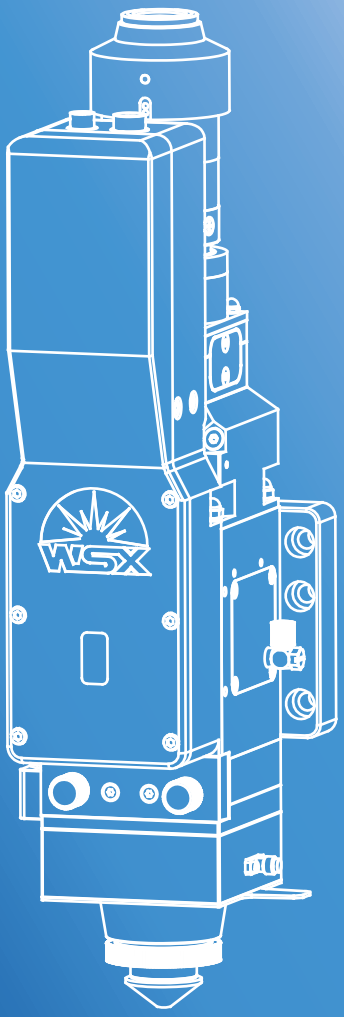


Auto Focusing Fiber Laser Cutting Head
NC30A
User Manual

Attention

Please read this manual carefully and make sure you understand its contents before using the laser head.

Please keep this manual for future operation and maintenance.

Test Condition

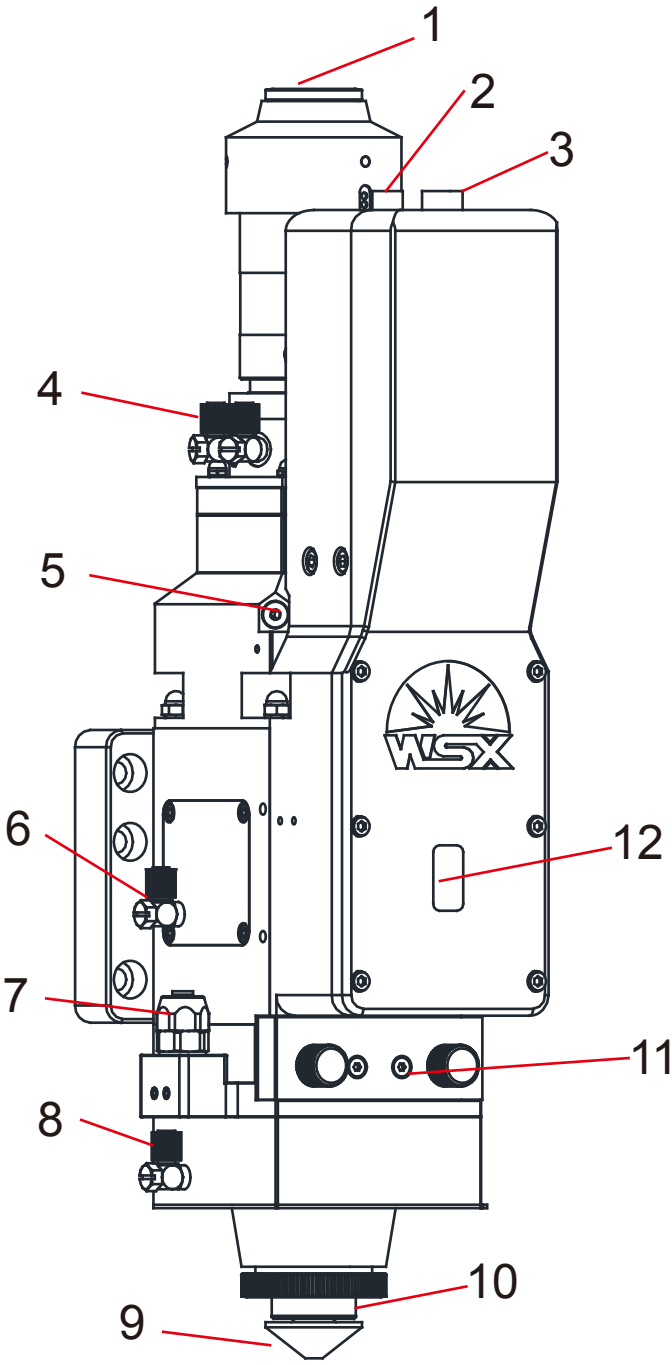
Correct wiring, normal electric, good earthing with smoothing and voltage stabilizing circuit.

Steps

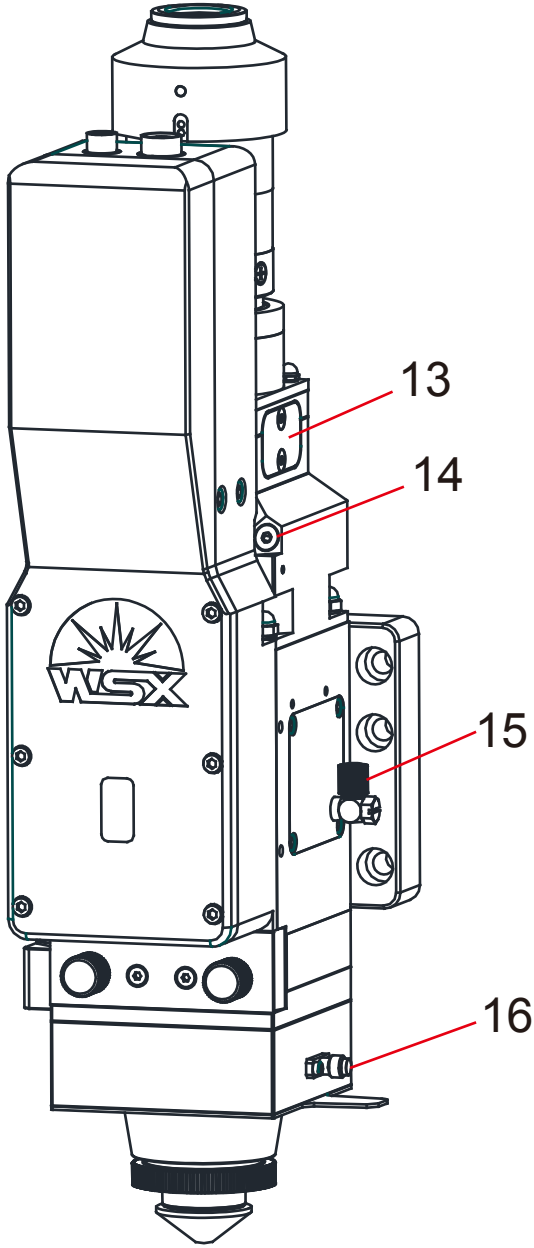
1. Adjust soft limitation to -100~100
2. Set inching speed to 1mm/s
3. Inching at positive direction until reach positive limitation
4. Inching at negative direction until reach negative limitation
5. After confirming effectiveness of positive & negative limitation, set back to origin
6. Restore soft limitation & inching speed to origin

Instruction

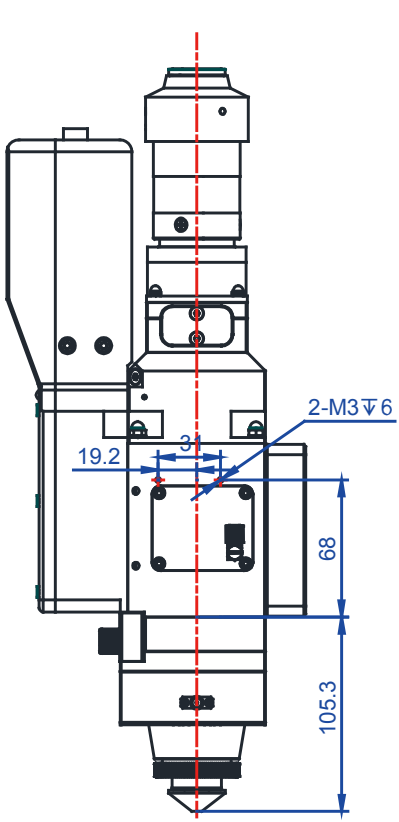
1. Make sure manual inching can find limit swicth
2. Reduce manual speed to ensure that invalid limitation will not cause structural damage.
3. Make sure wire connection of negative limitation swicth is correct and signal is normal
4. It's allowed to restore to origin automaticly only after confirming positive & negative limitation
5. Restore parameters to ensure system running correctly

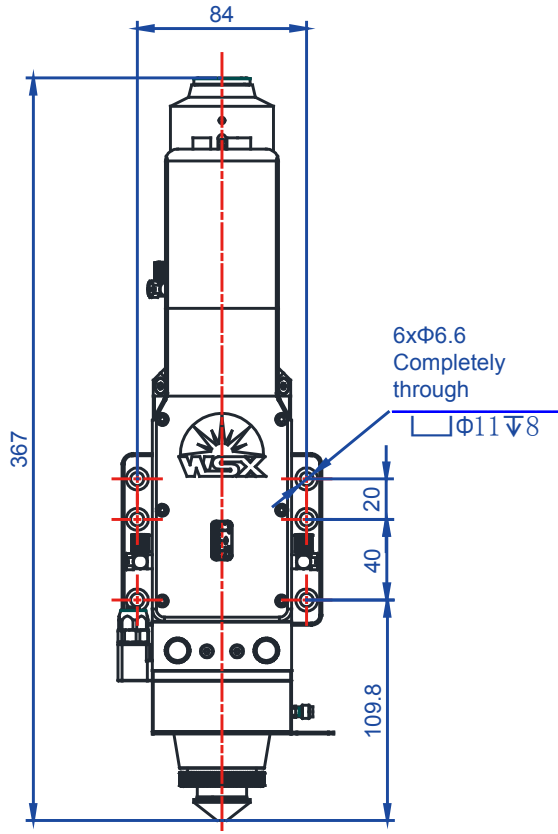


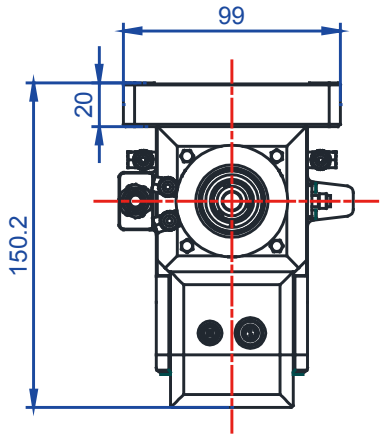
1. Fiber Access
2. Triphase power wire
3. Encoder&Limitation Signal
4. Cooling Water Connector 1
5. Center Adjusting (Y)
6. Cooling Water Connector 2
7. Cutting Gas Connector
8. Cooling Gas Connector
9. Nozzle
10. Ceramic Ring
11. Locking Device of Protective Window 1
12. Observation Window

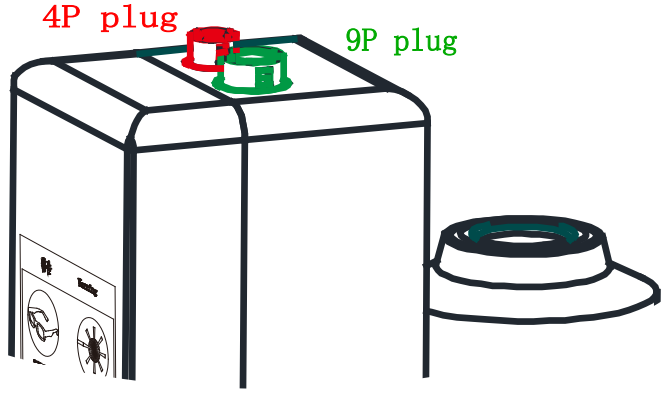


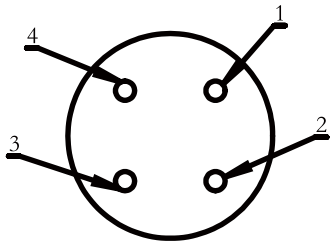
13. Protective Window 2
14. Center Adjusting (X)
15. Cooling Water Connector 3
16. Moving Signal Interface


2-M3↧6
19.2
3
68
105.3


84
367
6xΦ6.6
Completely
through
⌴Φ11↧8
20
40
109.8

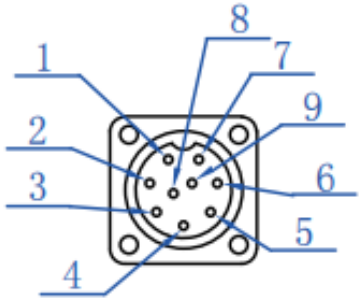

99
20
150.2





1	W
2	U
3	V
4	FG (Ground)

Servo Motor Power Supply Interface (Red)

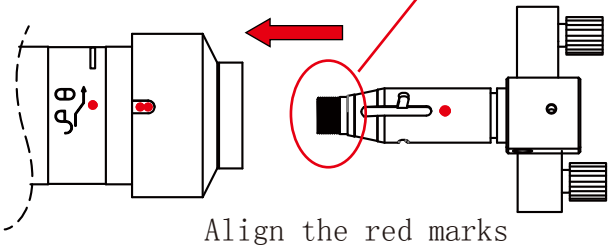


1	FG (Shield Wire)
2	-D (Encoder Signal Data-)
3	+D (Encoder Signal Data+)
4	SG (Signal Ground Wire)
5	VCC (Encoder Power +5V)
6	+24V (Approach Switch Power Line)
7	0V (Approach Switch Power Line)
8	W+ (Approach Switch Signal Line)
9	W- (Approach Switch Signal Line)

Servo Motor Encoder & Approach Switch Interface （Green）

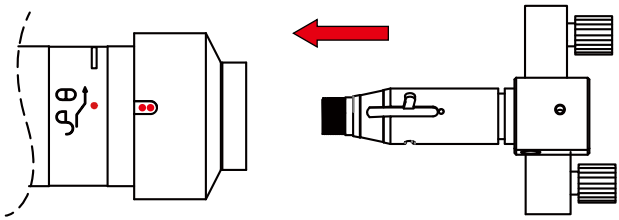
1. Place the laser head and optical fiber connector in a horizontal state;
2. Clean the QBH and fiber connector with clean rod and ethyl alcohol.

