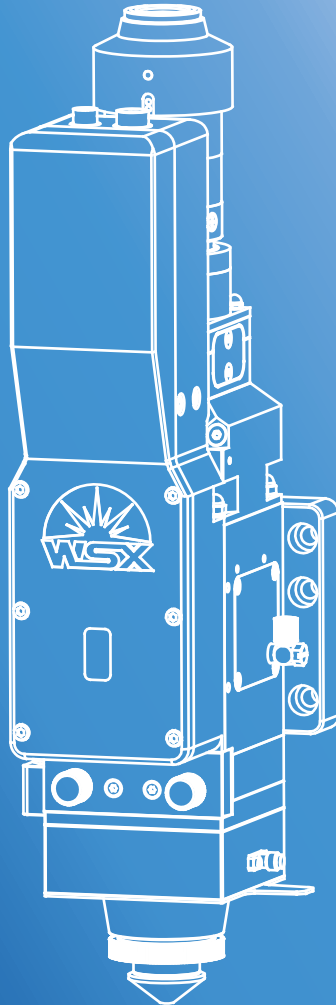




Automatic Focusing Fiber
Laser Cutting Head
NC30



User Manual

Shenzhen Worthing Technology Co.,Ltd.

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.

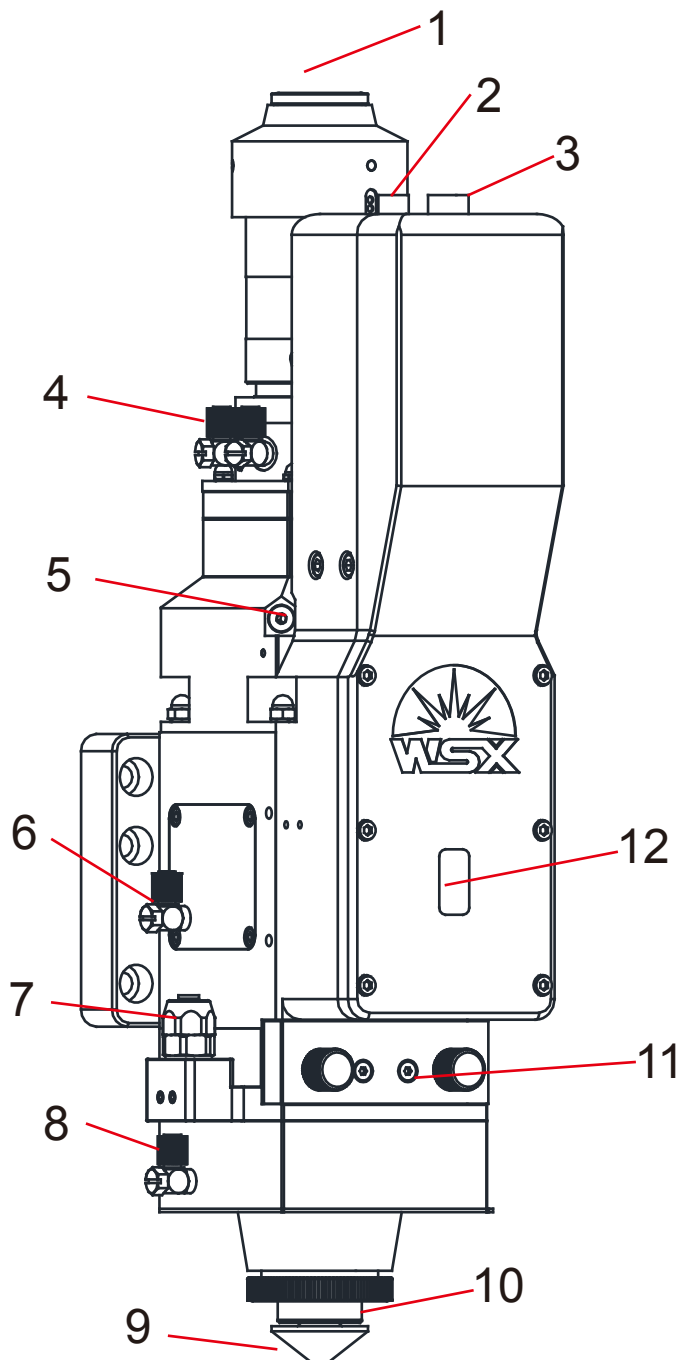


Steps

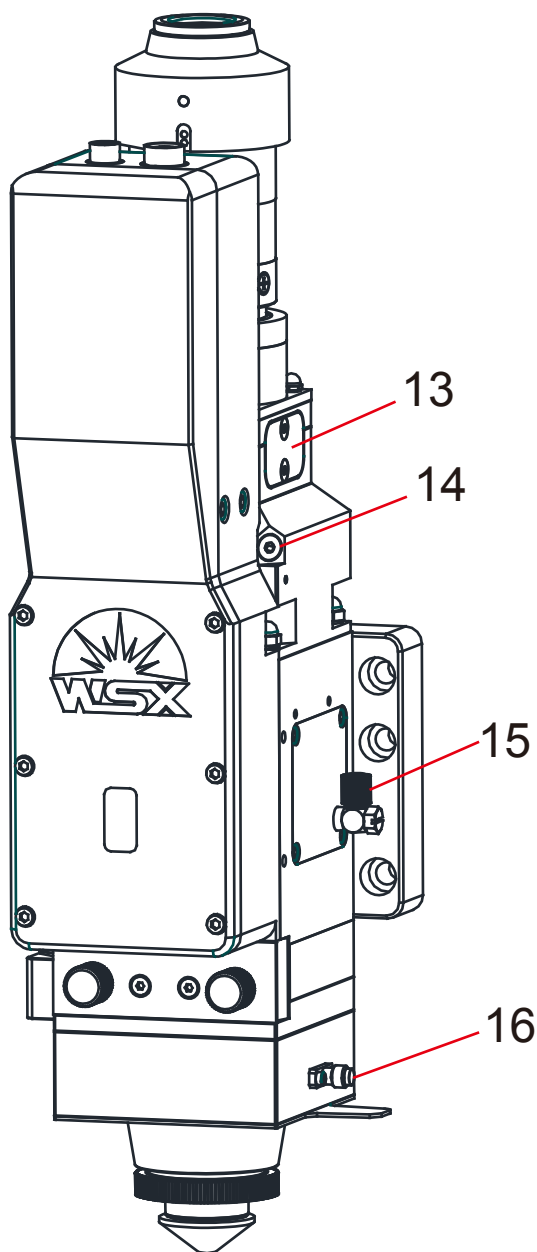
1. Adjust soft limitation to -100~100
2. Set inching speed to 1mm/s
3. Inching at positive direction until reach positive limitation
4. Inching at negative direction until reach negative limitation
