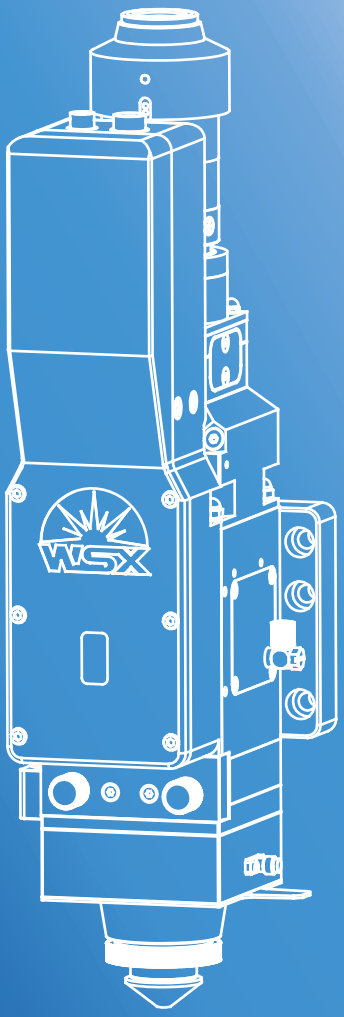


Auto Focusing Fiber Laser Cutting Head
NC30E
User Manual

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

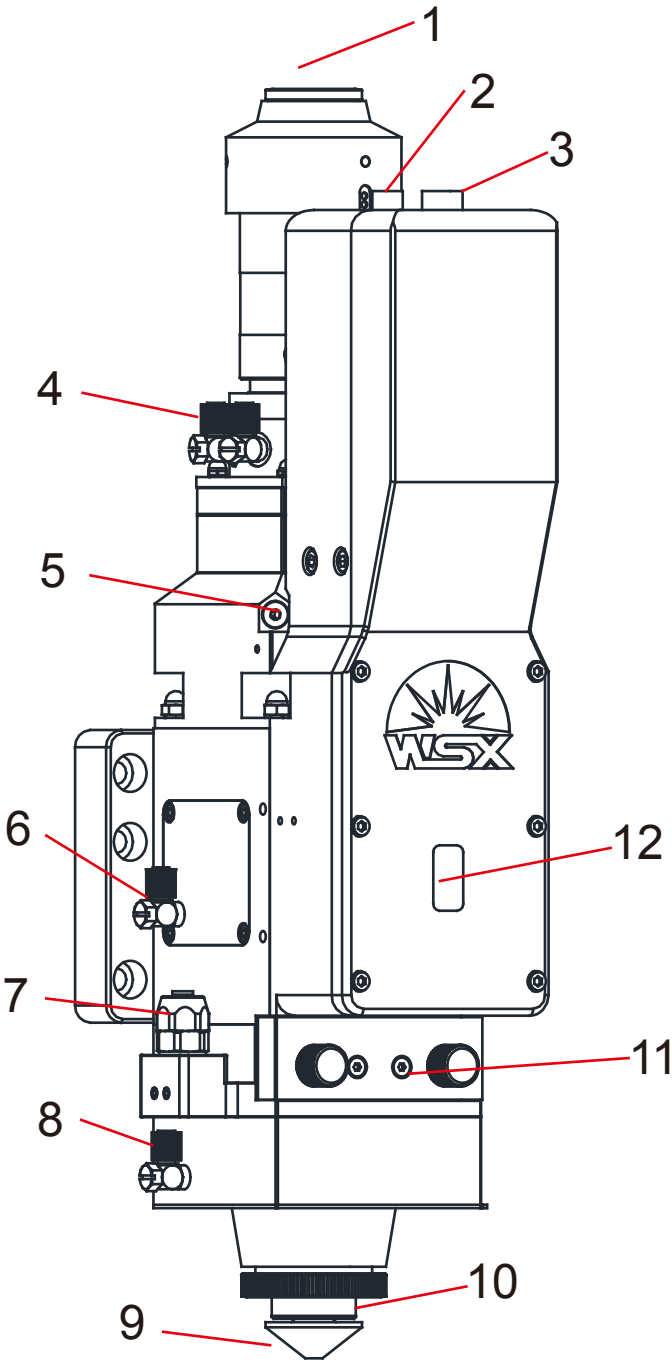
Correct wiring, normal electric, good earthing with smoothing and voltage stabilizing circuit.

Steps

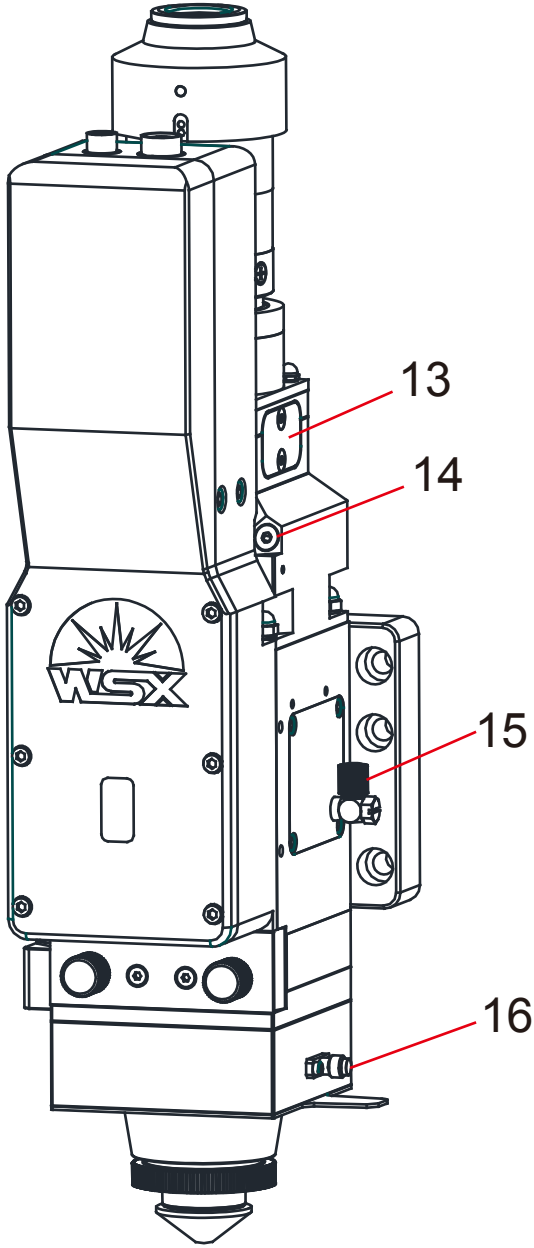
1. Adjust soft limitation to -100~100
2. Set inching speed to 1mm/s
3. Inching at positive direction until reach positive limitation
4. Inching at negative direction until reach negative limitation
5. After confirming effectiveness of positive & negative limitation, set back to origin
6. Restore soft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

Instruction

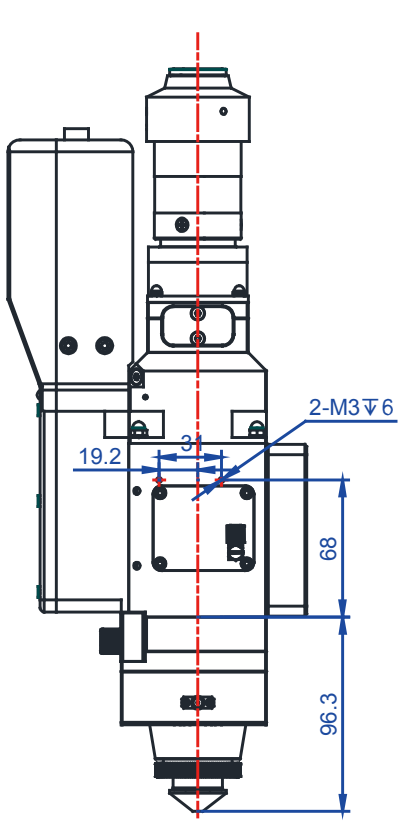
1. Make sure manual inching can find limit swicth
2. Reduce manual speed to ensure that invalid limitation will not cause structural damage.
3. Make sure wire connection of negative limitation swicth is correct and signal is normal
4. It's allowed to restore to origin automaticly only after confirming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