Inside the red circle is the plug of fiber rod; it is equipped with a protective cover. Before installation, tighten the cover to avoide it being loose duiring the processing which may cause offset light path and bad cutting quality or even cause burn damage to the fiber rod and cutting head.

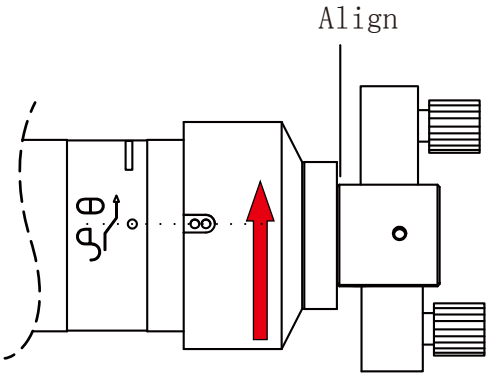


Align the red marks

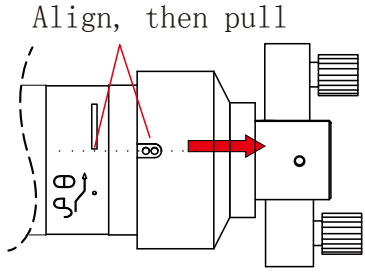
3. Insert the fiber connector into QBH gently;



4. After inserting, turn the turning rim in the arrow direction untill the two red marks are aligned to the white mark

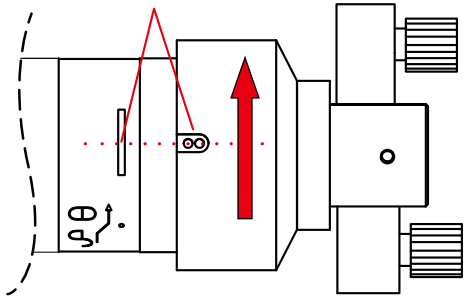


5. Then pull the turning rim as the picture below;



6. Turn the rim in the direction as picture below at moderate intensity to make it tight (Use thumb and index finger).

The red marks can be aligned to or over the middle of the white bar, but do not twist any more when it is in the right position.

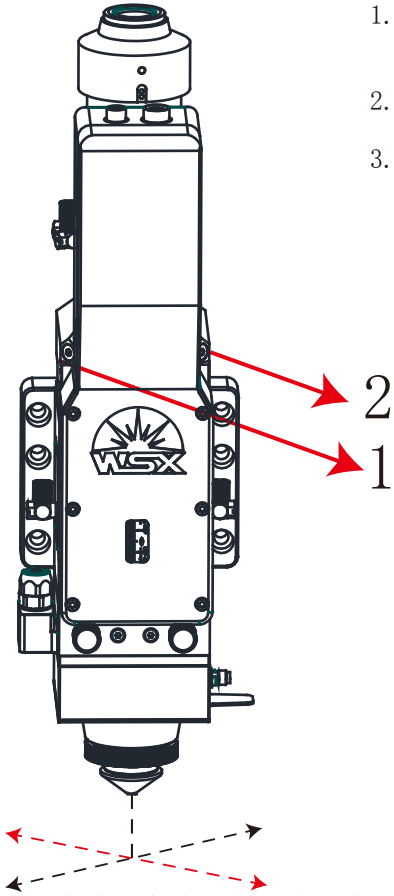


-

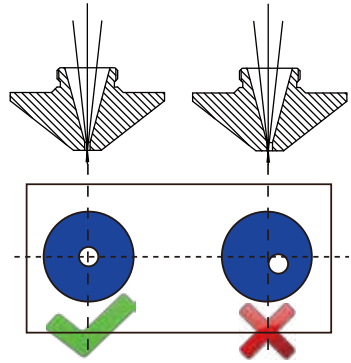
Note: Do not twist vigorously , it may cause damage to precision machinery.

To avoid dust or dirt entering into the fiber optic connector by accident, please clean the fiber rod first. Insert the fiber plug with the laser head in a horizontal position.

1. Y-Direction Horizontally Adjusting Screw
2. X-Direction Horizontally Adjusting Screw



1. Adjust the X/Y screw as Picture 14 by allen wrench and make the beam pass through the center of nozzle;
2. The cutting effect is perfect when the beam pass through the center of nozzle;
3. If the beam does not pass through the center of nozzle, it may cause the beam could not be emitted out or bad cutting effect and so on.

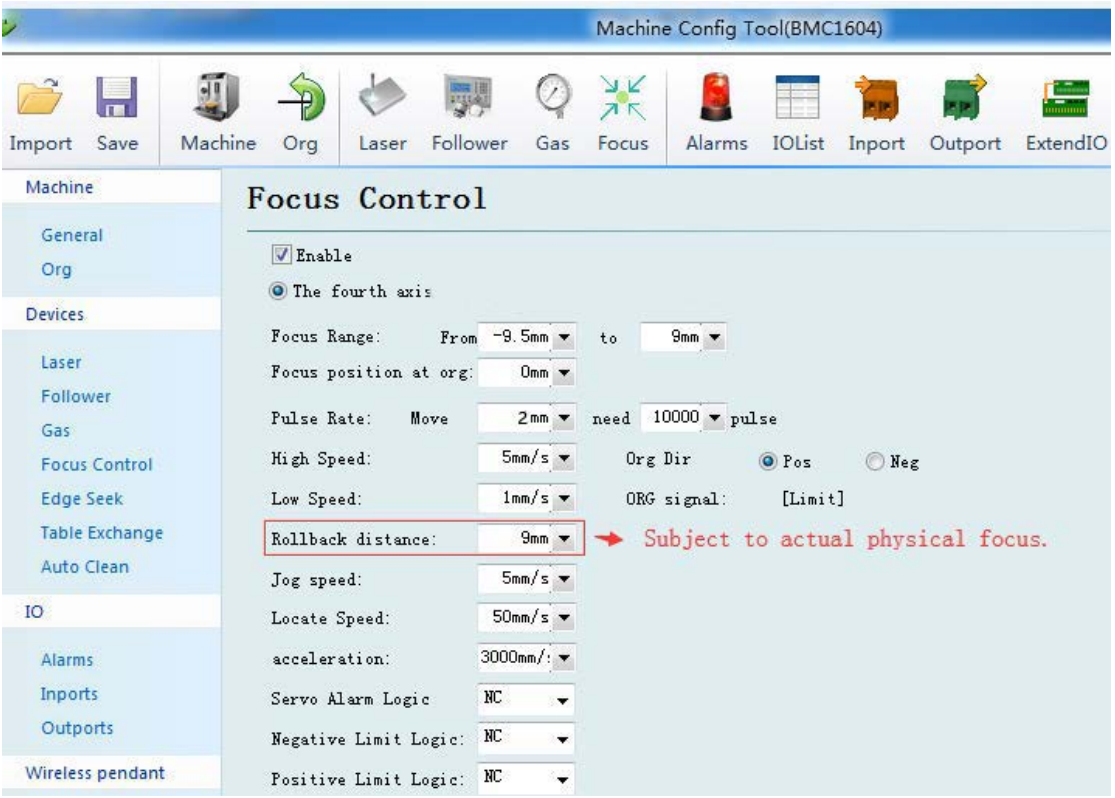


beam passes through the center (correct)

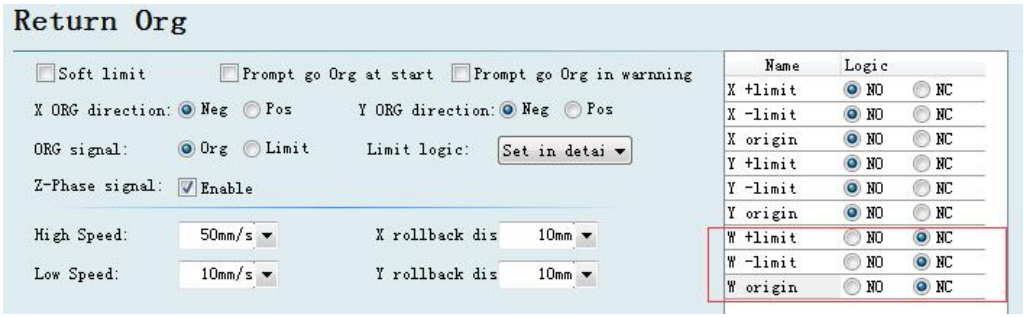
beam does not pass through the center(incorrect)

Methods of testing whether the beam pass through the center of nozzle:

1. Paste the transparent tape on the outlet of the nozzle (prefer to a new or undeformed nozzle);
2. Set the power of laser machine to 50W(take 500W for example,adjust the short burst power for 10%);
3. Take off the transparent tape after the beam has been emited for 1 - 2 seconds;
4. Face the tape to light source and observe the round mark of nozzle on the tape and burning spot of laser passing through the tape.
5. If they are concentric, the testing result is good, but if not, please keep adjusting.
6. When adjustment is finished, tighten the center locking ring (red part) immediately.



Note: 1.This parameter is default value; when user changes it, please avoid hard ware damage;
2. Please contact technicist to get specific parameters of different lens combinations.



Note: 1.Please choose normally closed mode for normally closed limitation switch.

Maintenance of Protective Window & Ceramic Ring & Nozzle

Check

Distance

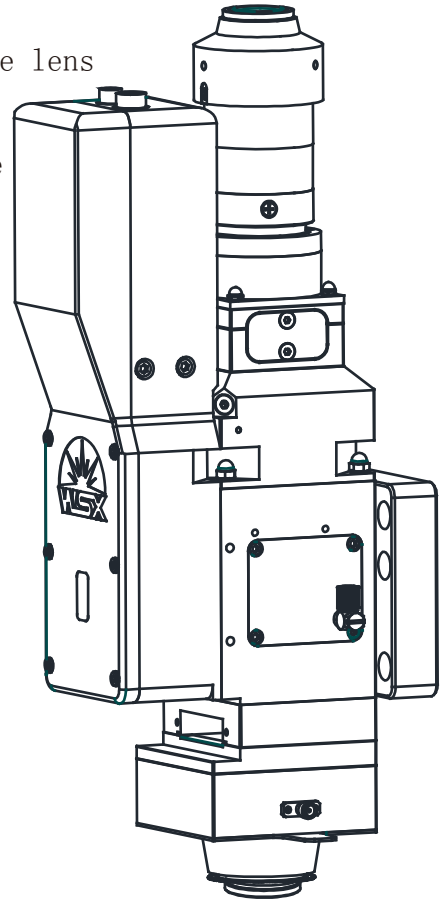
Replace

Adjust the lens

Maintenance

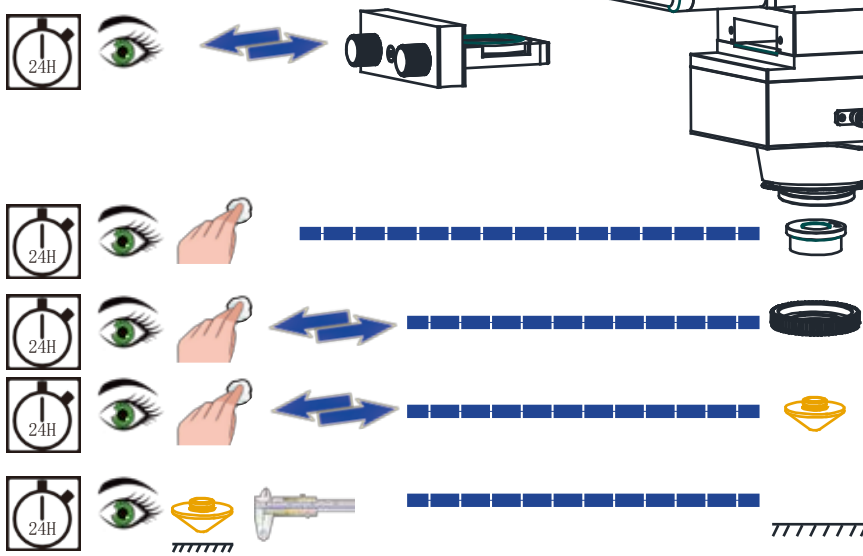
Maintenance Period

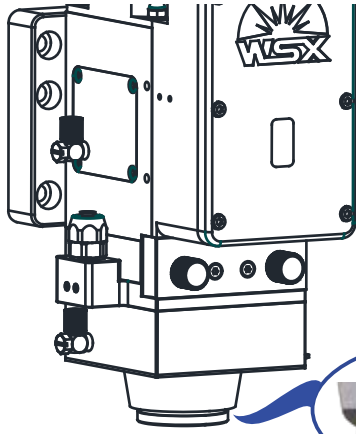
Calibration



Note:
Before maintenance, clean away the dust on the surface of the head with compressed air; then use clean cloth and ethyl alcohol to clean the related parts.