5. After confirming effectiveness of positive & negative limitation, set back to origin
6. Restore soft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

Instruction

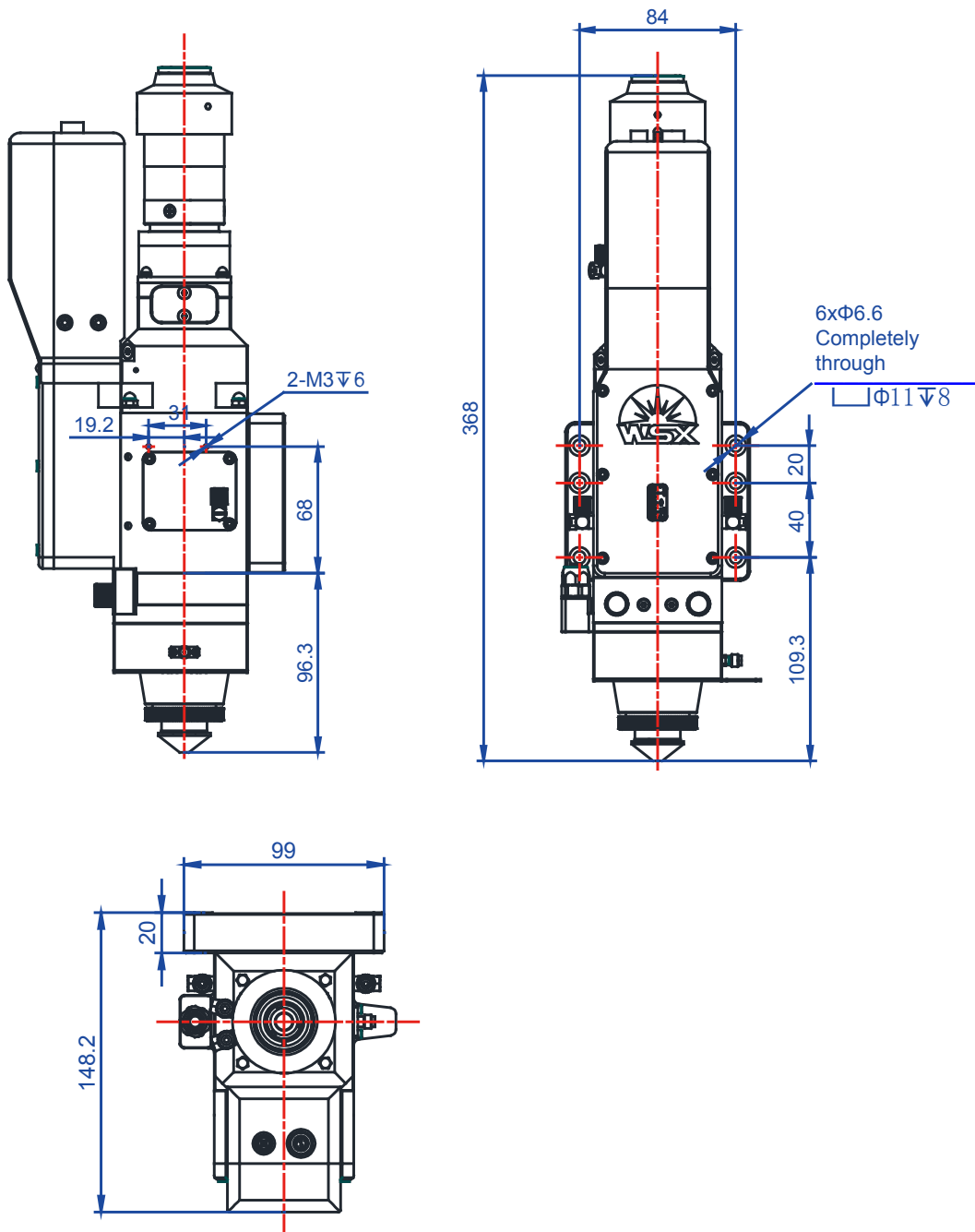
1. Make sure manual inching can find limit switch
2. Reduce manual speed to ensure that invalid limitation will not cause structural damage.
3. Make sure wire connection of negative limitation switch is correct and signal is normal
4. It's allowed to restore to origin automatically only after confirming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