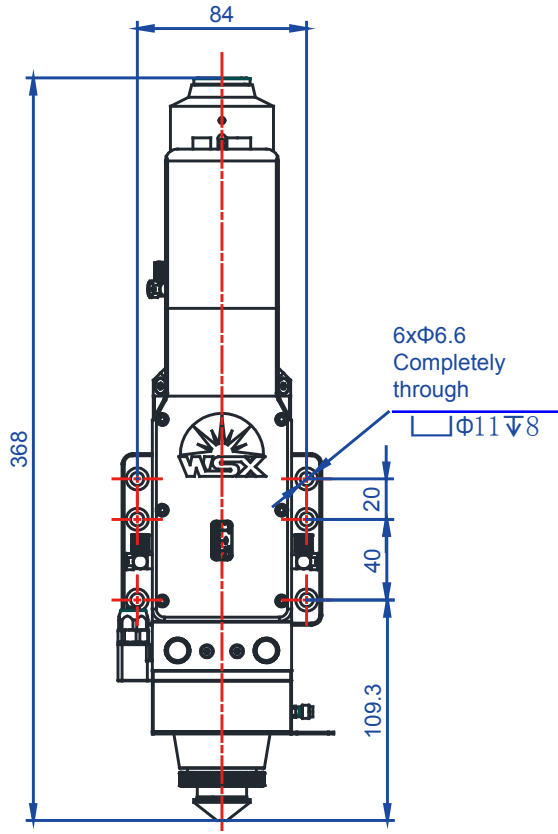


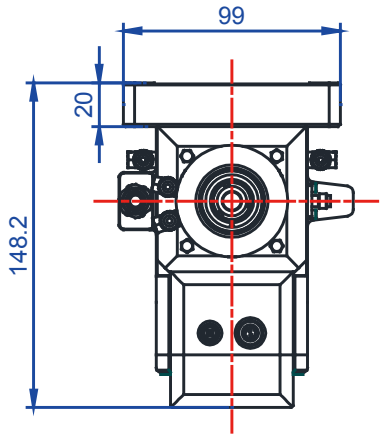
1. Fiber Access (QBH-F8)
2. Triphase power wire
3. Encoder&Limitation Signal
4. Cooling Water Connector (WJT-001)
5. Horizontal adjustment screw (LC01-129T3)
6. Cooling Water Connector (WJT-008)
7. Cutting Gas Connector (WJT-005)
8. Cooling Gas Connector (WJT-002)
9. Nozzle (WPCT-S/D-diameter)
10. Ceramic Ring (WTC-01A)
11. Bottom protective window (D30*5)
12. Focus Scale

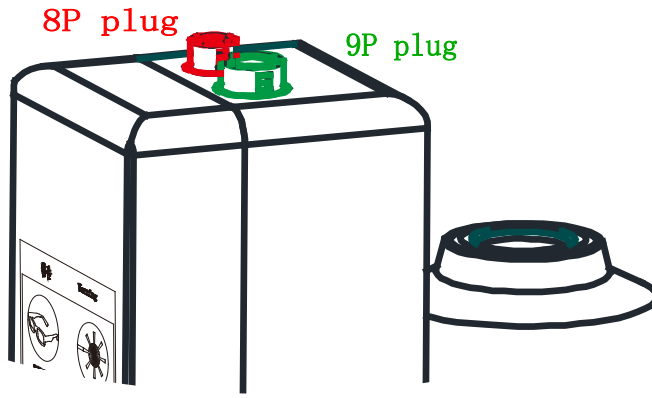


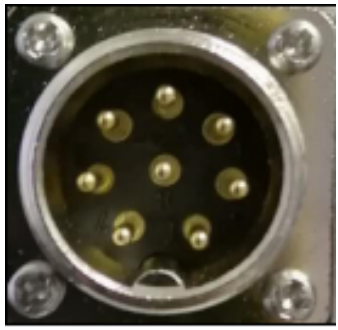
13. Top protective window (D22.35*4)
14. Horizontal adjustment screw
15. Cooling Water Connector
16. Sensor Signal connector (SMKF1 rhombus 2h)


2-M3↧6
19.2
3
68
96.3


84
368
6xΦ6.6
Completely
through
⌴Φ11↧8
20
40
109.3


99
20
148.2





No.	definition
1	shield
2	VCC
3	EGND
4	EA+
5	EA-
6	EB+
7	EB-
8	null

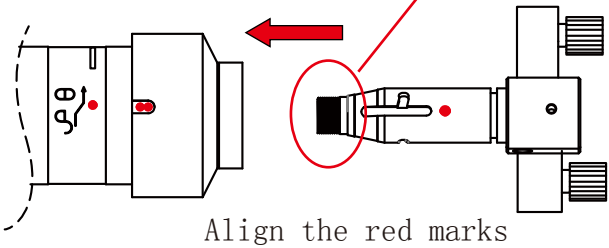
Hybrid Servo Code 8-core wire

No.	definition
1	null
2	A+
3	A-
4	B+
5	B-
6	+24V
7	0V
8	W+
9	W-

Hybrid servo power and limit 9-core wire

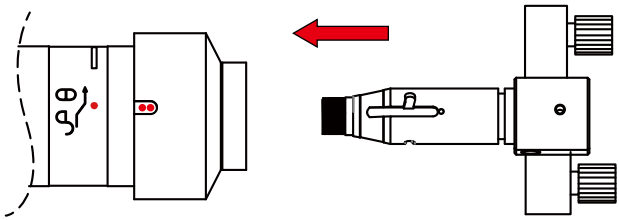
1. Place the laser head and optical fiber connector in a horizontal state;
2. Clean the QBH and fiber connector with clean rod and ethyl alcohol.

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.

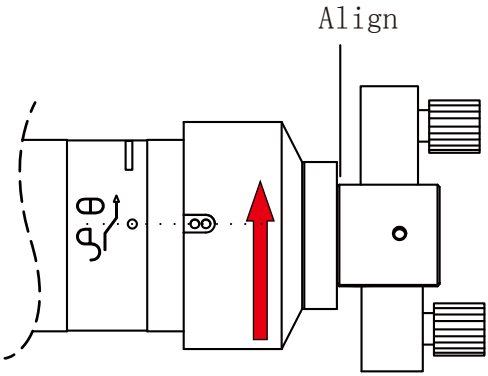


Align the red marks

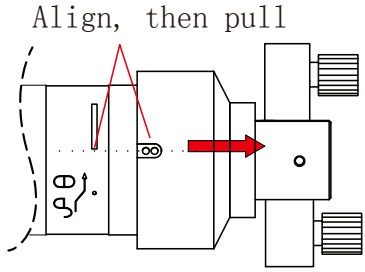
3. Insert the fiber connector into QBH gently;



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

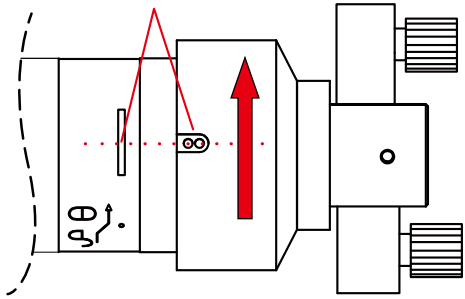


5. Then pull the turning rim as the picture below;



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.

