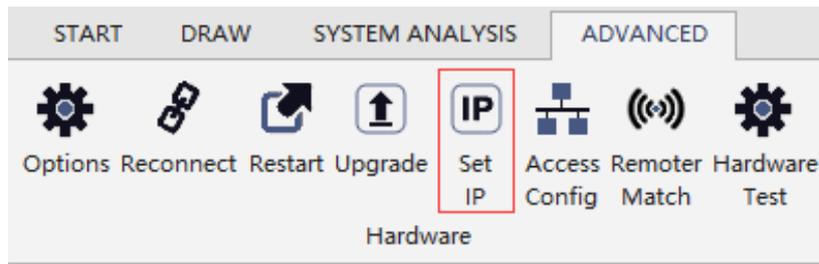
IP address：10.1.1.10，subnet mask：255.255.255.0，default gateway：10.1.1.1
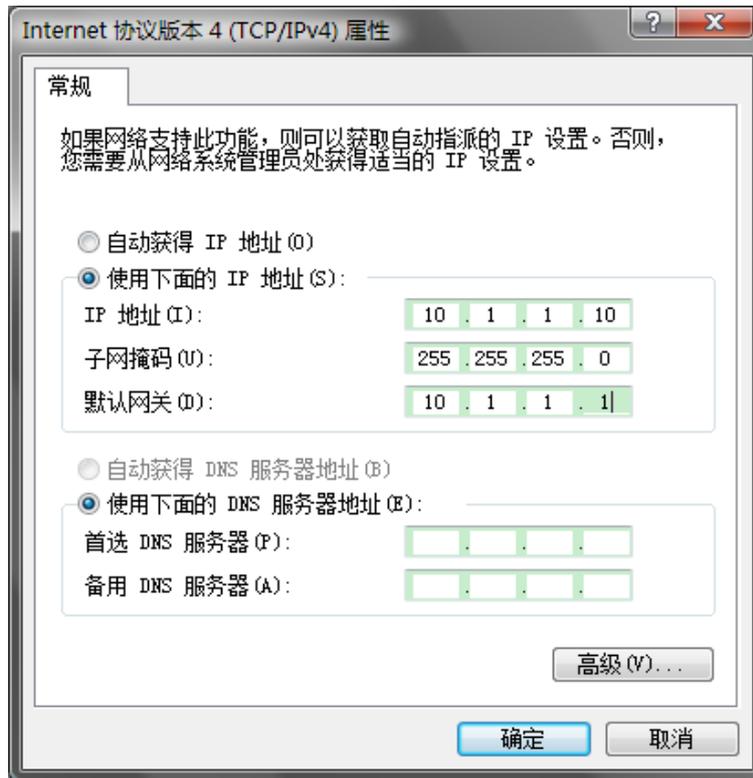
Note: FTC91 has been set to the correct IP address, no need to do anything with it.

2、after IP has been configured on PC, the network shall be working

Reconnect Hardware is not connected, please check the controller

4.3 parameter setting

Under Option in advance, we need to set up the parameter for XY, laser, height sensor, assistance gas etc.

Open up software, click advance –option, enter passcode 0000
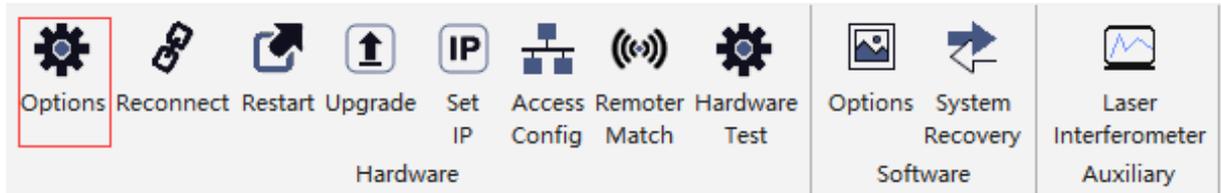
4.3.1 X Y Axis parameter