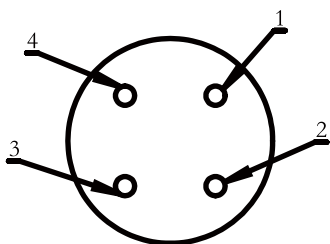
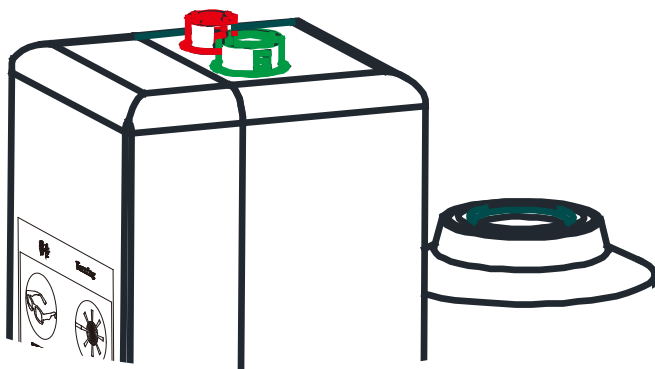


- 1.Fiber Access
- 2.Triphase power wire
- 3.Encoder&Limitation Signal
4. Cooling Water Connector 1
- 5.Center Adjusting (Y)
6. Cooling Water Connector 2
- 7.Cutting Gas Connector
- 8.Cooling Gas Connector
- 9.Nozzle
- 10.Ceramic Ring
- 11.Locking Device of Protective Window 1
- 12.Observation Window



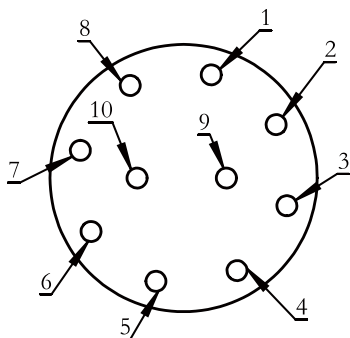
- 13. Protective Window 2
- 14. Center Adjusting (X)
- 15. Cooling Water
Connector 3
- 16. Moving Signal
Interface





1	W
2	U
3	V
4	FG (Earthing)

Servo Motor Power Supply Interface (Red)