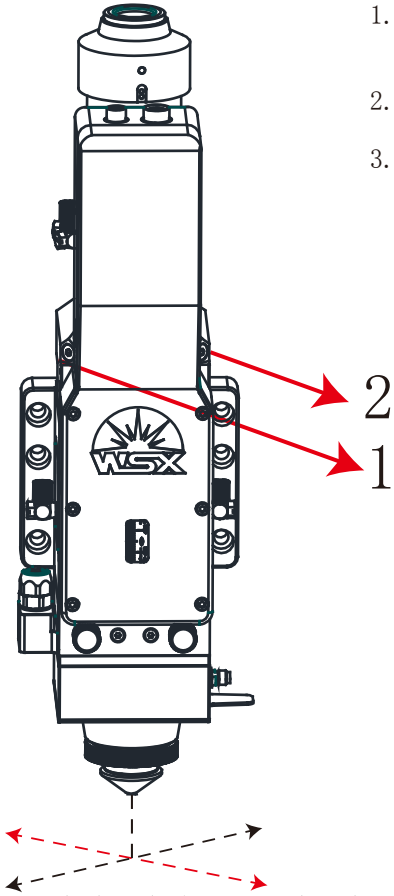


-

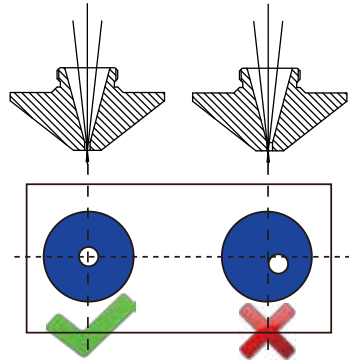
Note: Do not twist vigorously , it may cause damage to precision machinery.

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.

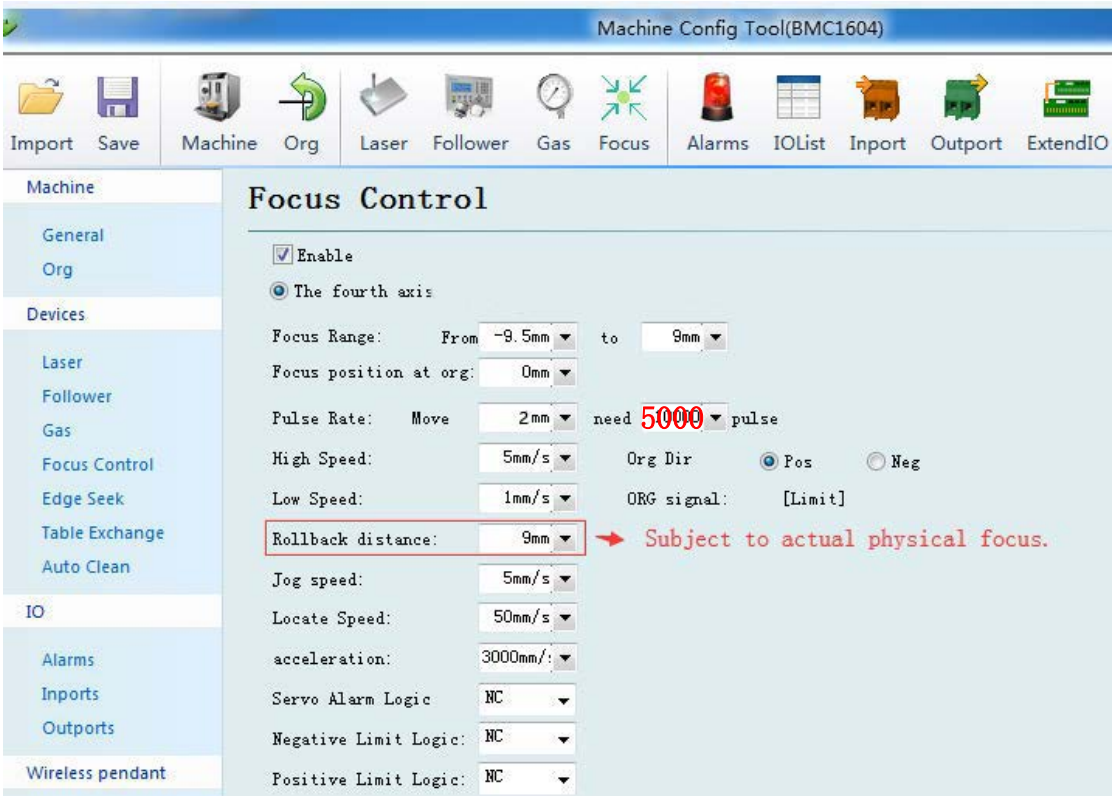


beam passes through the center (correct)

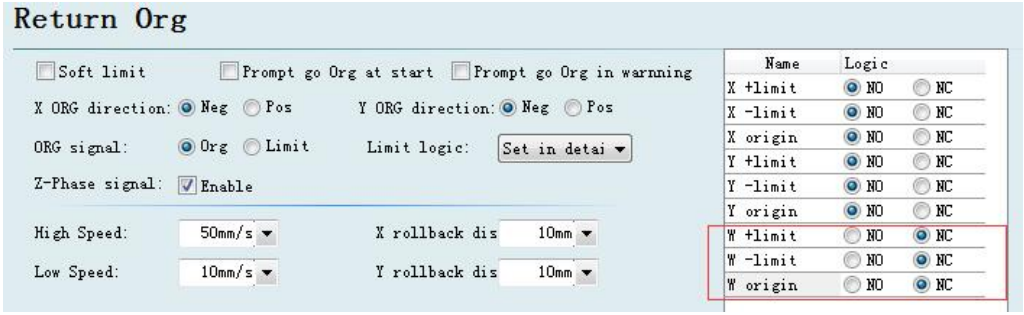
beam does not pass through the center(incorrect)

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

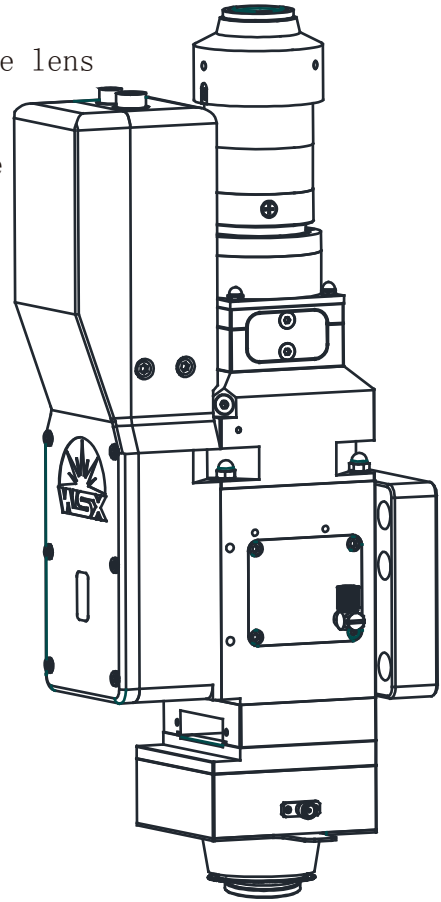
Replace

Adjust the lens

Maintenance

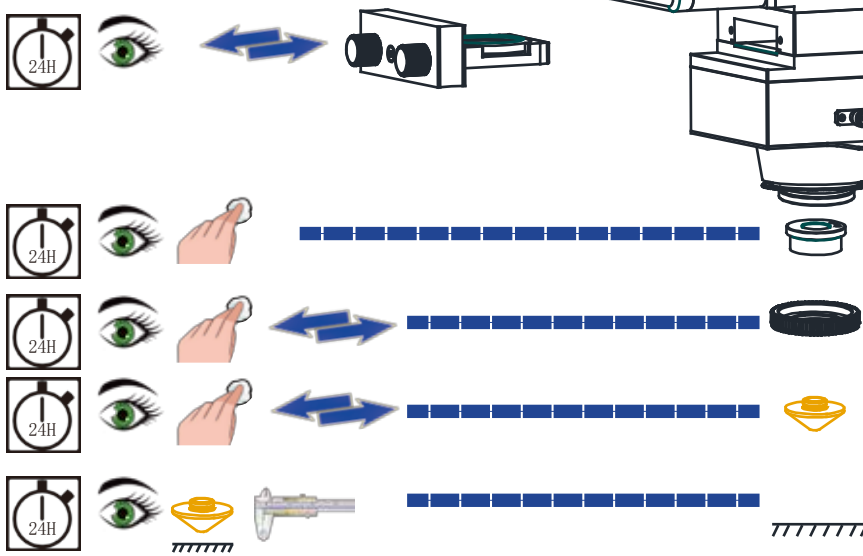
Maintenance Period

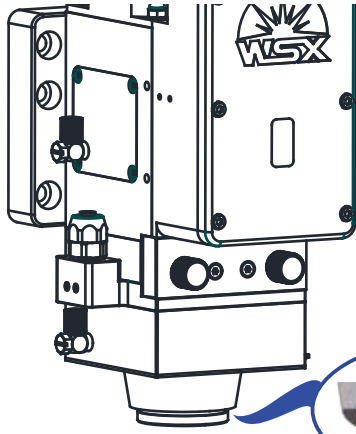
Calibration



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.