Note:
When the maintenance of ceramic ring & nozzle is finished, it is necessary to calibrate every time.

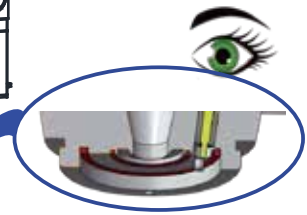




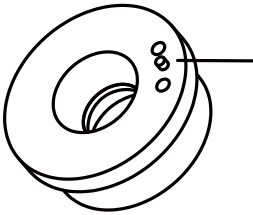
POWER

COOLING GAS

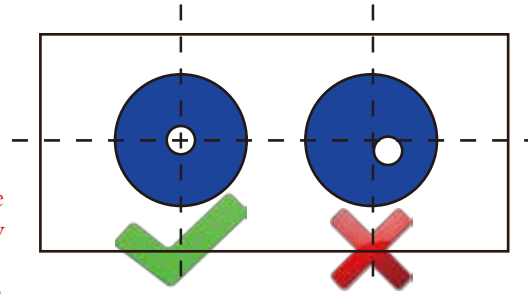
CUTTING GAS



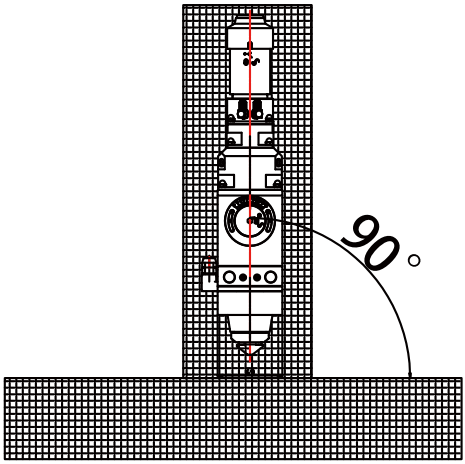
Note:
Before maintenance, clean away the dust on the surface of the head with compressed air; then use clean cloth and ethyl alcohol to clean the related parts.

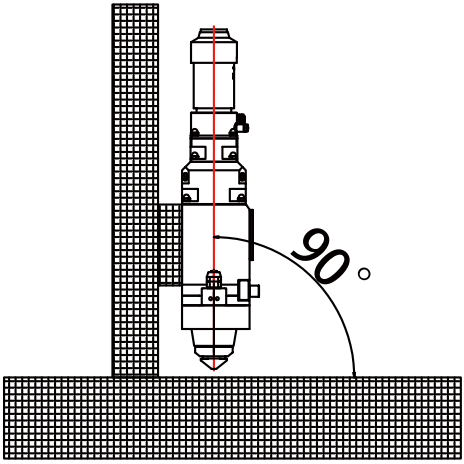


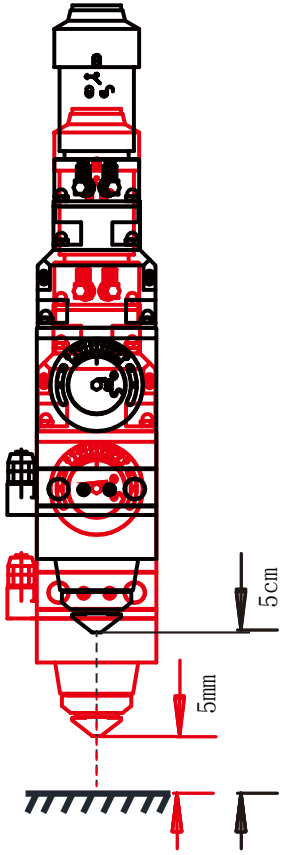
Note:
When the maintenance of ceramic ring & nozzle is finished, it is necessary to calibrate and test the beam to see whether it is in the center.



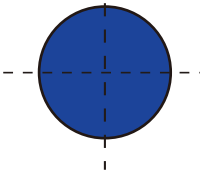
center checking



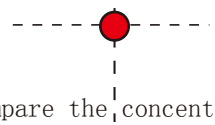




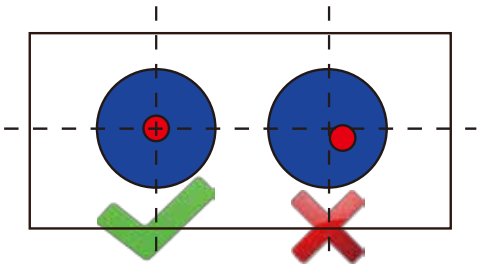
Step 1: set the laser power to 500W, make a short burst at the height of 5cm from the plate to burn a round scorch on the plate;

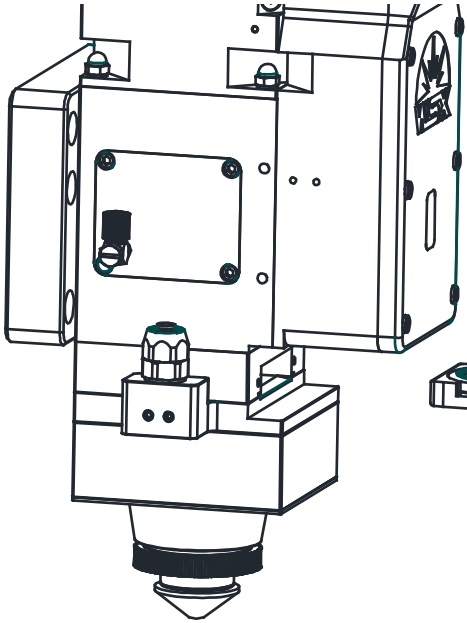


Step 2: set the laser power to 100W, make a short burst at the height of 1~5 cm from the plate to burn a round scorched spot on the plate;

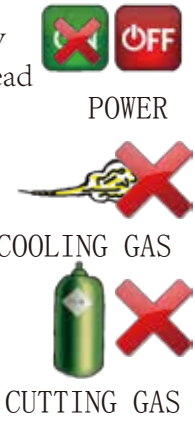


Step 3: compare the concentricity;

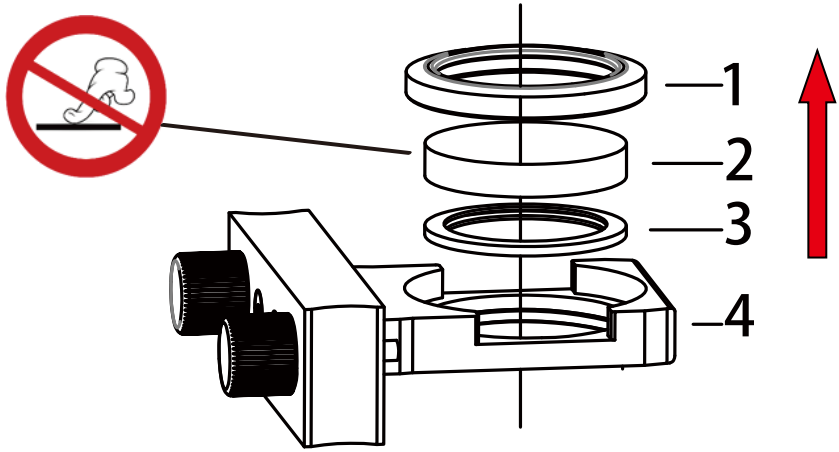




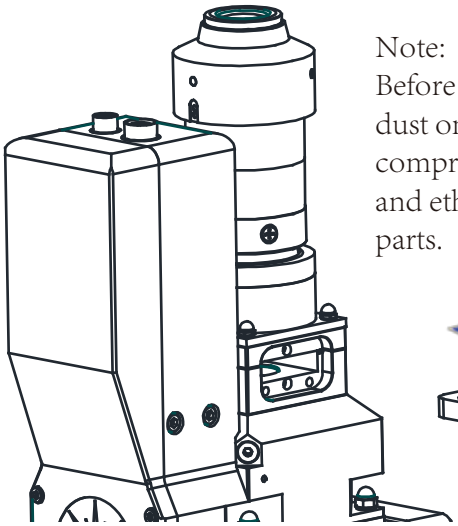
Note:
Before maintenance, clean away the dust on the surface of the head with compressed air; then use clean cloth and ethyl alcohol to clean the related parts.



Before maintenance, record the position and orientation of the lens; After maintenance, assemble as the record



1 Fixing Ring 2 Protective Window 3 Seal Ring 4 Pedestal
Note: All the parts must be removed in the direction of the arrow, otherwise it may cause damages.
DO NOT operate with wrench or iron plier.



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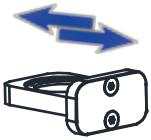
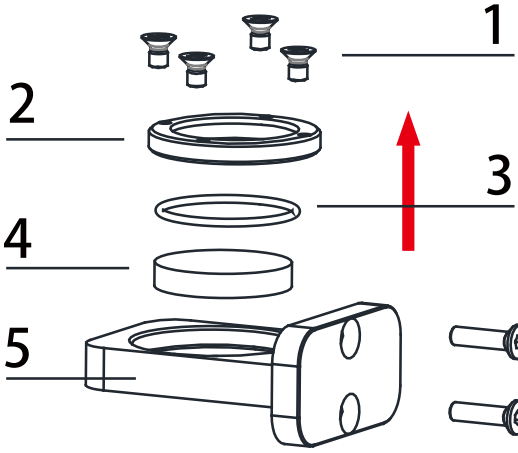


POWER

COOLING GAS

CUTTING GAS

Beware of Dropping

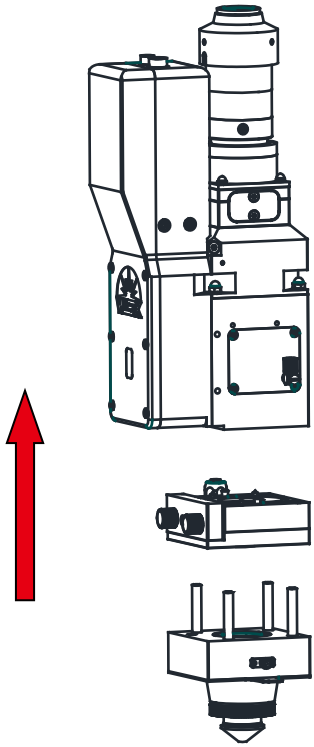


Before maintenance, record the position and orientation of the lens; After maintenance, assemble as the record

1 4-M3 Screw 2 Gland 3 Seal Ring

4 Protective Window 5 Pedestal

Note: Part 1~4 must be removed in the direction of the arrow, otherwise it may cause damages.



Note:
Before maintenance, clean away the dust on the surface of the head with compressed air; then use clean cloth and ethyl alcohol to clean the related parts.

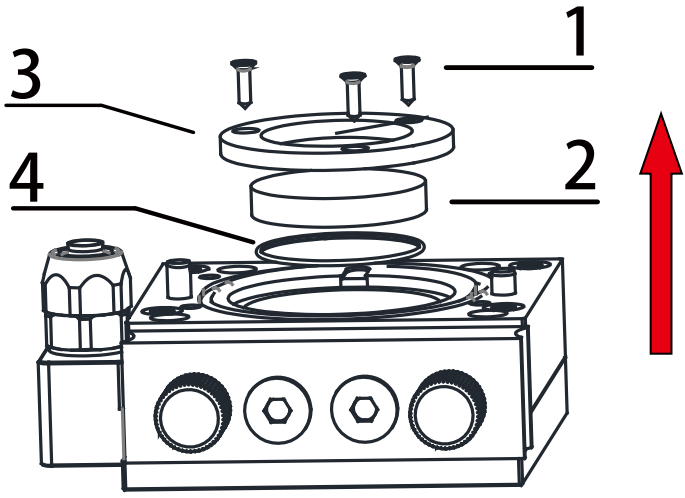
Before maintenance, record the position and orientation of the lens; After maintenance, assemble as the record

POWER

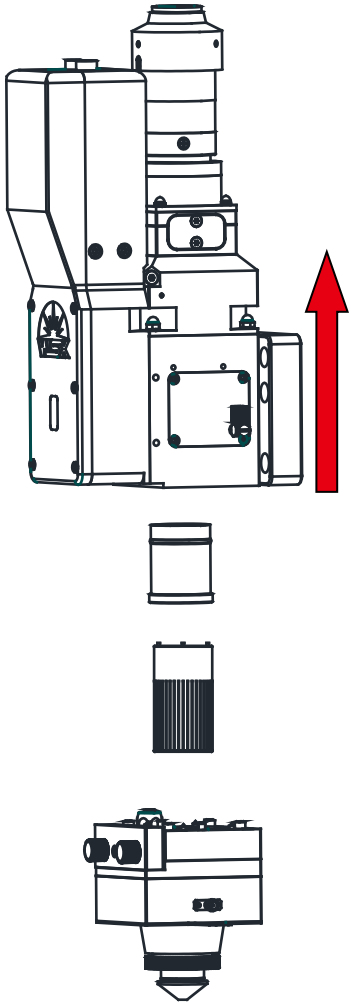
COOLING GAS

CUTTING GAS

Beware of Dropping



1 3-M3 Screw 2 Protective Window
3 Gland 4 O-Type Spring outer30*1.0

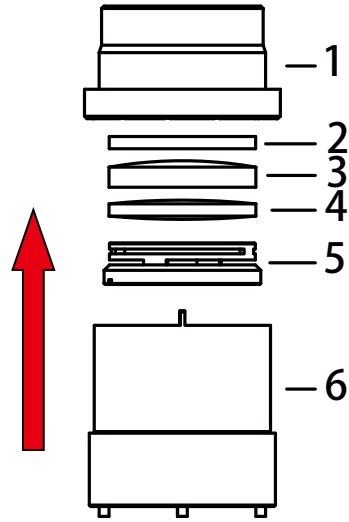


Note:
Before maintenance, clean away the dust on the surface of the head with compressed air; then use clean cloth and ethyl alcohol to clean the related parts.