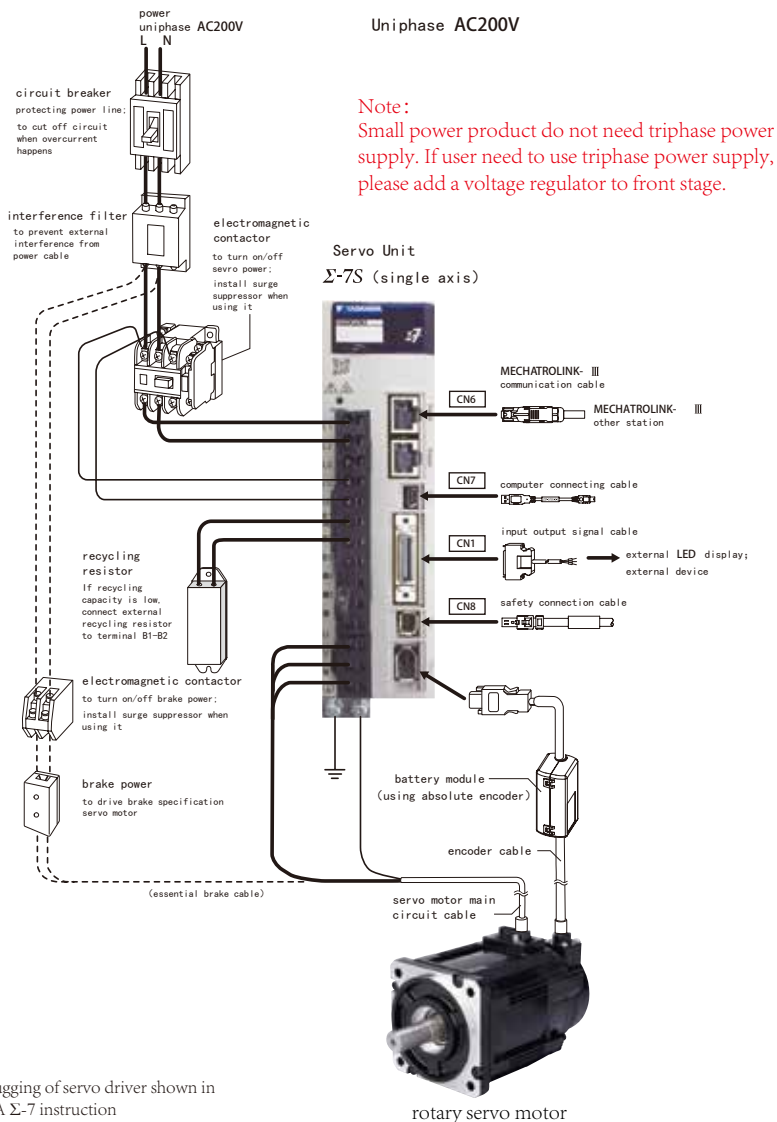
1	FG	(Shield Wire)
2	-D	(Encoder Signal Data-)
3	+D	(Encoder Signal Data+)
4	SG	(Signal Ground Wire)
5	VCC	(Encoder Power +5V)
6	+24V	(Approach Switch Power Line)
7	0V	(Approach Switch Power Line)
8	W+	(Approach Switch Signal Line)
9	W-	(Approach Switch Signal Line)

Servo Motor Encoder & Approach Switch Interface (Green)

Servo Driver Connects to Motor

YASKAWA-7 System Construction Example

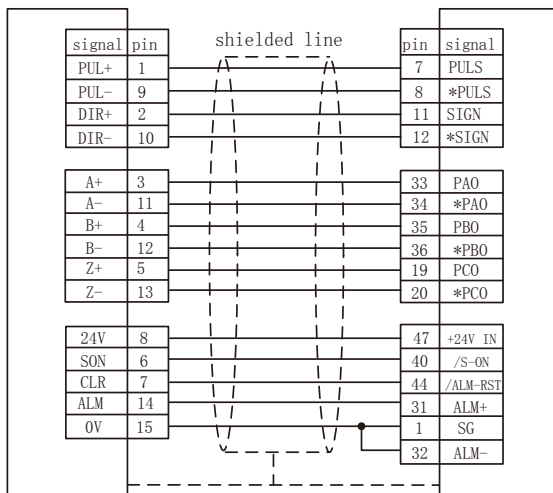
Σ -7S Servo Unit & Rotary Servo Motor



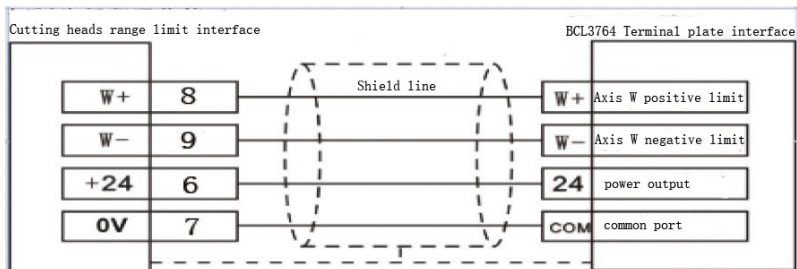
Friendess FSCUT2000A laser cutting control system BCL3764 terminal plate W axis DB15 servo control interface connect with YASKAWA servo drvier 50P interface definition