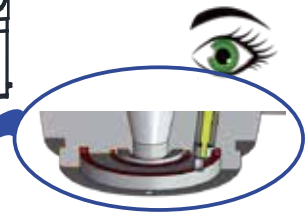




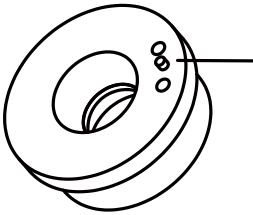
POWER

COOLING GAS

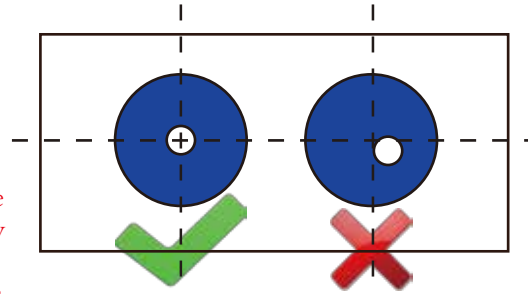
CUTTING GAS



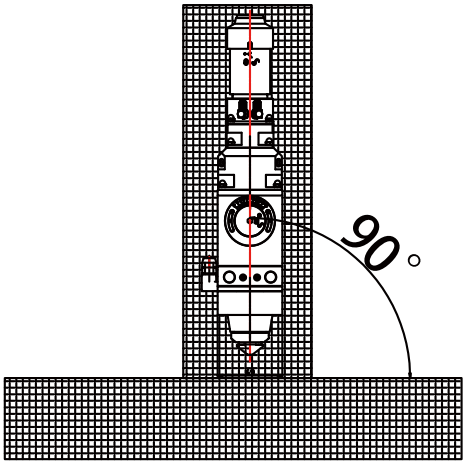
Note:
Before maintenance, clean away the dust on the surface of the head with compressed air; then use clean cloth and ethyl alcohol to clean the related parts.

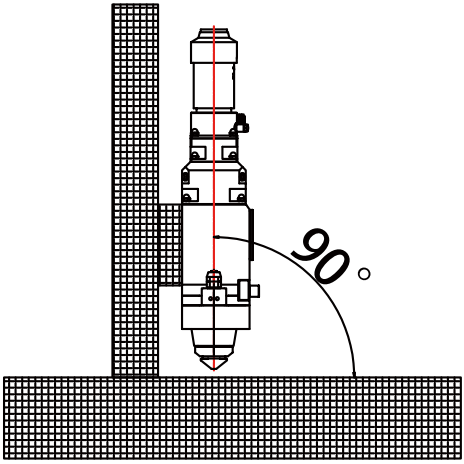


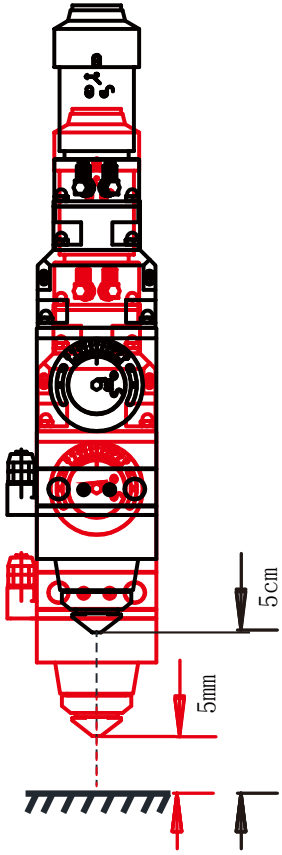
Note:
When the maintenance of ceramic ring & nozzle is finished, it is necessary to calibrate and test the beam to see whether it is in the center.



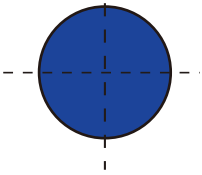
center checking



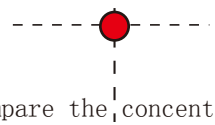




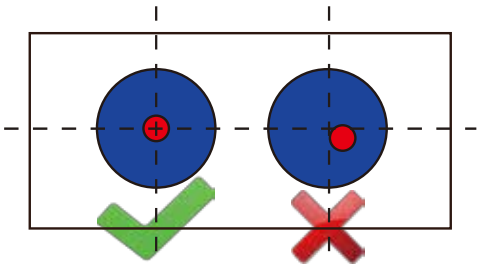
Step 1: set the laser power to 500W, make a short burst at the height of 5cm from the plate to burn a round scorch on the plate;

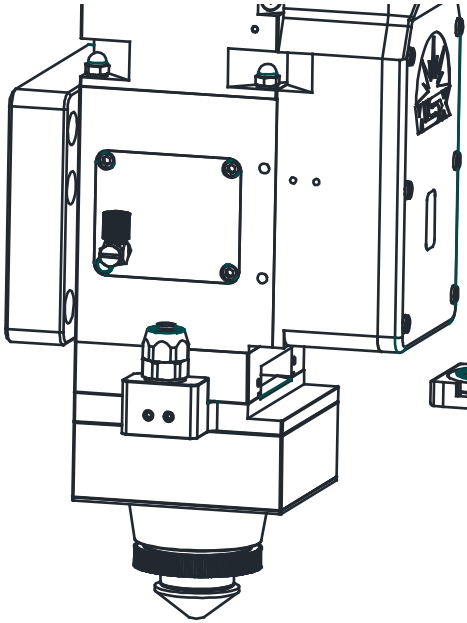


Step 2: set the laser power to 100W, make a short burst at the height of 1~5 cm from the plate to burn a round scorched spot on the plate;

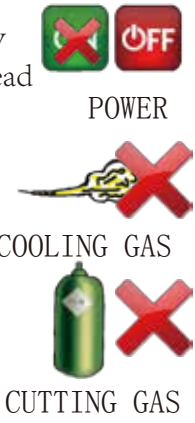


Step 3: compare the concentricity;

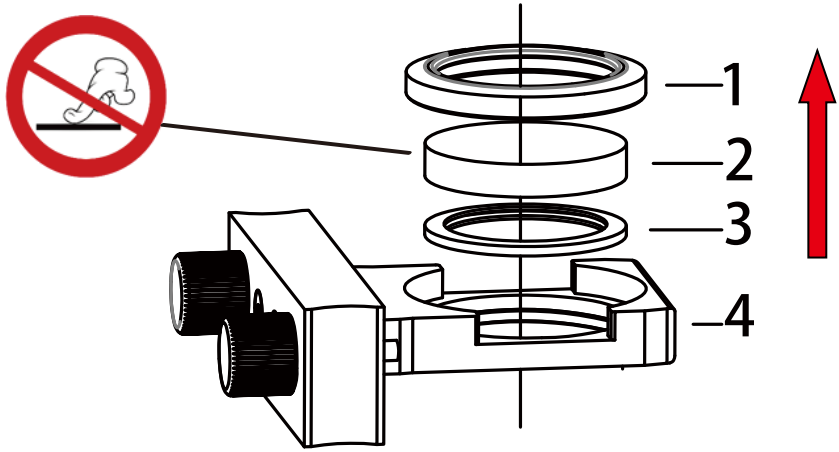




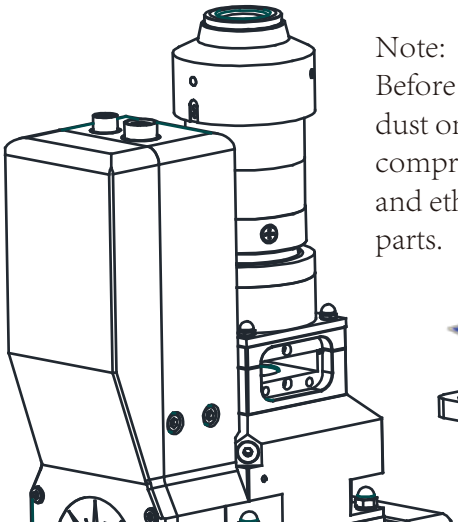
Note:
Before maintenance, clean away the dust on the surface of the head with compressed air; then use clean cloth and ethyl alcohol to clean the related parts.