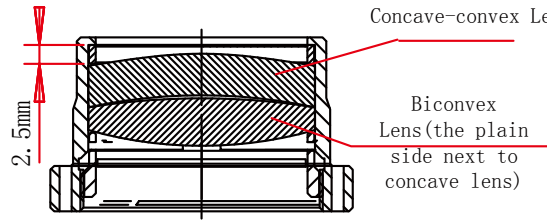
POWER

COOLING GAS

CUTTING GAS



1. Before maintenance, record the position and orientation of the lens; After maintenance, assemble as the record
2. Twist to the end and then turn backward 1/5 circle to prevent the lens being affected by temperature variation.



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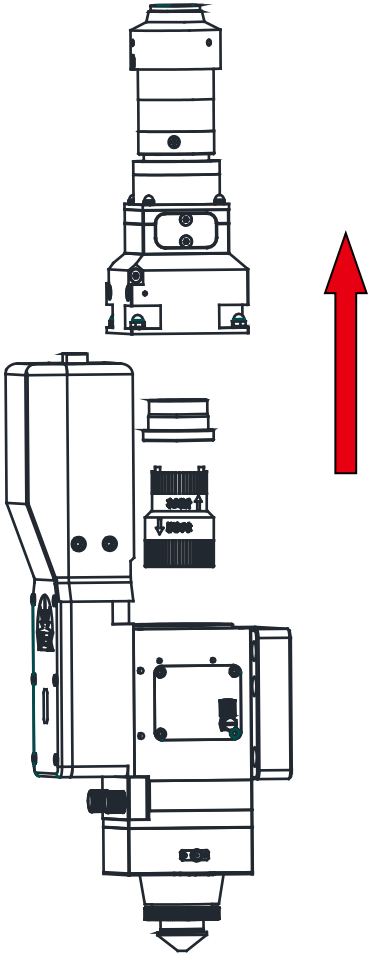
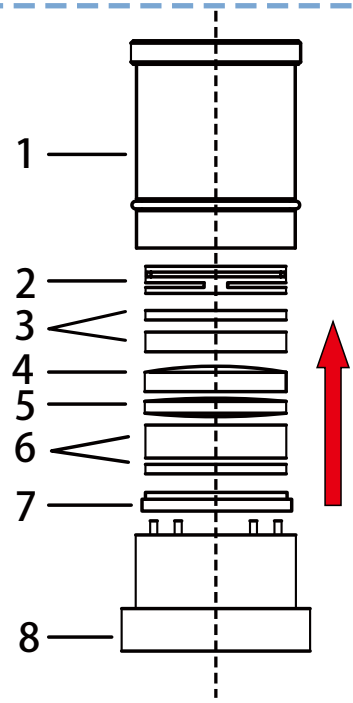
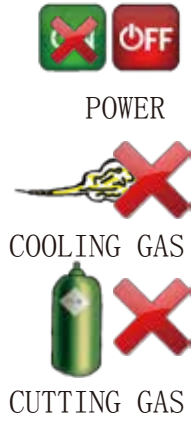
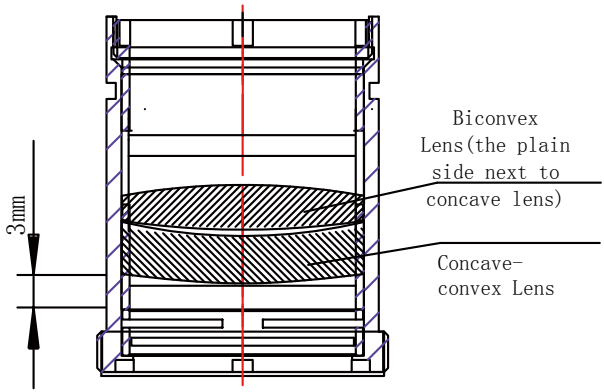






1.Before maintenance, record the position and orientation of the lens; After maintenance, assemble as the record

2.Twist to the end and then turn backward 1/5 circle to prevent the lens being affected by temperature variation.



Checking of wiring between laser head and driver

(1) Check the mark of the A+A-B+B- cable, which should correspond one-to-on with the A+A-B+B- on the plug.

(2) The A+A-B+B- cables cannot be connected to the ground wire and the casing, and the resistance between the A+A-B+B- and the casing is greater than 5MΩ.

Test conditions: one end of the cutting head is connected, and one end of the driver is not connected.

(3) The resistance between A+A-B+B- electrodes is about 20Ω. If the resistance is 0 (short circuit) or the multimeter shows infinity (open circuit), it is regarded as abnormal.

Test conditions: one end of the cutting head is connected, and one end of the driver is not connected.

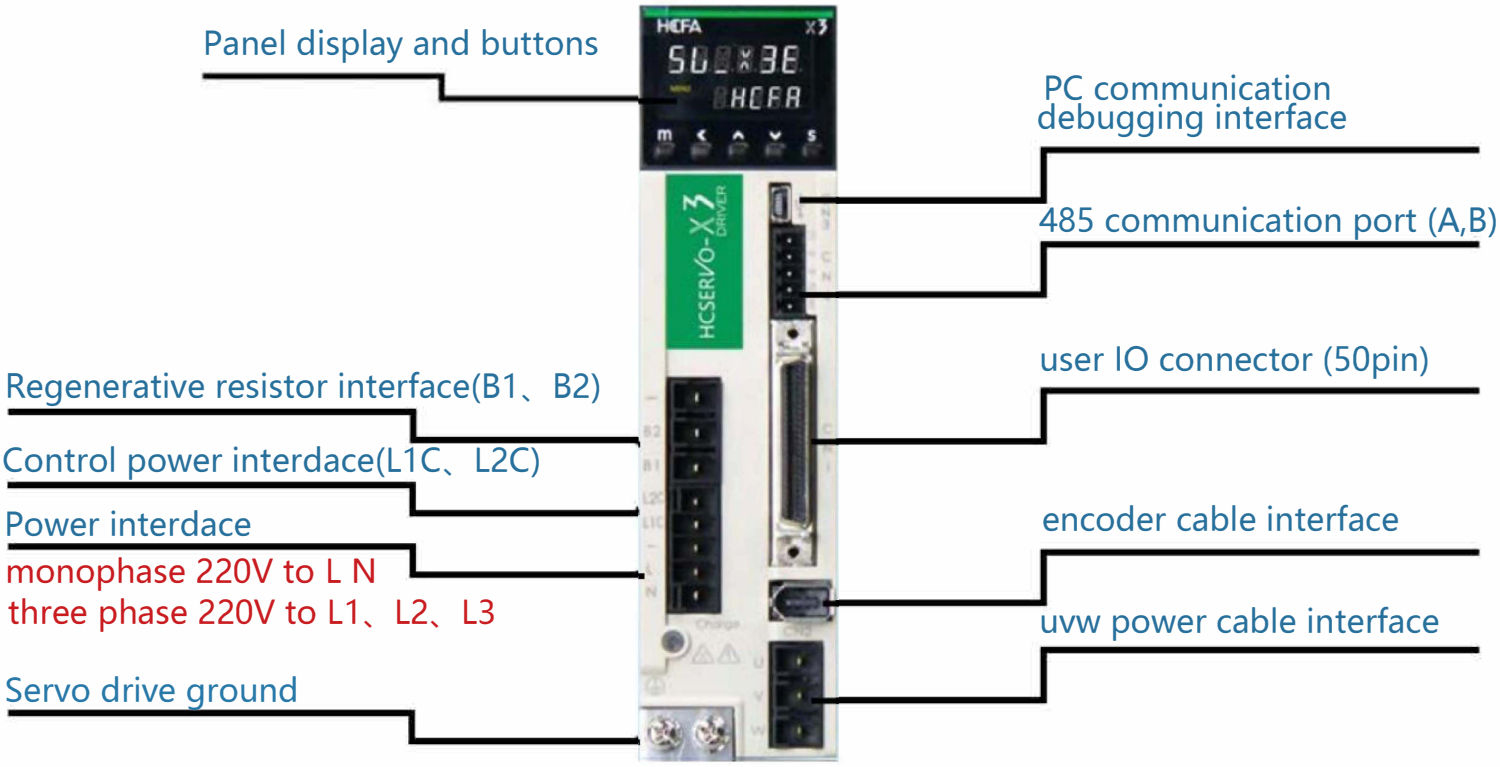
(4) Ground (very important).

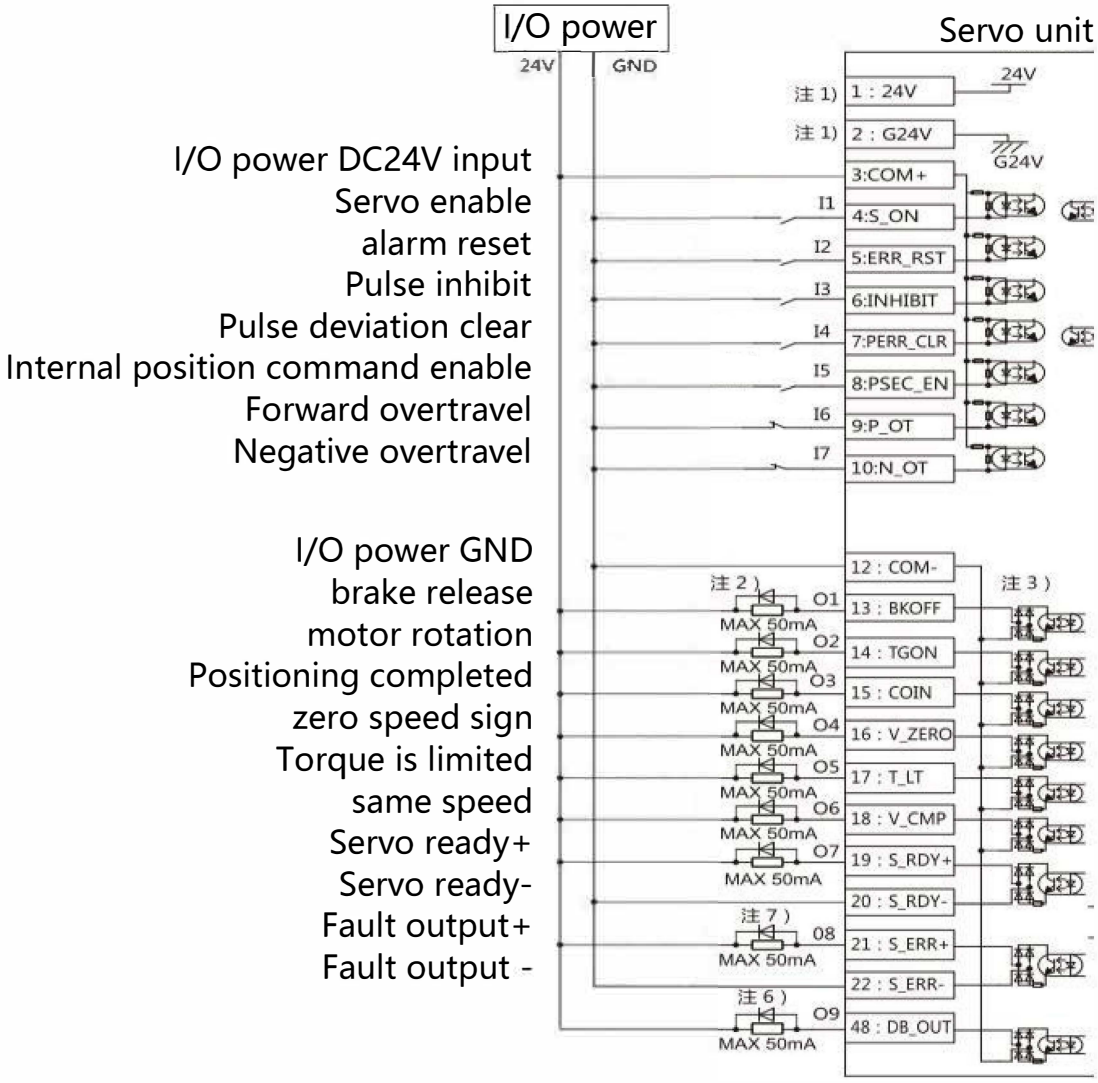
(5) When connecting the aviation plug, be sure to follow the steps below:

Step 1: Use an air gun to blow off the water, oil, dust and other debris in the aviation plug.