Motion Axis setup is for Axis parameter and back to origin point setup.
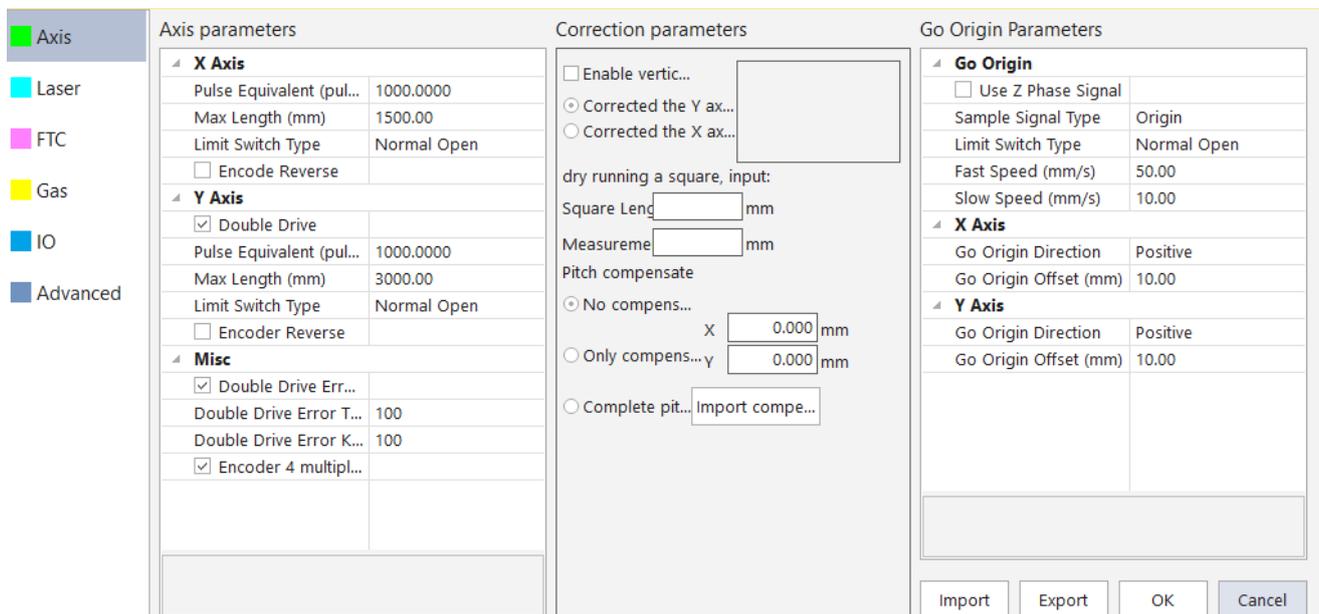
Please view the tables below for X/Y definations:

Axis Parameters	Parameters Name	Default Value	Remark
X-Axis	Max Length(mm)	1500	
	Pulse Equivalent(pulse/mm)	1000	The number of pulses needed to run 1mm
	Limit Switch Type	Normal Open	Limit switch type of X-axis should

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			be the same with Y-axis.
	Encode Reverse	Not check	
Y-Axis	Double Drive	Check	If checked, the Y axis enables dual drive mode
	Max Length(mm)	3000	
	Pulse Equivalent(pulse/mm)	1000	The number of pulses needed to run 1mm
	Limit Switch Type	Normal Open	Limit switch type of Y-axis should be the same with X-axis.
	Encode Reverse	Not check	
Misc	Double Drive Error Alarm	Check	If checked, the software will alarm and stop when the alarm condition is reached
	Double Drive Error Tolerance	100	
	Double Drive Error Keep Time	100	
	Encoder 4 multiplier freq	Check	
Go Origin	Use Z Phase Signal	Not check	
	Sample Signal Type	Origin	The user can select the limit signal or the origin signal
	Limit Switch Type	Normal Open	
	Fast Speed(mm/s)	50	
	Slow Speed(mm/s)	10	
X-Axis	Go Origin Direction	Positive	

	Go Origin Offset(mm)	10	
Y-Axis	Go Origin Direction	Positive	
	Go Origin Offset(mm)	10	

Setup guide：

1、According to machine X axis, Y axis (only Y Axis or Y1 and Y2 Axis), please disable W Axis.

If Y axis is set up as single drive mode, please not check dual drive mode.

2、limits and cutting machine size

System supports light/mechanical limits, open/close logic. Please set it up correctly otherwise limit may not be functionally working.

Note: Users should choose the same limit switch type to avoid the difference between X-axis and Y-axis.

Users may manually trigger limits and origin to see if the light on MCC mother board response accordingly.

Please make sure all limits are working functionally before we move to next step.

According to X/Y max travels, after the cutting head moves to the origin point of X/Y, pick soft limits. Once the cutting machine moves over the soft limits, it will warn.

3、pulse equivalent setting

Users need to setup the pulse equivalent correctly to achieve the best motion result and precision. SC1000 defines the number of pulse which can make X or Y axis travel 1mm.

e.g. when X Axis servo motor subdivision is 10000 for running 1 circle, the movement is 10mm, the pulse equivalent is 10000/10=1000

Pulse equivalent can use up to 4 digital after decimal point.

4、Setup origin point parameter

System default apply homing twice. Origin point can be managed by users, supporting servo motor Z/limits/origin signal as the adapting signal.