Friendess DB15 servo control interface

YASKAWA Σ -V servo 50P interface



Definition of laser focusing diujstment range limitation switch connector



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

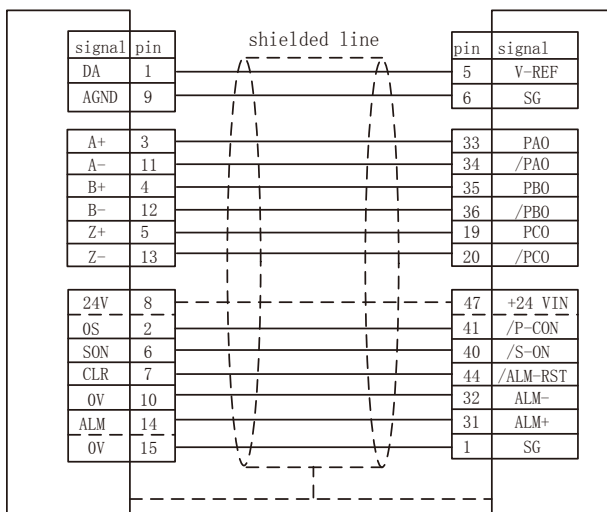
parameter	value	parameter	value	parameter	value
PN000	0010	PN170	1400	PN402	50
PN00B	0101	PN200	0000	PN403	50
PN100	120	PN20E	4194304	PN406	100
PN102	180	PN210	2500	PN50A	8100
PN103	100	PN212	2500	PN50B	6548

Note: 1.Definitions of servo driver and servo motor connector shown in YASKAWA servo driver instruction;
2.Please use uniphase power, L connects to L1&L1C; N connects to L2&L2C.

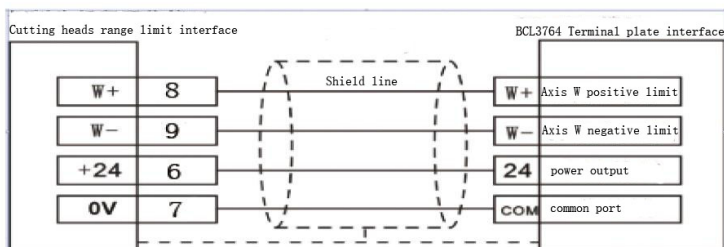
Friendess FSCUT4000A laser cutting control system BCL3724 terminal plate W axis DB15 servo control interface connect with YASKAWA servo driver 50P interface definition

BCS100 servo driver interface

YASKAWA Σ series servo 50P inter face



Definition of laser focusing djustment range limitation switch connector



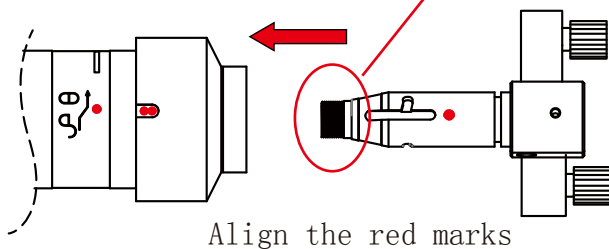
Parts of parameter list, subject to actual using and YASKAWA servo instruction.

parameter	value	parameter	value	parameter	value
PN000	0000	PN170	1400	PN402	50
PN00B	0101	PN200	0000	PN403	50
PN100	120	PN20E	4194304	PN406	100
PN102	180	PN210	2500	PN50A	8100
PN103	100	PN212	2500	PN50B	6548

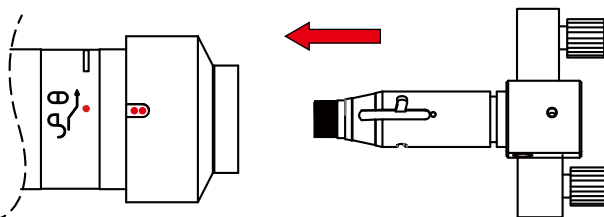
Note: 1.Definitions of servo driver and servo motor connector shown in YASKAWA servo driver instruction; 2.Please use uniphase power, L connects to L1&L1C; N connects to L2&L2C.

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.

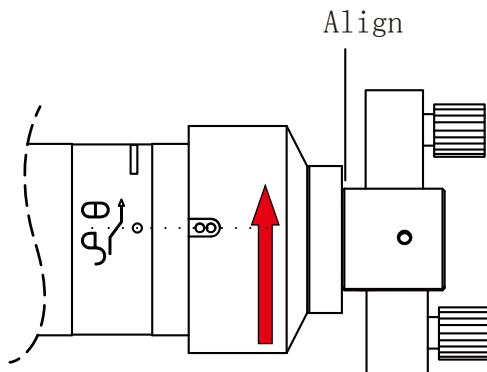
Inside the red circle is the plug of fiber rod; it is equipped with a protective cover. Before installation, tighten the cover to avoid it being loose during the processing which may cause offset light path and bad cutting quality or even cause burn damage to the fiber rod and cutting head.