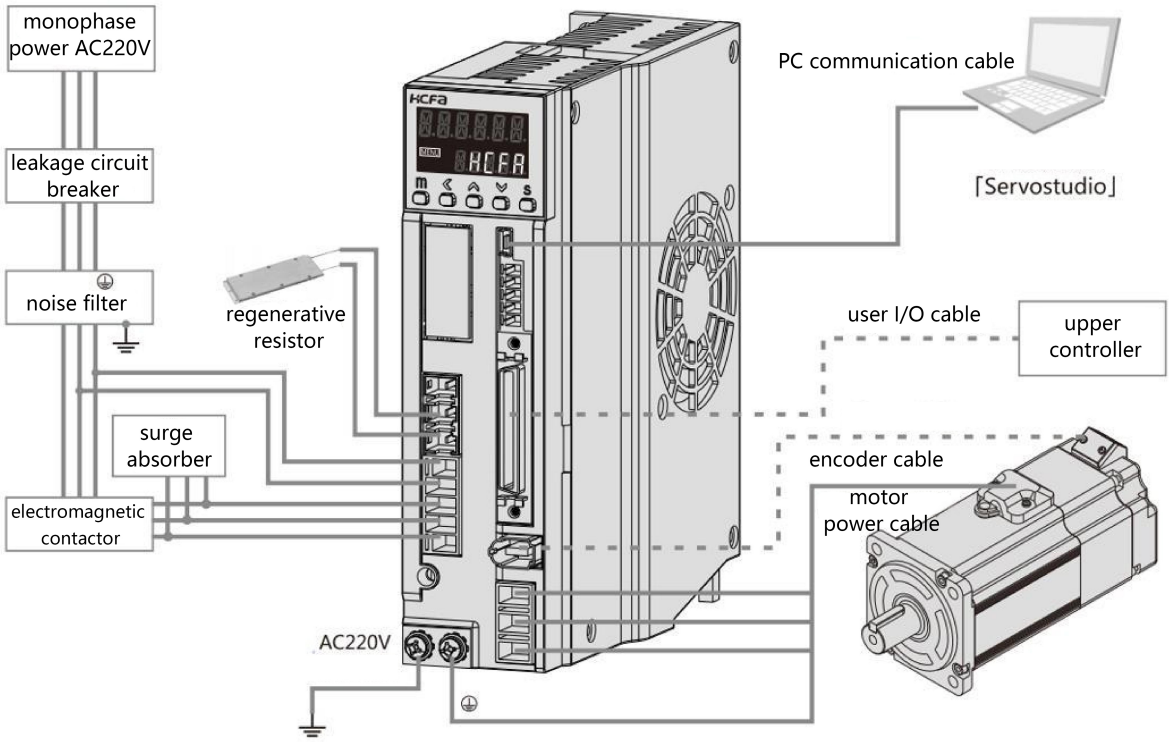
Step 2: Tighten the male and female headers of the aviation plug.

Step 3: Use masking tape or electrical tape to wrap the air plug to prevent moisture, oil and dust from entering the aviation plug.


Panel display and buttons
PC communication debugging interface
485 communication port (A,B)
user IO connector (50pin)
encoder cable interface
uvw power cable interface
Regenerative resistor interface(B1、B2)
Control power interdace(L1C、L2C)
Power interdace
monophase 220V to L N
three phase 220V to L1、L2、L3
Servo drive ground


I/O power
Servo unit
24V
GND
I/O power DC24V input
Servo enable
alarm reset
Pulse inhibit
Pulse deviation clear
Internal position command enable
Forward overtravel
Negative overtravel
I/O power GND
brake release
motor rotation
Positioning completed
zero speed sign
Torque is limited
same speed
Servo ready+
Servo ready-
Fault output+
Fault output -
注 1) 1 : 24V
注 1) 2 : G24V
3:COM+
4:S_ON
5:ERR_RST
6:INHIBIT
7:PERR_CLR
8:PSEC_EN
9:P_OT
10:N_OT
12 : COM-
13 : BKOFF
14 : TGON
15 : COIN
16 : V_ZERO
17 : T_LT
18 : V_CMP
19 : S_RDY+
20 : S_RDY-
21 : S_ERR+
22 : S_ERR-
48 : DB_OUT
MAX 50mA

HCFA servo connection



Wiring points

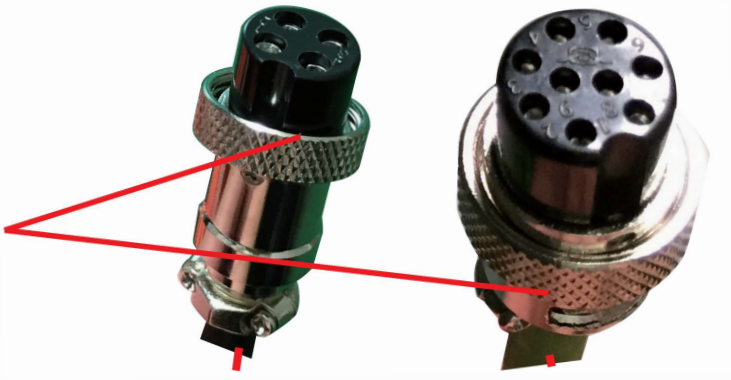
The control circuit power supply and the main circuit power supply should be wired from the same AC220V main power supply;

For user I/O cables, please use shielded twisted pair cables

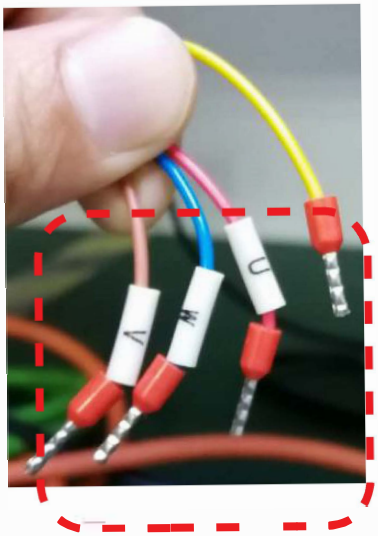
The length of the encoder cable should be less than 20M.

Note: For the debugging of the servo drive, please refer to the HCFA manual

Servo wiring and checking



Lock to prevent loosening



U, V, W order cannot be reversed

CChecking of wiring between laser head and driver

(1) Check the mark of the UVW cable, which should correspond one-to-one with the UVW on the plug.Ω.

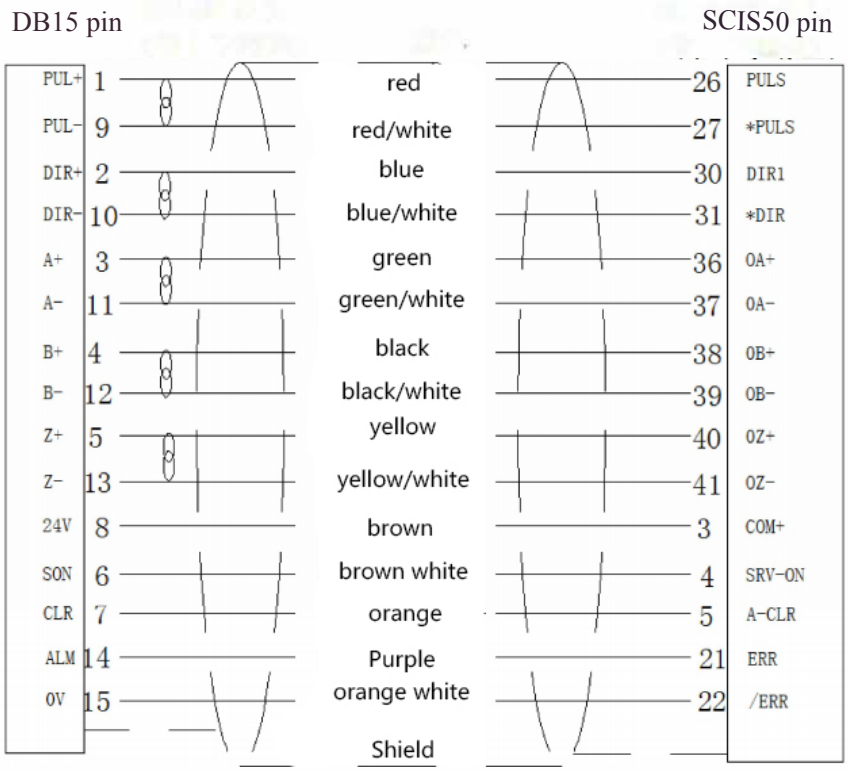
(2) The UVW cannot be connected to the ground wire and the casing, and the resistance between the UVW and the casing is greater than 5MΩ.
Test conditions: one end of the cutting head is connected, and one end of the driver is not connected.

(3) The resistance between UVW electrodes is about 20Ω. If the resistance is 0 (short circuit) or the multimeter shows infinity (open circuit), it is regarded as abnormal.
Test conditions: one end of the cutting head is connected, and one end of the driver is not connected.

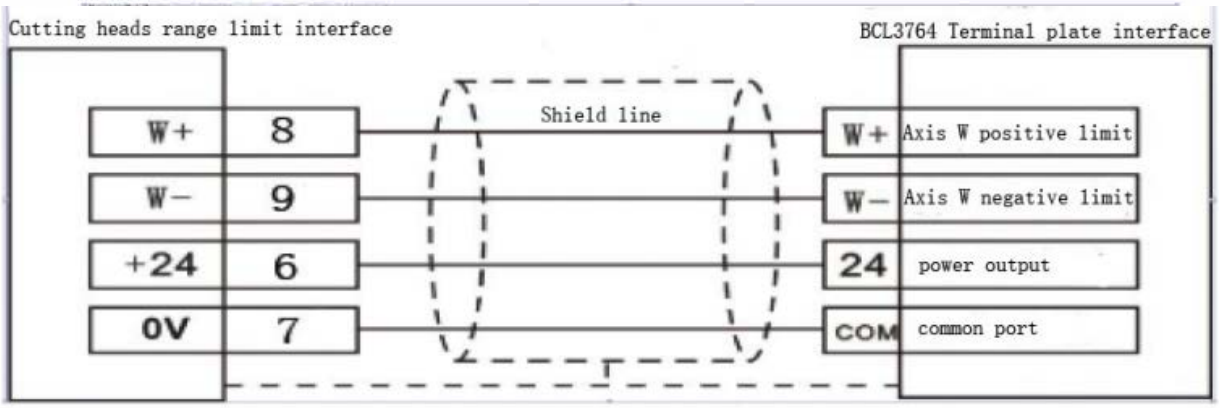
(4) Ground (very important).

(5) When connecting the aviation plug, be sure to follow the steps below:
Step 1: Use an air gun to blow off the water, oil, dust and other debris in the air port. Step 2: Tighten the male and female headers of the aerial plug.
Step 3: Use masking tape or electrical tape to wrap the air plug to prevent moisture, oil and dust from entering the air plug.

FSCUT2000A laser cutting control system BCL3764 terminal board w-axis DB15 servo control interface connection HCFA servo driver 50P interface definition



Cutting head focus adjustment range stroke limit switch interface definition



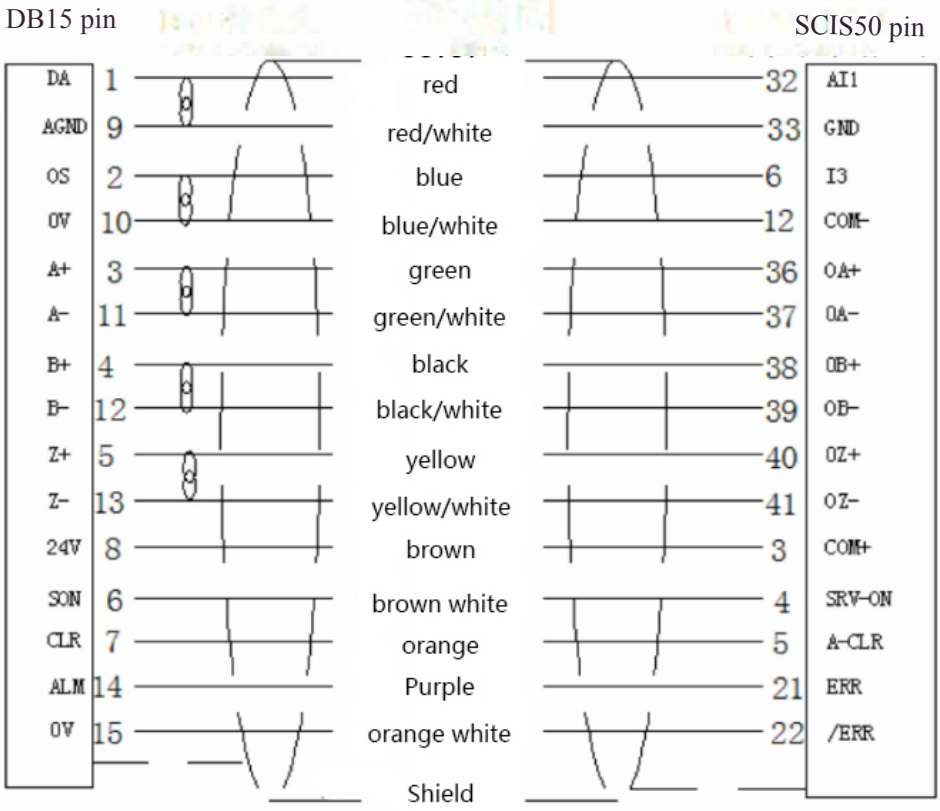
Parts of parameter list, subject to actual using and HCFA servo instruction.