Mechanical origin 〈Supporting servo motor Z/limits/origin signal as the adapting signal.〉
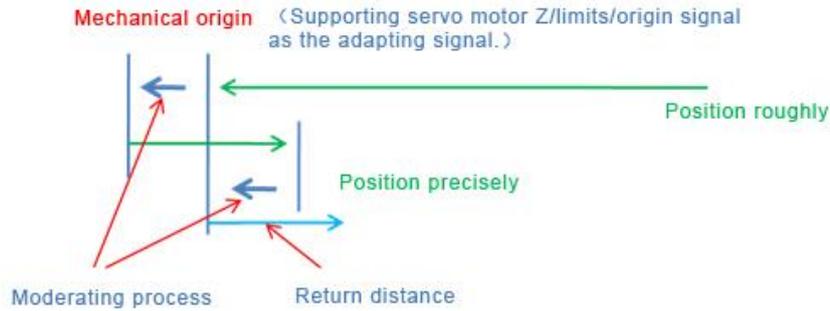
According to the graphics above, the homing speed is not recommended to set to high speed.

4.3.2 laser setting

Raycus laser setting:

choose Raycus

choose MCC Serial

not choose

IPG laser setting:

choose IPG

choose MCC Serial

not choose

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MaxPhotonics laser setting

Axis	Laser Type	MaxPhotonics	→ choose MaxPhotonics
Laser	**General**		
FTC	Control Type	**IO**	→ support: serial / net / I/O and so on.
	DA		
Gas	DA Port	**DA1**	
	DA Range	**0 ~ 10V**	→ choose DA port by the signal of 0-10V
IO	**IO**		
	Remote Start	0	
Advanced	Shutter	**8**	→ Shutter can be configured in any unused output port.
	Laser Emission	**13**	
	Red Light	0	
	PC Serial		
	Port Number	COM1	
	Baud Rate	9600	

Note: since Maxphotonics laser has no laser gate, so shutter port can be configured in any unused output port.

After the laser configuration, please enable shutter/laser to make sure the laser emit is OK.

4.3.3 FTC91

1. click the advance on FTC91 control panel, under system parameter, please make sure the network enable is YES.

2. Choose net under the control type below.

Axis	FTC Parameters	
Laser	**General**	
	Control Type	**Net**
FTC	**PC Serial**	
	Port Number	**COM3**
Gas	Baud Rate	9600
	DI	
IO	Follow	0
	Drill	0
Advanced	Jog Up	0
	Jog Down	0
	DO	
	Alarm Status	0
	Follow in Place	0
	Drill in Place	0

4.3.4 gas
The system supports high pressure valve, low pressure valve and proportional valve. Gas port can be configured according to different requirements.

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Axis	Gas Parameters	
Laser		
FTC		
Gas		
IO		
Advanced		

Gas Parameters

▲ **Low Pressure Valve**	
Air	14
O2	13
N2	0
▲ **High Pressure Valve**	
Air	0
O2	0
N2	0
▲ **Proportional Valve**	
Air	None
O2	None
N2	None
Max Pressure (Bar)	10.00
▲ **Main Valve**	
Main Valve	0
▲ **Secondary Valve**	
Low Pressure Gas	0
High Pressure Gas	0

4.3.5I/O

I/O supports signal light, emergency stop, chiller warning.

For instance the 3 color signal light：

Cabling accordingly to the I/O points configured below.

IO

▲ **DO**	
Standby Signal	4
Process Signal	5
Alarm Signal	6
Dedust	0
▲ **DI**	
Emergency Stop	0
Water Alarm	1
Water Alarm Switch ...	Normal Open
Laser Alarm	0
Laser Alarm Switch T...	Normal Open
▲ **Misc**	
☐ Standby Signal Al...	

4.3.6Remoter pair up

Wireless Remoter need to pair up before we can use.

steps：

1、Please connect the USB receiver to the computer.

2、click on the advanced below and select remoter type SC1000 PC.

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If users are using the V1.0.106 SP01version, then they don't need to set this parameter. The old version :

The V1.0.106 SP01version :

3、 switch on the remoter and start to pair up.