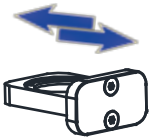
Before maintenance, record the position and orientation of the lens; After maintenance, assemble as the record



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.



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.

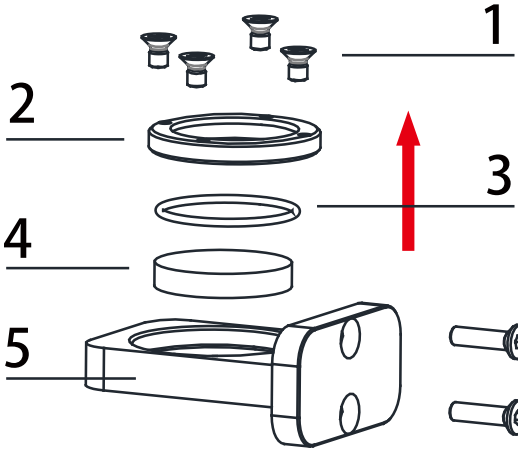


POWER

COOLING GAS

CUTTING GAS

Beware of Dropping

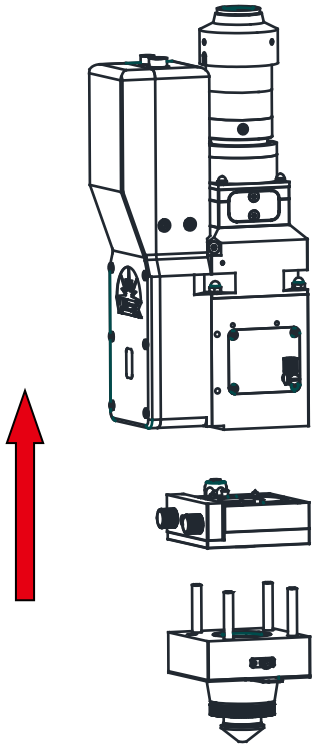


Before maintenance, record the position and orientation of the lens; After maintenance, assemble as the record

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.

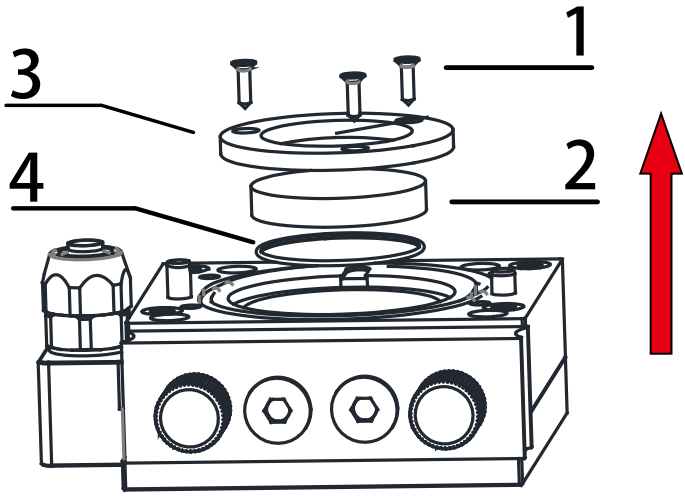
Before maintenance, record the position and orientation of the lens; After maintenance, assemble as the record

POWER

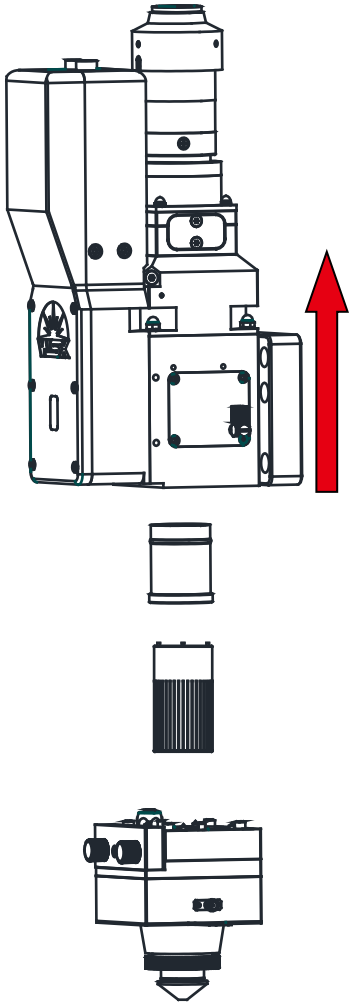
COOLING GAS

CUTTING GAS

Beware of Dropping



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

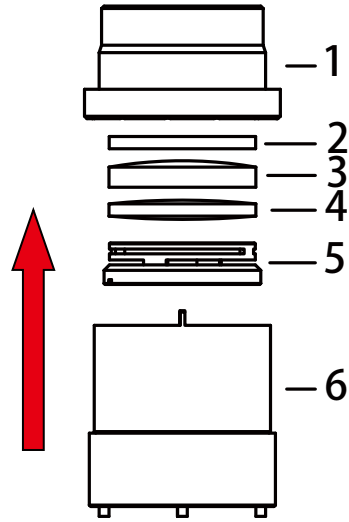


Note:
Before maintenance, clean away the dust on the surface of the head with compressed air; then use clean cloth and ethyl alcohol to clean the related parts.

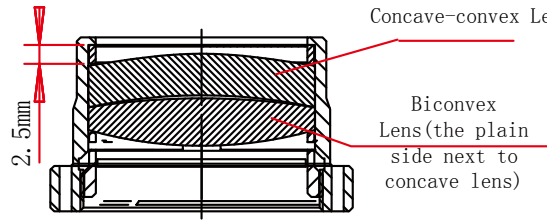
POWER

COOLING GAS

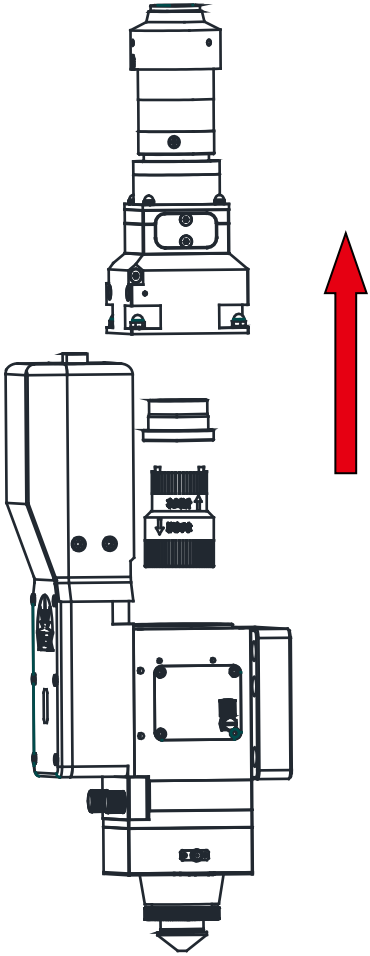
CUTTING GAS

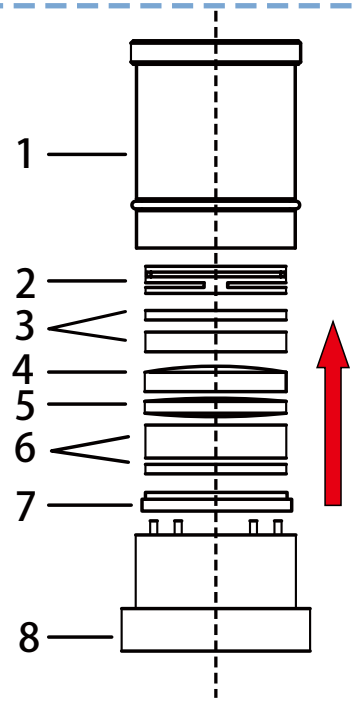


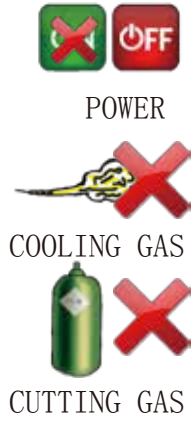
1. Before maintenance, record the position and orientation of the lens; After maintenance, assemble as the record
2. Twist to the end and then turn backward 1/5 circle to prevent the lens being affected by temperature variation.