NC30A parameter

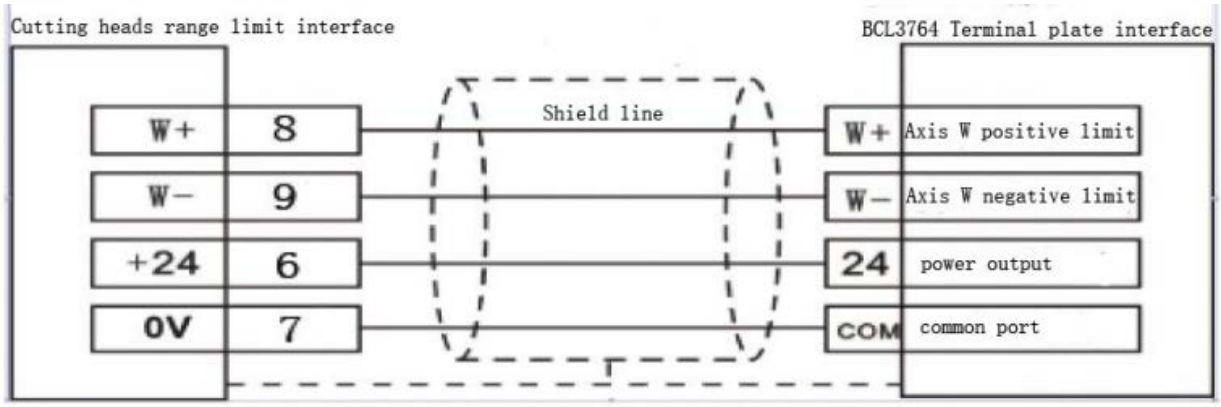
parameter	value	parameter	value	parameter	value
P0. 00	1	P0. 08	10000	P03. 10	600
P0. 01	0	P0. 14	2500	P06. 40	80
P0. 03	14	P03. 09	600		

Note: 1.Definitions of servo driver and servo motor connector shown in HCFA servo driver instruction; 2.Please use uniphase power, L connects to L1; N connects to L2.

FSCUT2000A laser cutting control system BCL3764 terminal board w-axis DB15 servo control interface connection HCFA servo driver 50P interface definition



Cutting head focus adjustment range stroke limit switch interface definition



Parts of parameter list, subject to actual using and HCFA servo instruction.

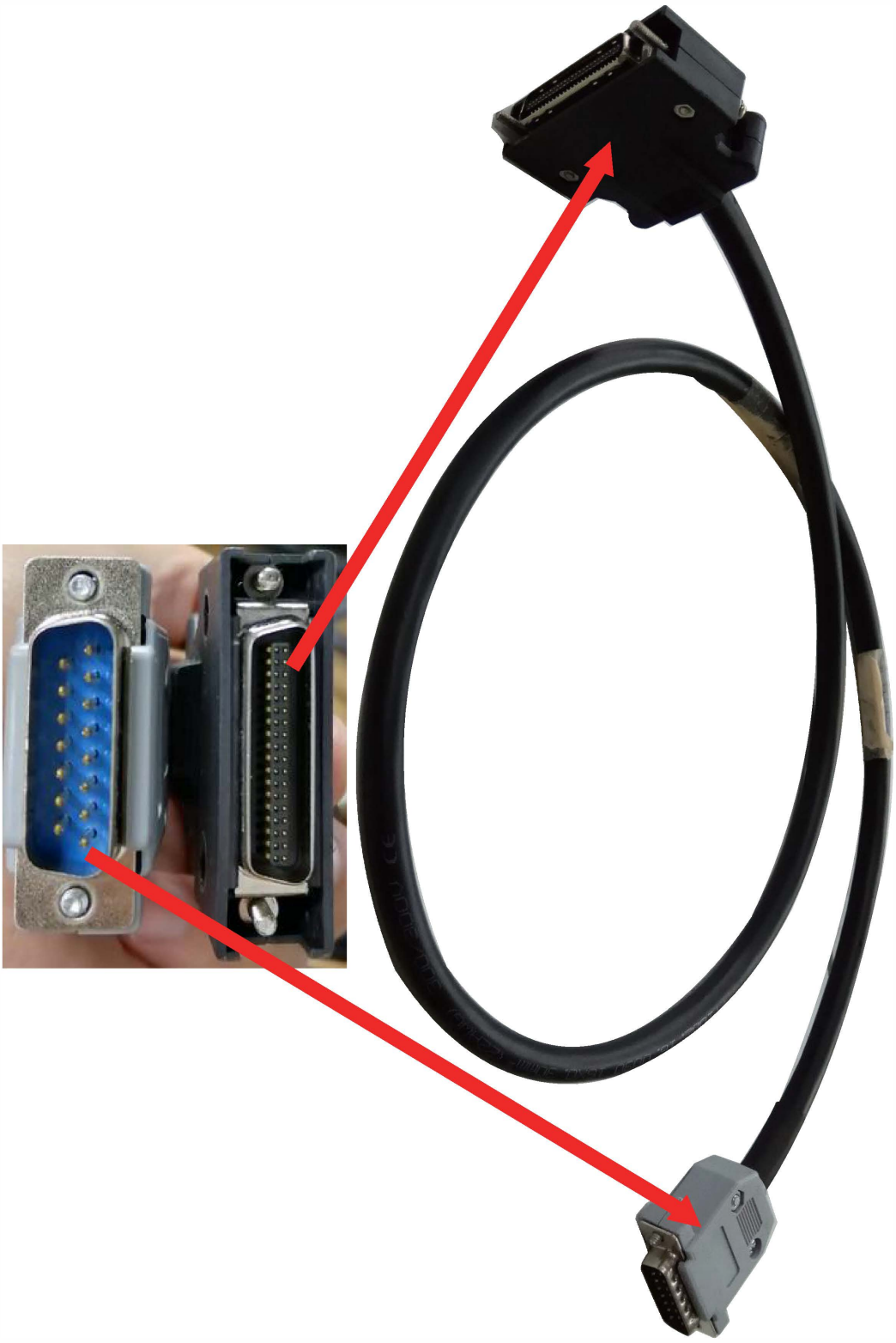
NC30A parameter

parameter	value	parameter	value	parameter	value
P0. 00	1	P0. 08	10000	P03. 10	600
P0. 01	1	P0. 14	2500	P06. 40	80
P0. 03	14	P03. 09	600	P04. 03	12

Note: 1.Definitions of servo driver and servo motor connector shown in HCFA servo driver instruction; 2.Please use uniphase power, L connects to L1; N connects to L2.

50P in plug

connects to drive CN1



15Pin plug connects to W-axis

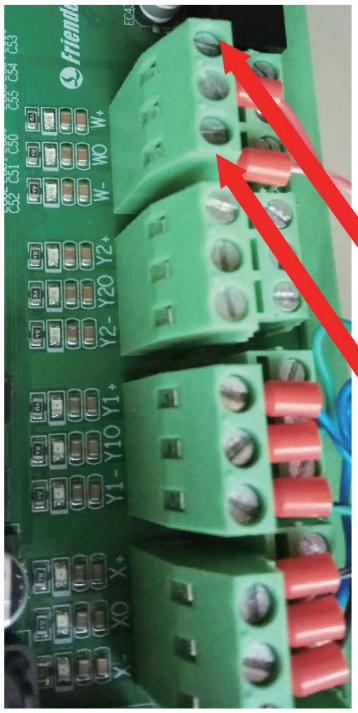
HCSERVO-X3
DRIVER
CN1
W axis
BCL3724 V2.1

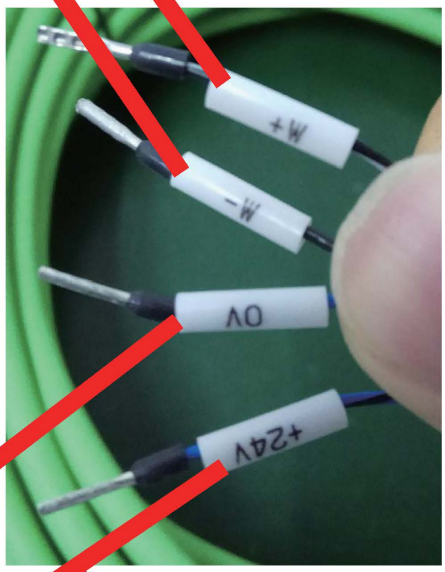
W

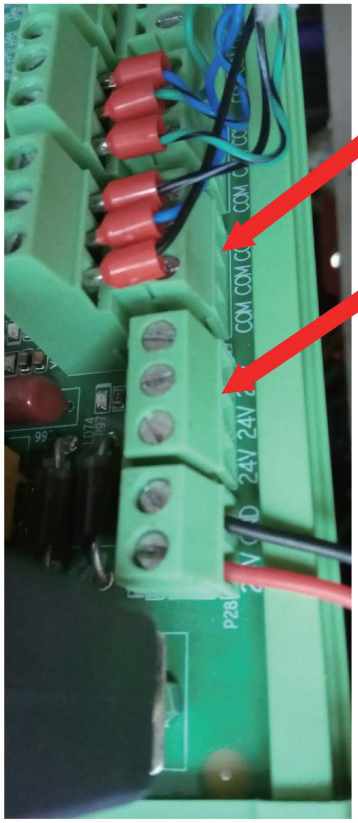
Y2

Y1

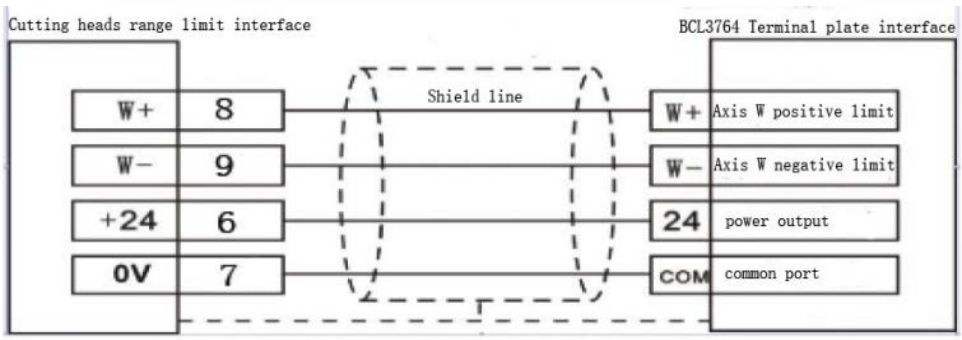
X







Definition of laser focusing adjustment range limitation switch connector



Limit signal inspection method:

Test condition

(1)Connect the DC24 power supply.
(2)Do not connect W+ W- first.
(3)The laser head scale 0 is in the middle of the window..