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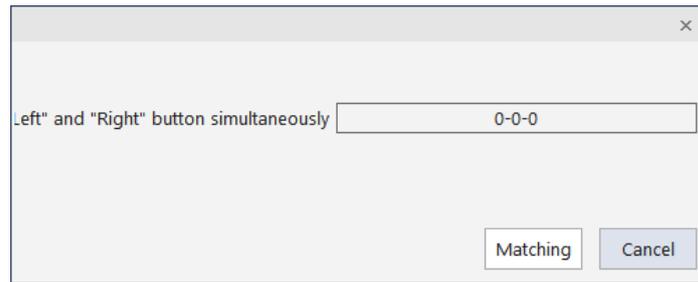
4、Pressing matching to finish the pair up.
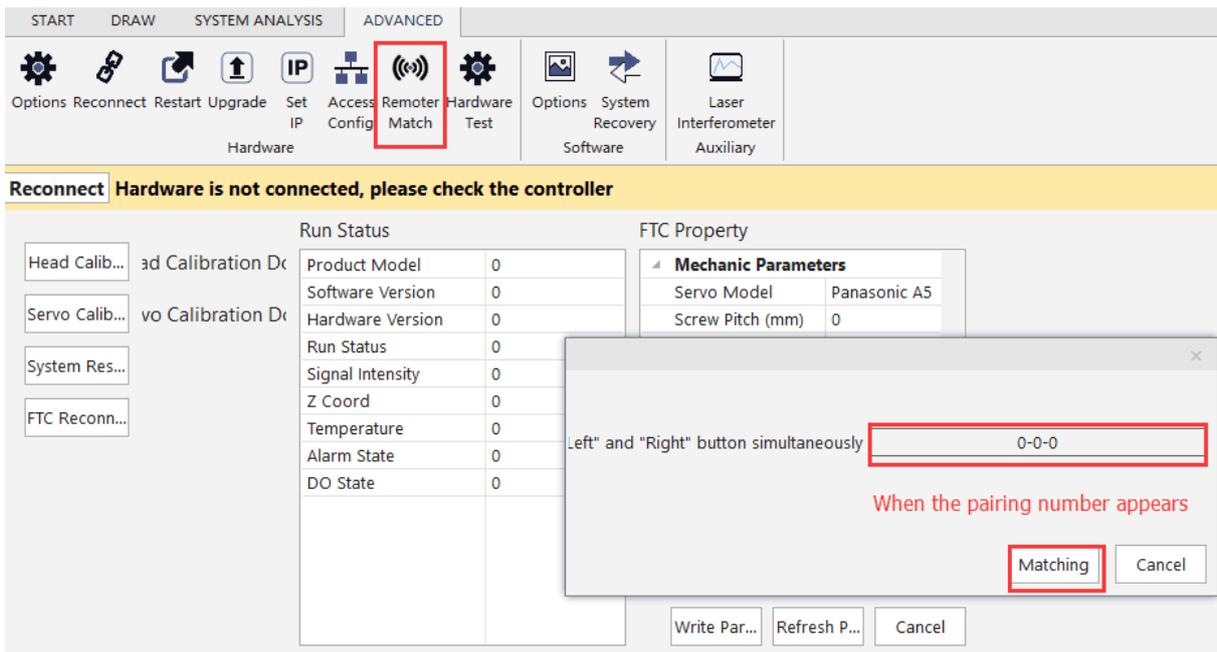
5.Run

After all paratemer in option has been configured, we can start to move the machine.

1、make sure all direction is correct.
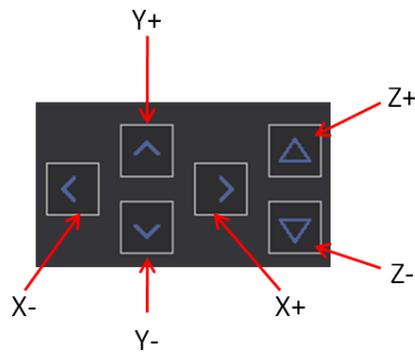
2、make sure the speed and accurate is meet the requirement.

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Error
measurement

Yellow outline:
Encoder feedback
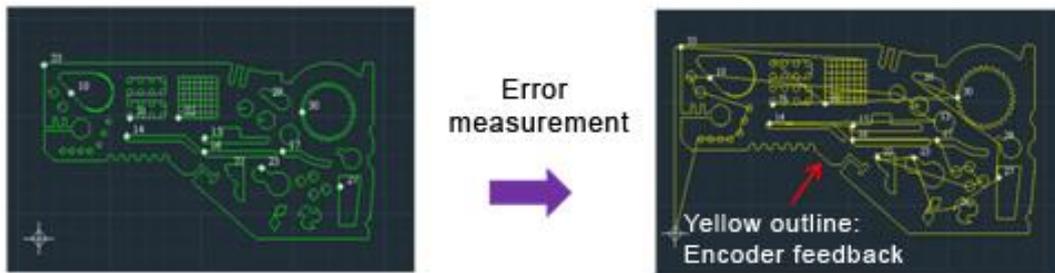
3、FTC91

The first time we use the machine, we need to do a servo calibration and then do a head calibration.

4、make sure all gas and laser is functionally working.

■ Follow	■ Gas	Not Use ▾
■ Shutter	■ RedLight	■ Laser

☐ Only Selected G...   Pwr(%) 30 ▲▼