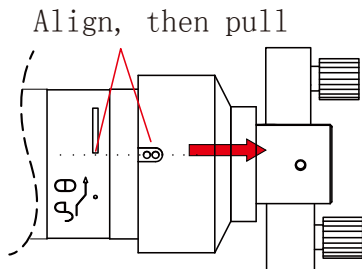
3. Insert the fiber connector into QBH gently;



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

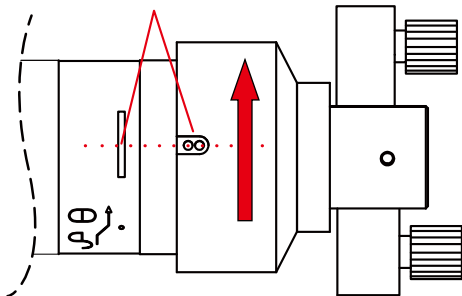


5. Then pull the turning rim as the picture below;



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.

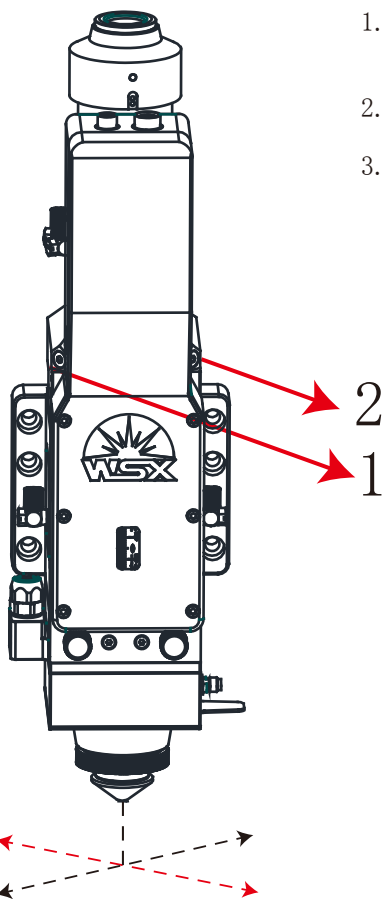


Note: Do not twist vigorously , it may cause damage to precision machinery.

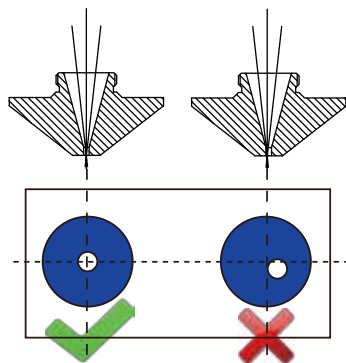


To avoid dust or dirt entering into the fiber optic connector by accident, please clean the fiber rod first. Insert the fiber plug with the laser head in a horizontal position.

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 emitted 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.

Machine Config Tool(BMC1604)

Machine

General

Org

Devices

Laser

Follower

Gas

Focus Control

Edge Seek

Table Exchange

Auto Clean

IO

Alarms

Inports

Outports

Wireless pendant

Focus Control

☒ Enable

☒ The fourth axis

Focus Range: From to

Focus position at org:

Pulse Rate: Move need pulse

High Speed: Org Dir ☒ Pos ☐ Neg

Low Speed: ORG signal: [Limit]

Rollback distance:

➔ Subject to actual physical focus.

Jog speed:

Locate Speed:

acceleration:

Servo Alarm Logic:

Negative Limit Logic:

Positive Limit Logic:

Note: 1.This parameter is default value; when user changes it, please avoid hard ware damage;

2. Please contact technician to get specific parameters of different lens combinations.

Return Org

☐ Soft limit

☐ Prompt go Org at start

☐ Prompt go Org in warning

X ORG direction: ☒ Neg ☐ Pos

Y ORG direction: ☒ Neg ☐ Pos

ORG signal: ☒ Org ☐ Limit

Limit logic:

Z-Phase signal: ☒ Enable

High Speed:

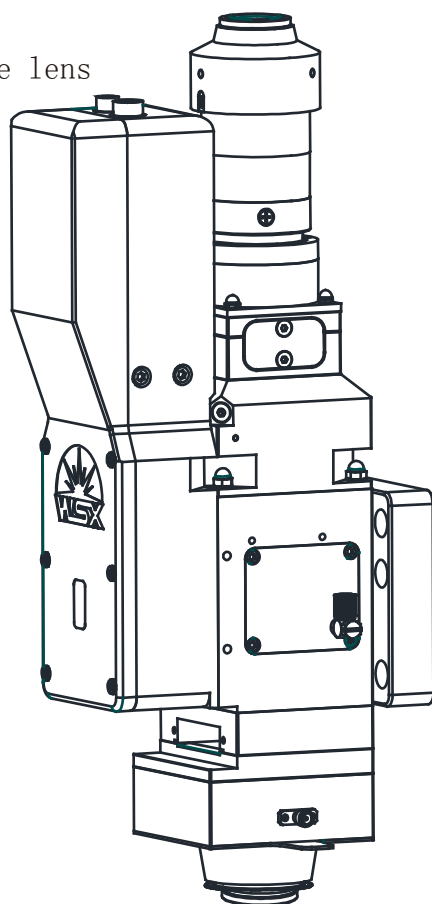
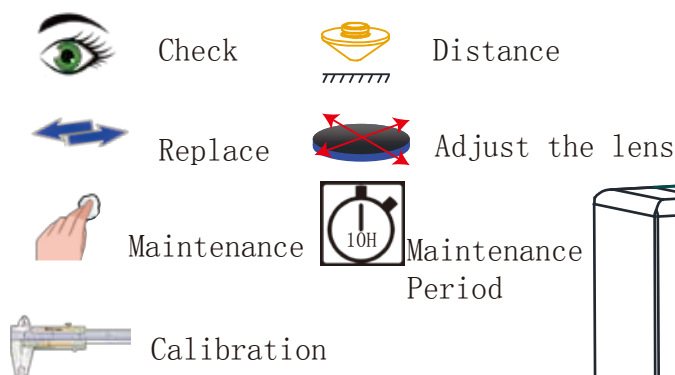
X rollback dis:

Low Speed:

Y rollback dis:

Name	Logic	
X +limit	<input checked="" type="radio"/> NO	<input type="radio"/> NC
X -limit	<input checked="" type="radio"/> NO	<input type="radio"/> NC
X origin	<input checked="" type="radio"/> NO	<input type="radio"/> NC
Y +limit	<input checked="" type="radio"/> NO	<input type="radio"/> NC
Y -limit	<input checked="" type="radio"/> NO	<input type="radio"/> NC
Y origin	<input checked="" type="radio"/> NO	<input type="radio"/> NC
W +limit	<input type="radio"/> NO	<input checked="" type="radio"/> NC
W -limit	<input type="radio"/> NO	<input checked="" type="radio"/> NC
W origin	<input type="radio"/> NO	<input checked="" type="radio"/> NC

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

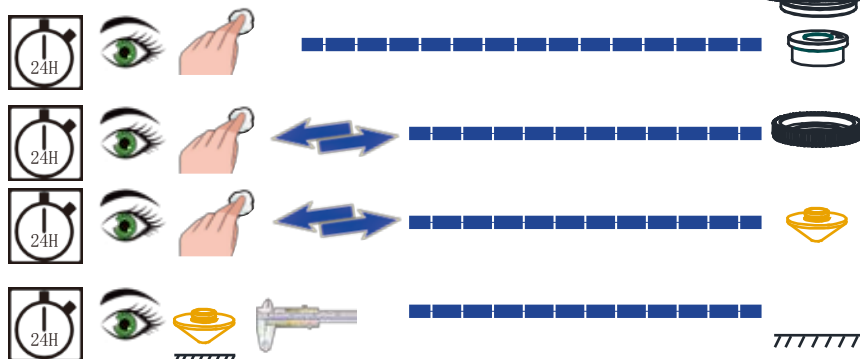


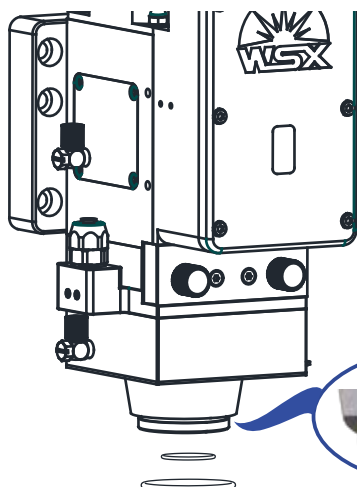
Note:

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.





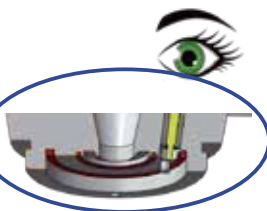
POWER



COOLING GAS

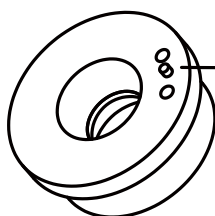


CUTTING GAS



Note:

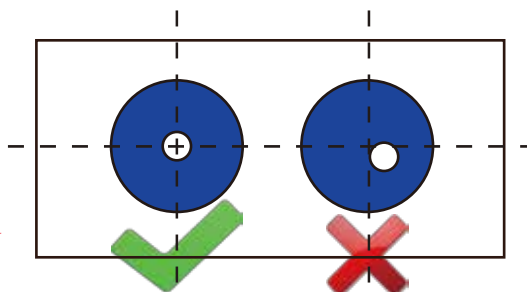
Before maintenance, clean away the dust on the surface of the head with compressed air; then use clean cloth and ethyl alcohol to clean the related parts.