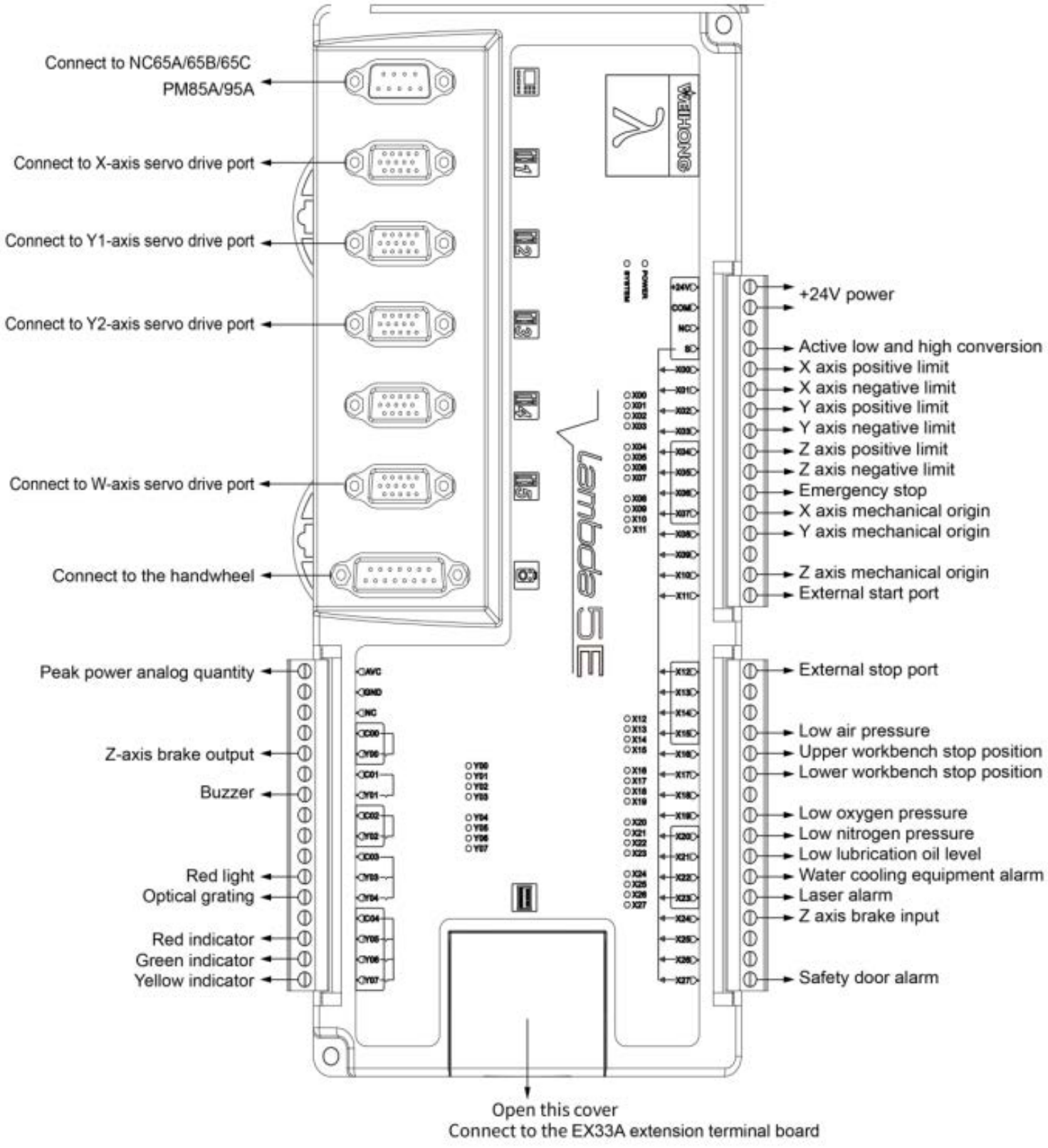
Steps

(1) Select the "DC voltage" gear for the multimeter, 200V or above.
(2) The red test lead is connected to the DC24V end, and the black test lead is connected to the W+ end (the side of the laser head line).
(3) If the displayed voltage value is greater than 18V, it is normal (theoretical value is 24V), and if it is less than 14V, it is abnormal (theoretical value is 0V).
(4) Jog in the positive direction, observe that the voltage changes, and the voltage difference is more than 12V, which is normal.
(5) The red test lead is connected to the DC24V end, and the black test lead is connected to the W- end (the side of the laser head line).
(6) If the displayed voltage value is greater than 18V, it is normal (theoretical value is 24V), and if it is less than 14V, it is abnormal (theoretical value is 0V).
(7) Jog in the positive and negative directions in turn, observe that the voltage has changed, and the voltage difference is greater than 12V, which is normal.
(8) Connect W+ W- to the corresponding port of the system expansion card.
(9) Open the control software, the limit logic high is normally closed. Jog the movement to the positive and negative limit and observe whether the system can detect the limit.
(10) The above is the detection method of the normally closed limit switch, and the opposite is true for the normally open type.

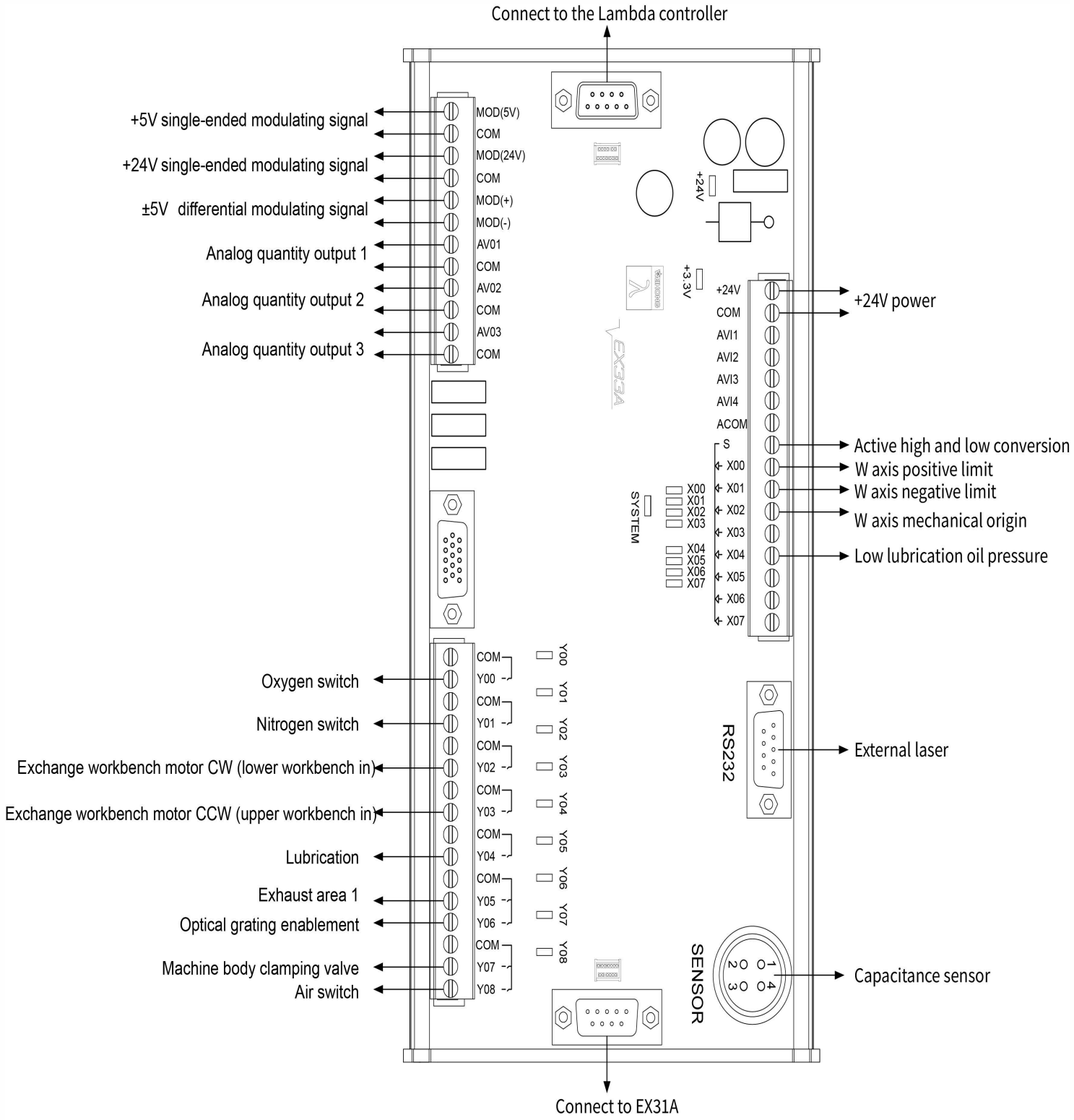
Weihong Introduction

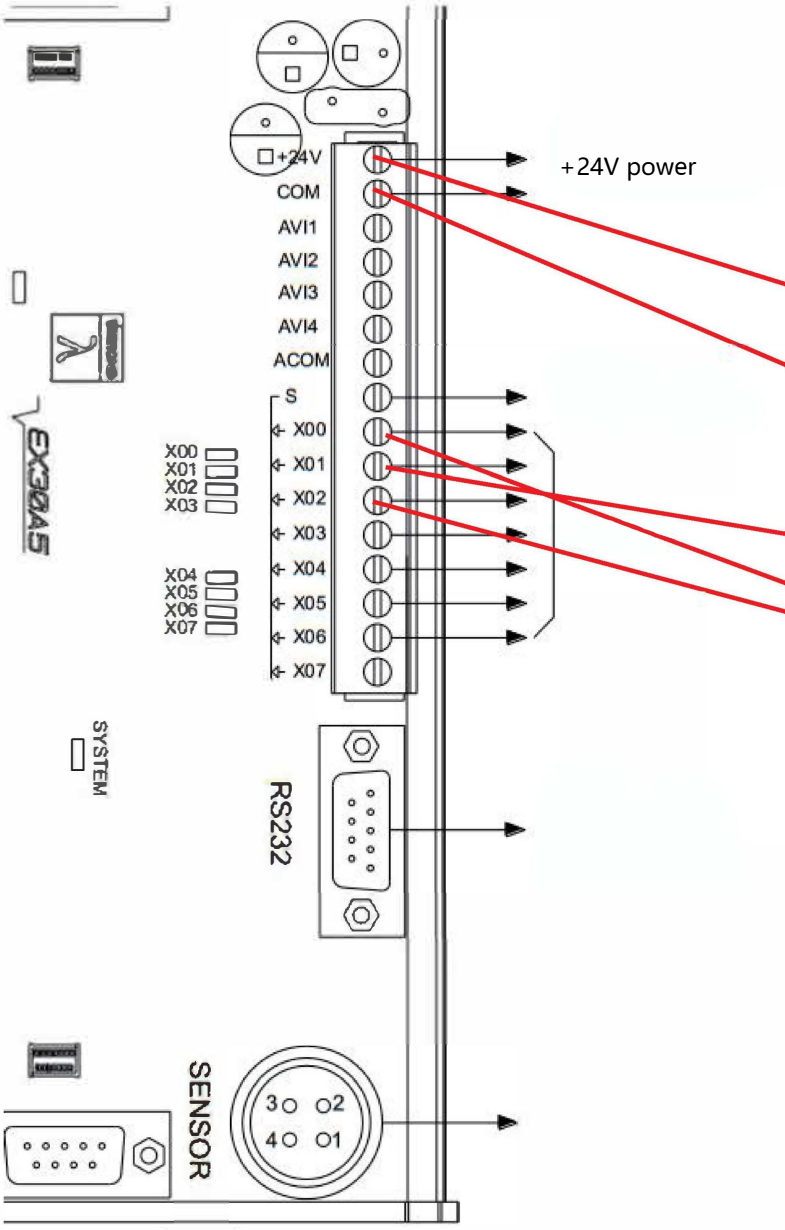
Weihong expansion board 1

Terminal board wiring diagramam

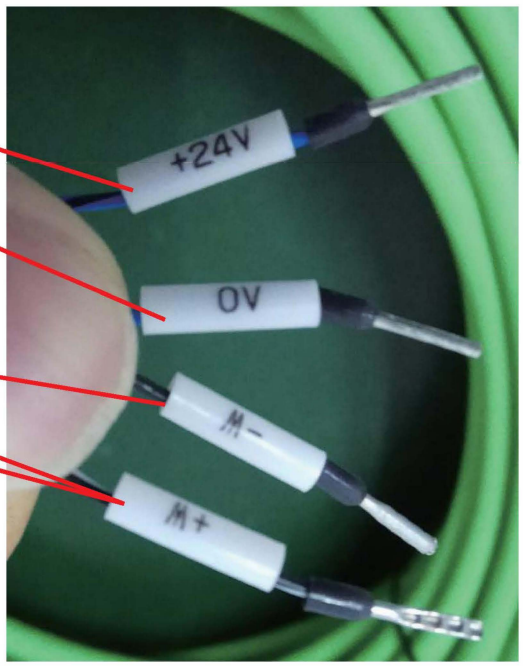


Weihong expansion board 2



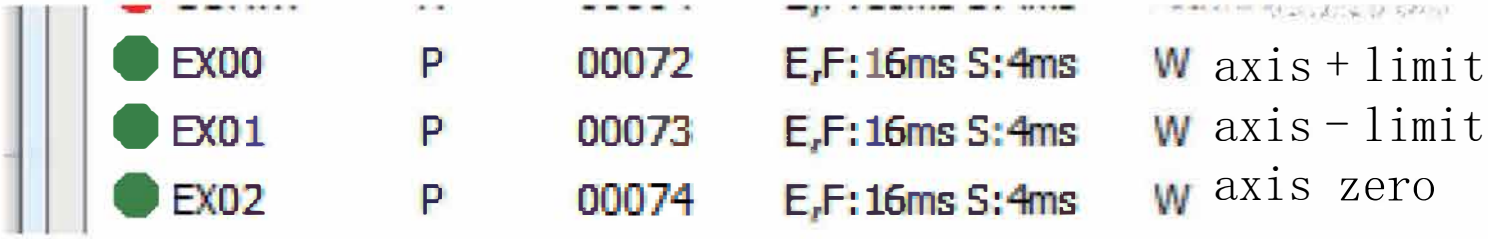


Please connect +24V to the "+24V" port and S port on the board.