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.

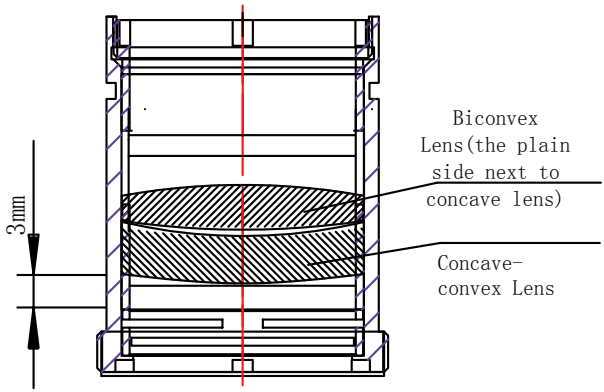






1.Before maintenance, record the position and orientation of the lens; After maintenance, assemble as the record

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



Leadshine driver wiring diagram

Serial communicati on port

Pulse control 26pin interface

Encoder 15pin interface

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:

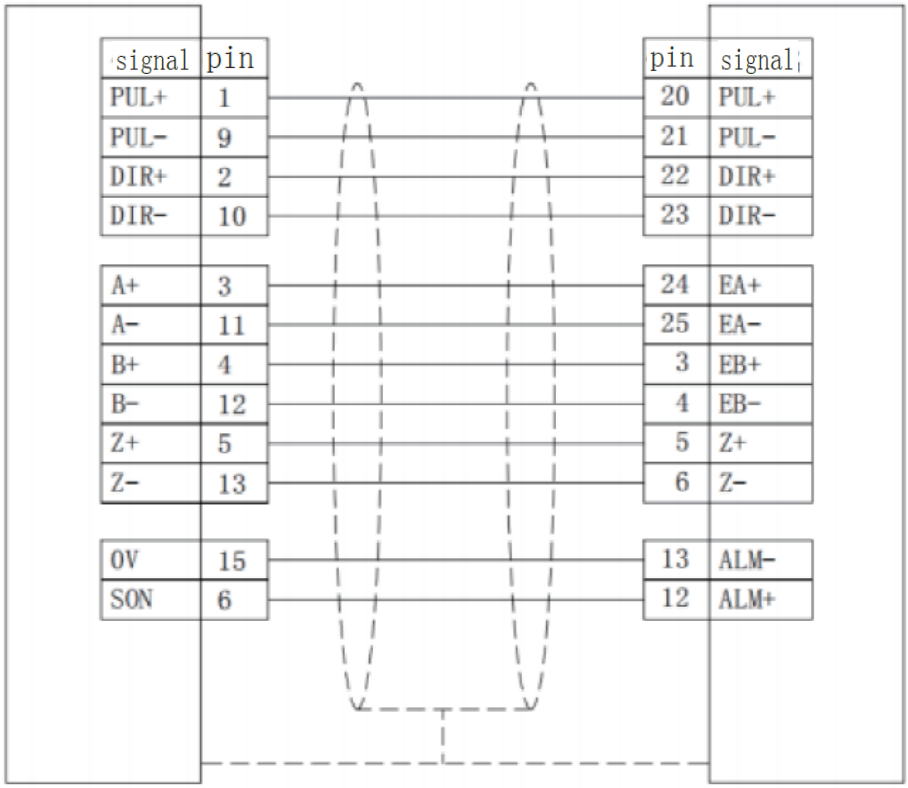
Step 1: Use an air gun to blow off the water, oil, dust and other debris in the aviation plug.

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

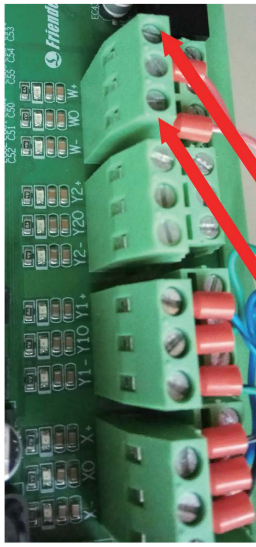
Step 3: Use masking tape or electrical tape to wrap the air plug to prevent moisture, oil and dust from entering the aviation plug.

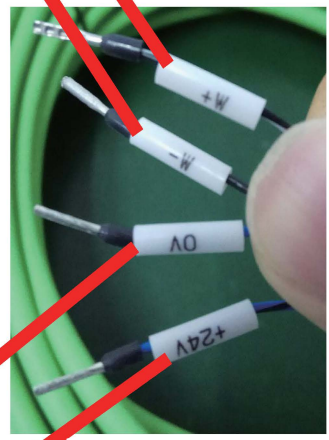
FSCUT2000A laser cutting control system BCL3764 terminal board W-axis DB15 servo control interface connection to Leadshine servo drive 26P interface definition

FSCUT DB15 pin **Leadshine servo drive 26P**

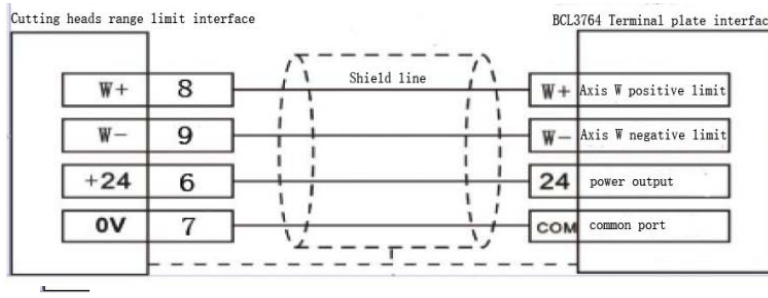


No.	parameter	value
1	7	5000
2	19	0
3	42	1





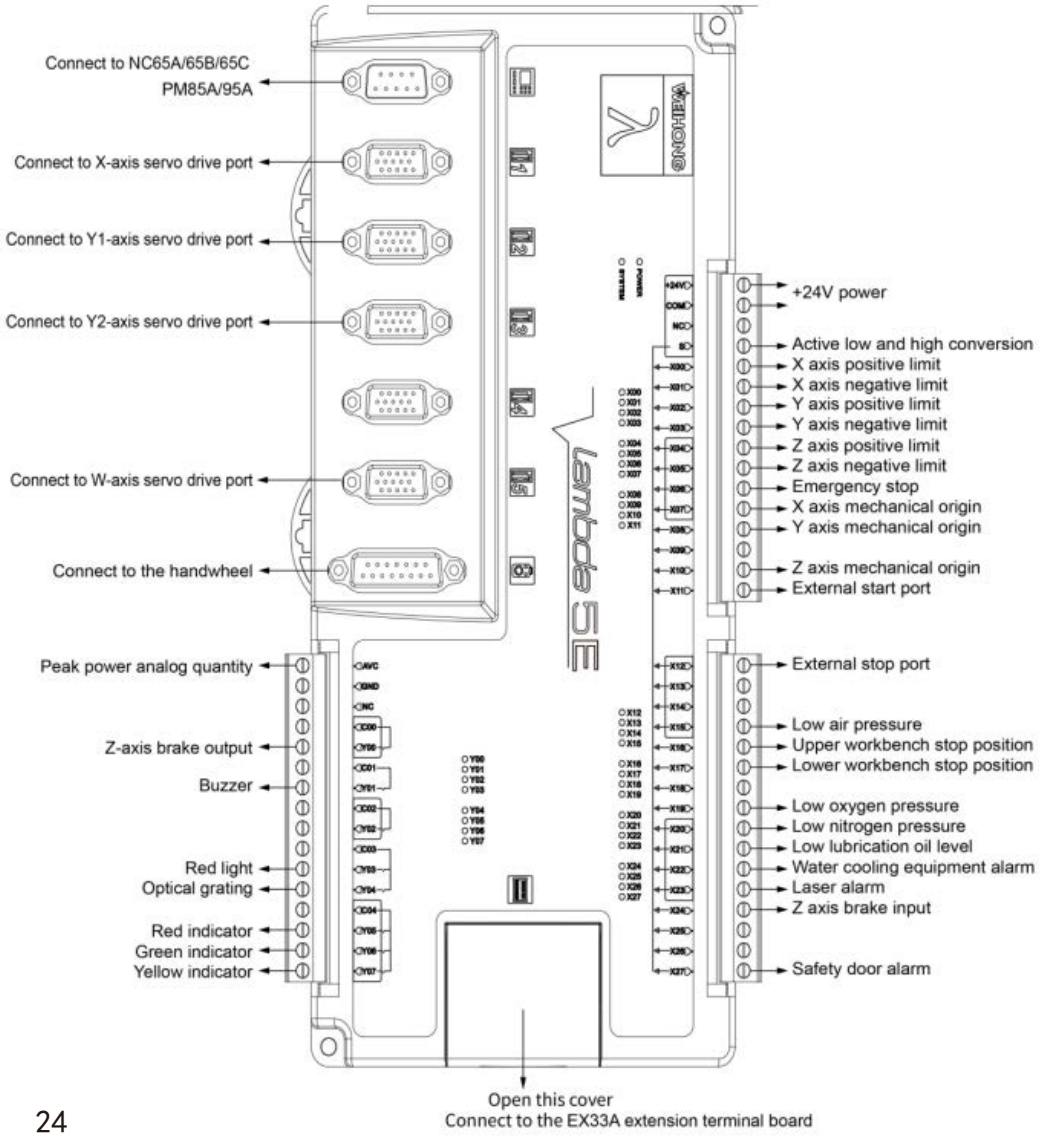
Definition of laser focusing adjustment range limitation switch connector



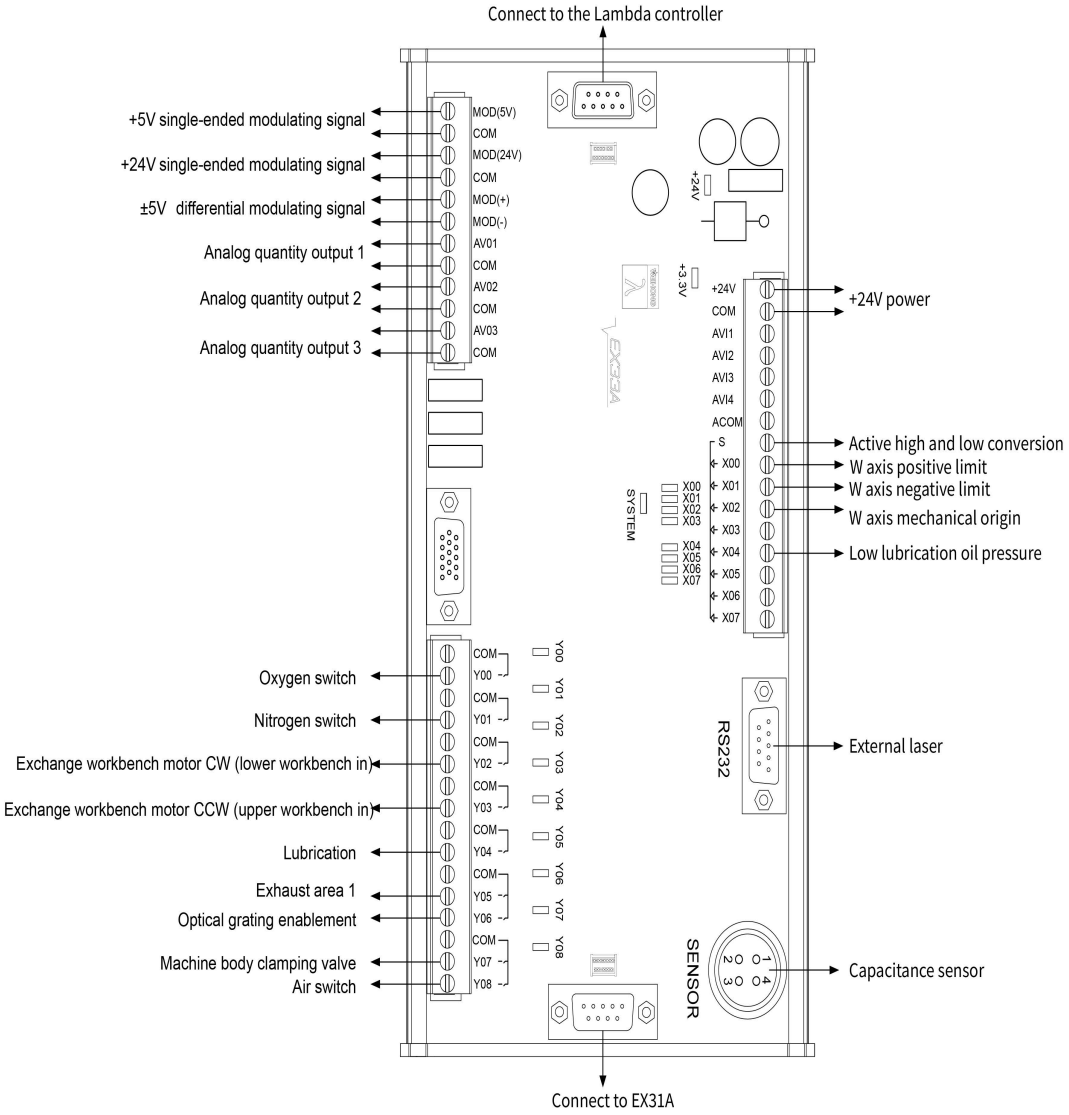
AlphaT Introduction

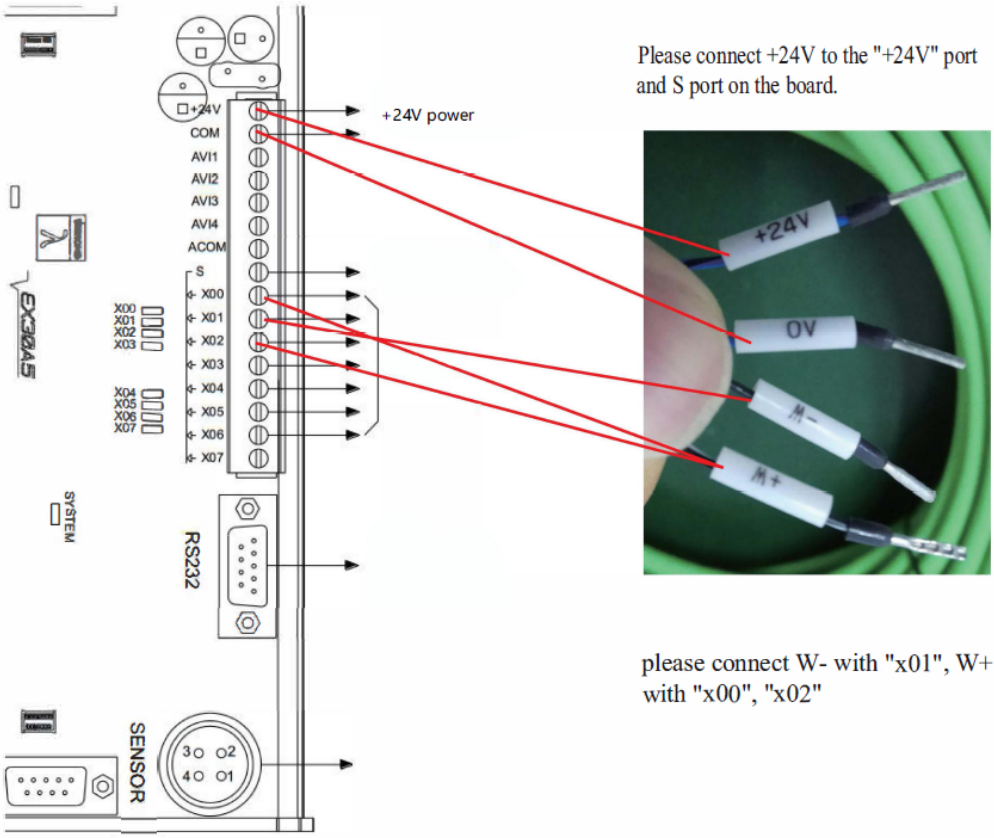
AlpphaT expansion board 1

Terminal board wiring diagram



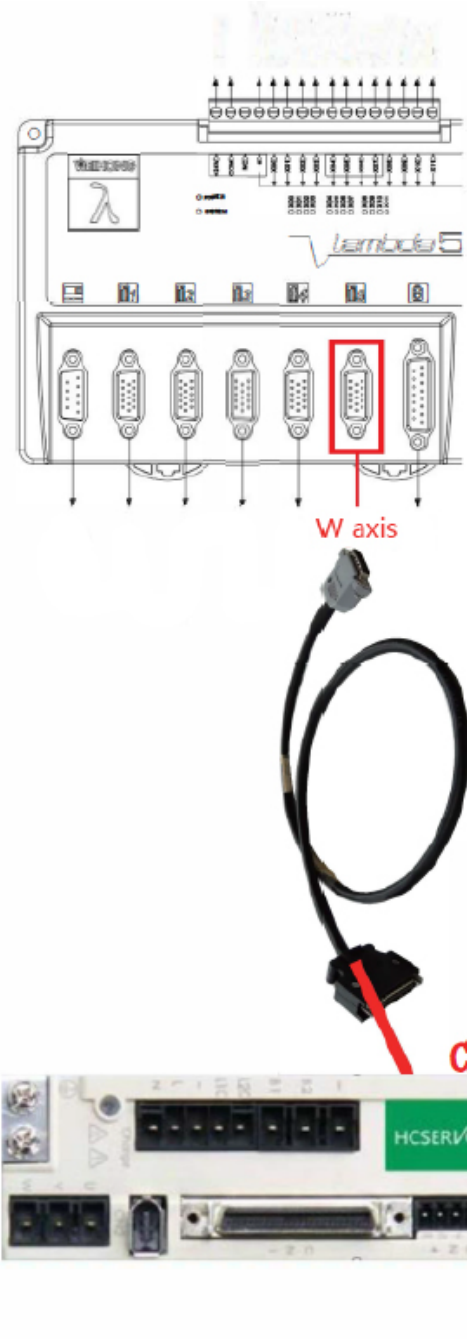
AlphaT expansion board 2





Limit logic parameter configuration

EX00	P	00072	E,F;16ms S:4ms	W-axis + limit
EX01	P	00073	E,F;16ms S:4ms	W-axis - limit
EX02	P	00074	E,F;16ms S:4ms	W-axis zero


W axis
CN1
HCSERVO-X3
DRIVER

AlphaT parameter configuration

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

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.

Troubleshooting

The cause of the failure of the nozzle temperature is too high during the processing:
1. Centering offset.

2. Protection lens contamination.

3. Contamination of focusing lens or collimating lens.

4. Fiber rod contamination.

5. Plate heat transfer.

6. The inner core hole and the outer hole are not concentric

7. The defocus amount is too large.

Troubleshooting:

1. Check for misalignment, and adjust if there is any misalignment.

2. Take out the protective lens for inspection. After taking out the protective lens holder, be sure to use textured paper to seal the empty position of the cutting head. (Protection window, nozzle opening) Do not take out the protective lens holder and then blow air. If the protective lens is contaminated, it needs to be cleaned.

3. Check the optical lens inside the cutting head. Raise the cutting head to the highest position, turn on the red light, unscrew the nozzle, at the lower end of the ceramic body. Place a piece of white paper within a 40mm position and move it up and down to observe the uniformity distribution of the red light. When observing the red light, try to block the periphery of the red light to ensure a certain contrast and enable clearer observation. If there are obvious black spots, it can be judged that the internal focusing or collimating lens or the fiber end face is polluted. This needs to be handled by contacting the after-sales service engineer. Do not disassemble the laser head without authorization, and do not continue to use it, so as not to cause greater damage .

4. If there is no problem with the above inspections, the cutting nozzle is still very hot, and it is necessary to check the light without cutting and blowing at full power. Note that when the light is emitted, put a bucket of water about 1 meter below the nozzle, and put an iron plate in the bucket to prevent the bucket burnt out. Use full power to check whether the nozzle is hot. The time is 1~10 minutes. If the nozzle does not heat up, it means that the heat transfer of the plate during cutting causes the nozzle to heat up. If the nozzle is still hot, remove the focusing lens and the collimator lens and laser head.

5. Check the nozzle, the nozzle surface with damaged is not bright and easy to absorb heat, and the new nozzle surface is not easy to absorb heat.

The abnormal capacitance value alarm fault reasons:

1. The ceramic is damaged or loose.
2. The nozzle is damaged or loose.
3. The probe inside the sensor is damaged and inelastic.
4. The copper contacts of the ceramic and the stainless steel tooth ring are not connected
5. The resistance value of the ceramic is not large enough.
6. Signal cable problem.

Troubleshooting:

1. Check the ceramic and nozzle for damage or looseness. If damaged or loose, replace and reinforce.
2. After removing the ceramic and nozzle, check whether the probe contact of the cutting head sensor is damaged and whether it is still elastic. If so, you need to contact the supplier for replacement.