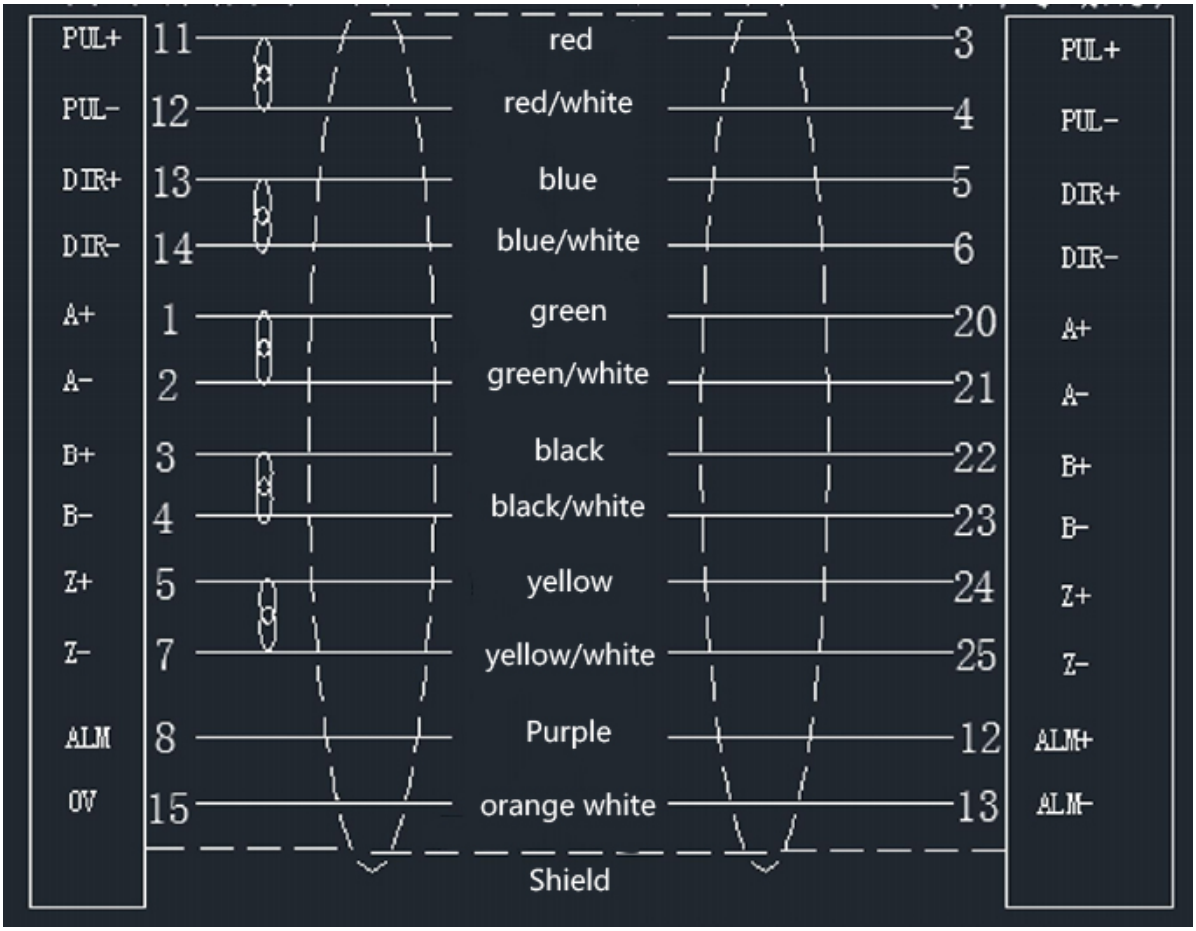
please connect W- with "x01", W+ with "x00", "x02"

Limit logic parameter configuration

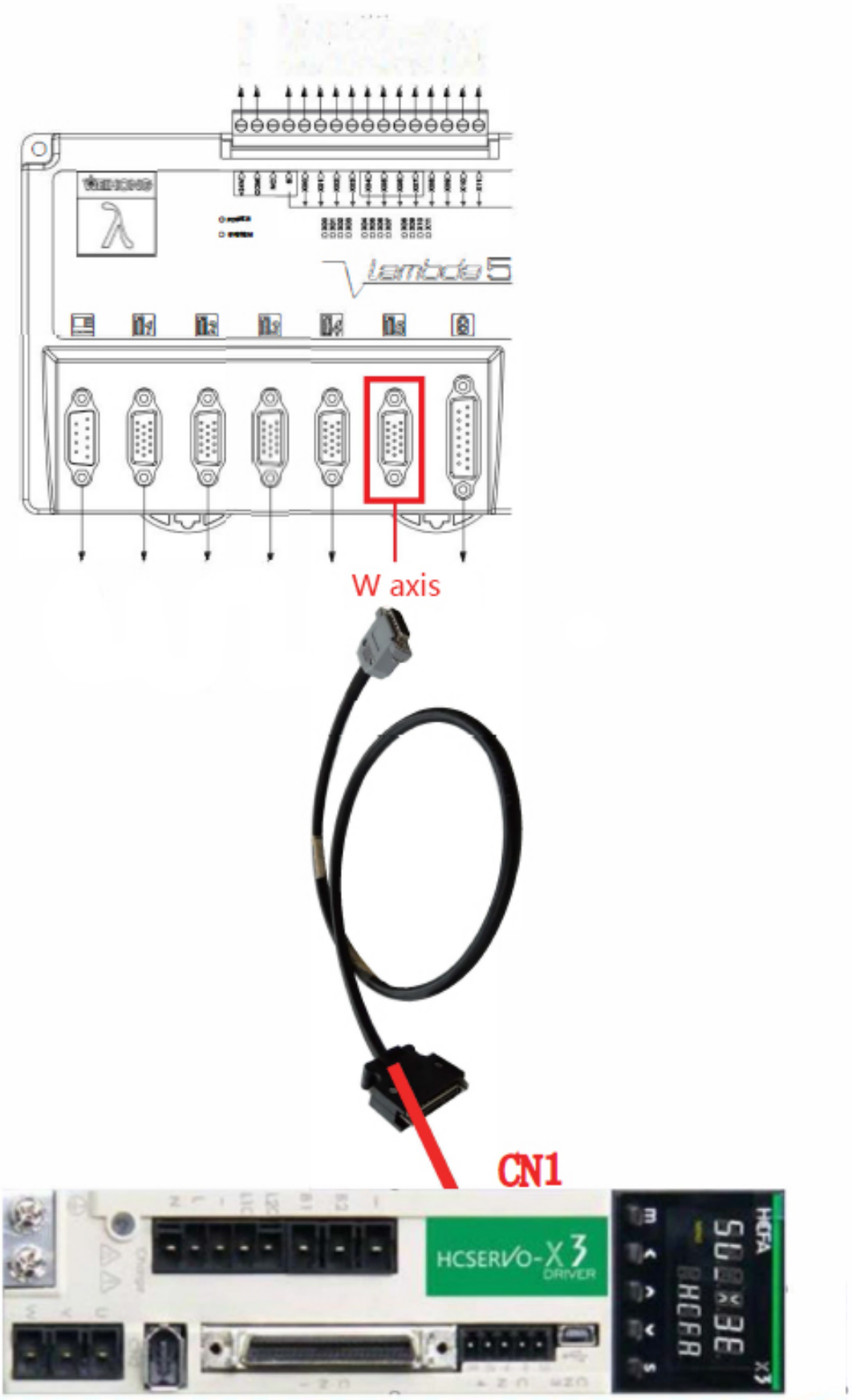


Connection of HCFA and Weihong communication line（NC30A))

Weihong 15P HCFA 50P

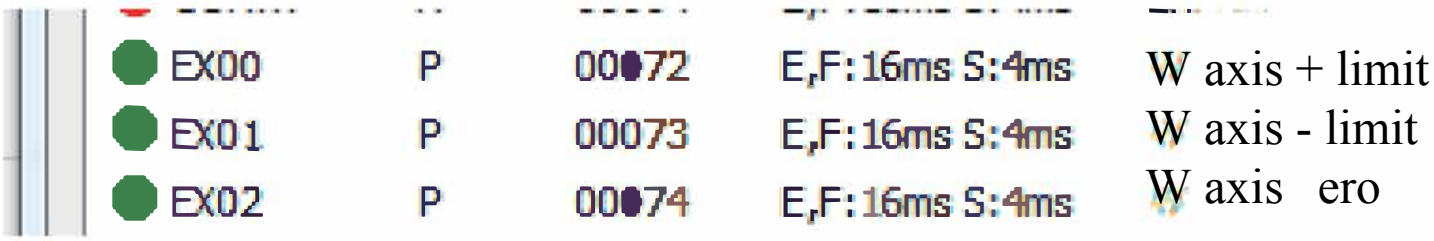


parameter	value	parameter	value	parameter	value
P0. 00	1	P0. 08	10000	P03. 10	600
P0. 01	1	P0. 14	2500	P06. 40	80
P0. 03	14	P03. 09	600		

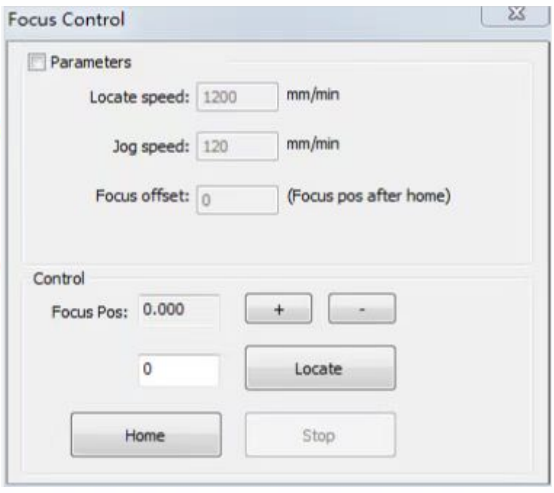

W axis
CN1
HCSERVO-X3
DRIVER
HCFA

Name	Value	Unit	Effective
1.0.3 W-axis			
Encoder Direction(W)	1		Immediately
Axis Direction(W)	1		Immediately
Pulse Equivalent(W)	0.001	mm/p	Immediately
Command Pulse Count Per Rev	10000		Immediately
Feedback Pulse Count Per Revo	65536		Immediately
Upper Limit of Soft Limit (W)	100	mm	Immediately
Lower Limit of Soft Limit (W)	-100	mm	Immediately
Enable Soft Limit Protection (W	Yes		Immediately
Max Speed of Axis (W)	48000	mm/min	Immediately
Check Axis Encoder Error(W)	No		Immediately
Encoder Static Tolerance(W)	0.1	mm	Immediately
Encoder Dynamic Tolerance(W)	40	mm	Immediately

Limit logic parameter configuration

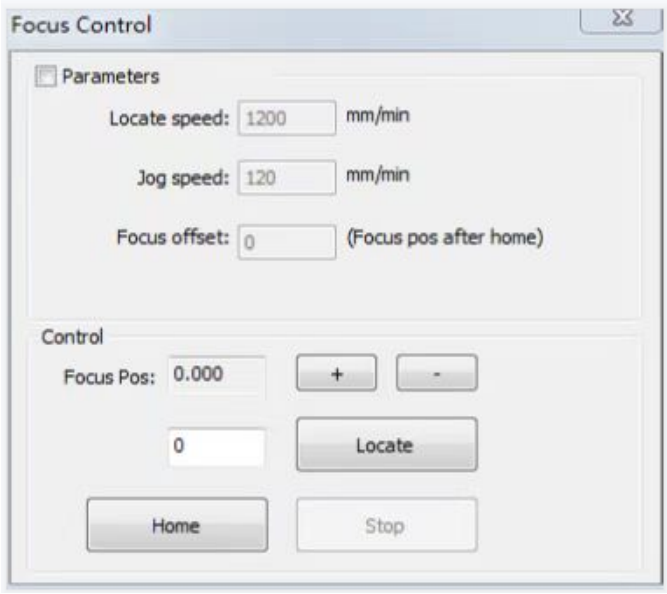


Name	Value	Unit	Effective
1.1.4 Origin Setting(W)			
Use Z Phase Signal(W)	No		Immediately
Coarse Positioning Direction(W	1		Immediately
Coarse Positioning Speed(W)	600	mm/min	Immediately
Fine Positioning Speed(W)	60	mm/min	Immediately
Retract Distance(W)	2	mm	Immediately
Retract Speed(W)	200	mm/min	Immediately
Min Distance between Coarse a	0.5	mm	Immediately
Enable Latch(W)	Yes		Immediately



3.4.0 General Parameters			
Enable Exchange Workbench	Yes		Immediately
Control Mode at Workbench Ex	1		Immediately
Exchange Workbench by jog	No		Immediately
Workbench released machining	No		Immediately
Protect the machine tool when	Yes		Immediately
Delay after Exchanging Stoppin	2000	ms	Immediately
3.4.1 Z-axis Travel			
Use Different Lower Limit for W	No		Immediately
Soft Limit Lower Limit for Uppe	-300	mm	Immediately
Soft Limit Lower Limit for Lowe	-500	mm	Immediately
Z-axis docking position of the u	-10	mm	Immediately
Z-axis docking position of the l	-10	mm	Immediately
3.4.2 Clamping Device			
Delay as Signal to Clamp Machi	Yes		Immediately
Delay to Clamp Machine Bed	3000	ms	Immediately
Delay as Signal to Release Mac	No		Immediately
Delay to Release Machine Bed	3000	ms	Immediately
3.4.3 Protection Door			
Enable Protection Door	No		Immediately
3.5 Focus Control			
Enable Focus Control	No		After Restart
Focus control mode	0		After Restart
Foucs Reached Check Delay	1000	ms	Immediately
Go Home Check Delay	20	s	Immediately

Name: Enable Camera
Value: No
Desc.: Whether to enable camera.



Appendix 1: Common electrical faults and solutions

Fault code	Fault cause	Troubleshooting and handling methods
Err.007	Encoder initialization failed	Check the encoder wiring, or replace the encoder cable
Err.013	Encoder communication exception	1. Check the encoder wiring, or replace the encoder cable 2. Check that the encoder is well grounded
Err.017	Torque saturation timeout	Check that the UVW is disconnected
Err.018	Control power underpressure	1. Check the input power supply and wiring 2. Replace the drive
Err.019	Speed failure	1. Check the UVW and the encoder wiring 2. Check the drive & motor
Err.020	Overvoltage	Check the input power supply voltage
Err.043	The position deviation is too large	Check whether the motor line is disconnected