3. Check whether the signal line is disconnected, and check whether the copper contacts of the ceramic and the stainless steel tooth ring are connected.
4. If there is no problem with the above 3 points, clean the ceramic with alcohol, and dry it with a blower or oven. Because the surface of the ceramic is not dry, when the resistance value is less than 1 megohm, the capacitance value will also alarm abnormally.

Reasons for the failure of optical fiber interlock alarm:

1. The fiber installation is not in place.
2. QBH temperature is too high
3. QBH internal contact problem.
4. Laser fiber connector problem.

Troubleshooting:

1. Re-lock the fiber according to the instruction of the cutting head.
2. Check the water temperature and water pipes.
3. Contact the cutting head manufacturer for processing

Reasons for abnormal cutting effect:

1. Whether the cutting parameters are correct.

2. Whether the cutting focus is correct.

3. The cutting gas is correct.

4. Whether there is any problem with the cutting head lens.

Troubleshooting:

1. Check cutting parameters and cutting focus position.

2. Check gas adequacy and gas purity. According to the selected cutting gas, observe the barometer on the gas cylinder. If it is oxygen, it must be kept at about 10 kg. Check whether the output gas voltage value of the cutting system corresponds to the value displayed by the gas proportional valve, generally 10V corresponds to 10 kg; Adjust the thickness of the cut sheet accordingly. The purity can be satisfied by checking the gas cylinder label to meet the purity of more than 99.9%. If nitrogen cutting is used, it can also be detected by cutting the stainless steel end face. The yellowing of the end face is low in purity, and high-purity gas needs to be replaced immediately.

3. Take out the protective lens and check if there is any pollution. If there is pollution, the lens needs to be cleaned.

4. Check whether the inner lens of the cutting head and the fiber end face are normal.

The centering is easy to shift during the processing. Reasons for the failure:

1. Optical fiber loose

2. The problem of adjusting module

3. Ceramic is loose

4. Nozzle is loose

Troubleshooting:

1. Check whether the fiber is locked and whether there is still swing.

2. Contact the cutting head manufacturer.

3. Check whether the ceramic and nozzle are locked, if they are loose, they need to be reinforced

4. If no problem is found after the above, it is necessary to check whether the focusing lens barrel and collimating lens barrel are loose.

Analysis of the reasons for the slag burning under the protective lens

1. It may be related to the cutting process parameters, especially the thick plate perforation parameters.

2. It may be related to the blockage of the air passage.

3. It is recommended to put the air blow in front of the follower in the PLC process setting of the HypCut system.

4. It may be related to electronic valve, check valve and proportional valve.

5. It may be related to the cutting board, especially the film cutting.

6. The one-way valve is worn and dust blows to the protective lens and affects the lens.

Dust is easily generated here

poor cutting inspection:

If the cutting effect does not meet the requirements during the cutting process, especially when the cutting effect is not good when cutting with nitrogen or air, first check whether the gas path of the cutting head is blocked and whether there are foreign objects in the gas path, as shown in the figure below.