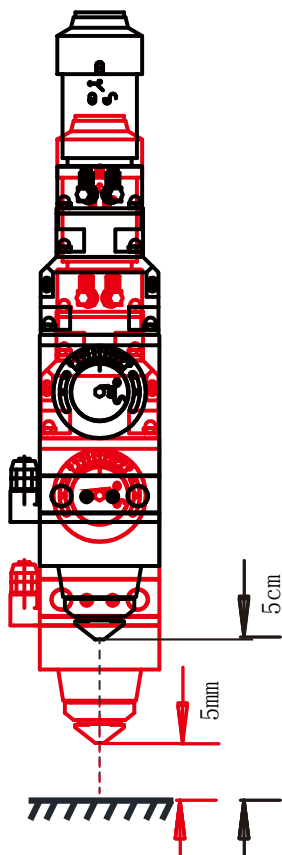
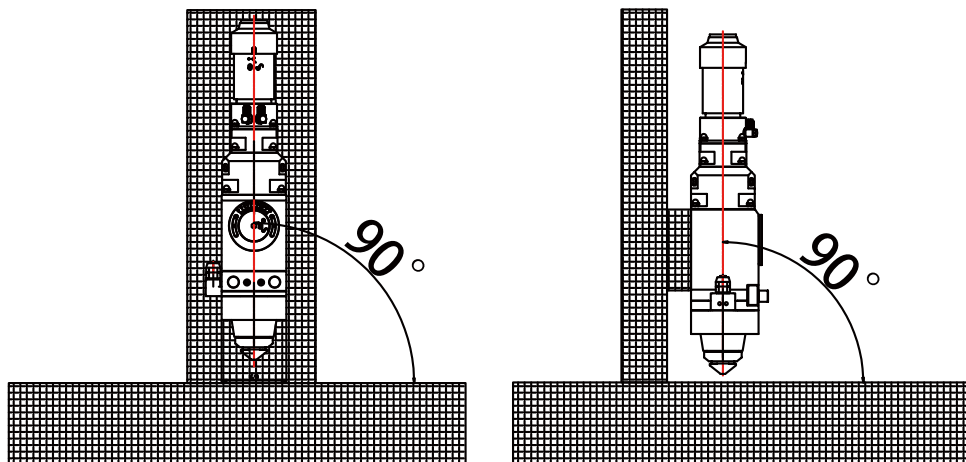
position of pin

Note:

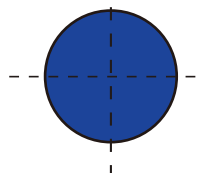
When the maintenance of ceramic ring & nozzle is finished, it is necessary to calibrate and test the beam to see whether it is in the center.



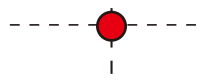
center checking



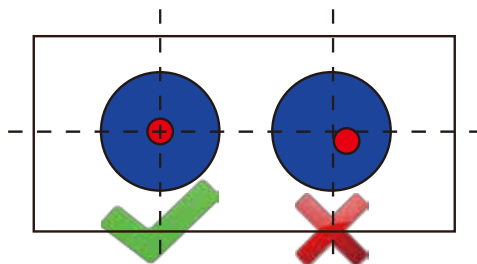
Step 1: set the laser power to 500W, make a short burst at the height of 5cm from the plate to burn a round scorch on the plate;

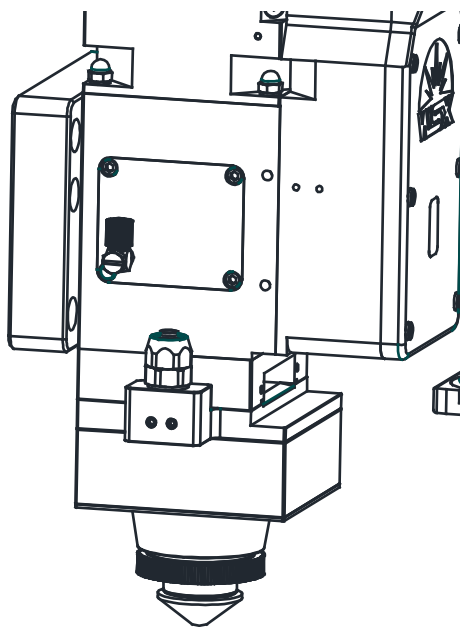


Step 2: set the laser power to 100W, make a short burst at the height of 1~5 cm from the plate to burn a round scorched spot on the plate;



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.



POWER



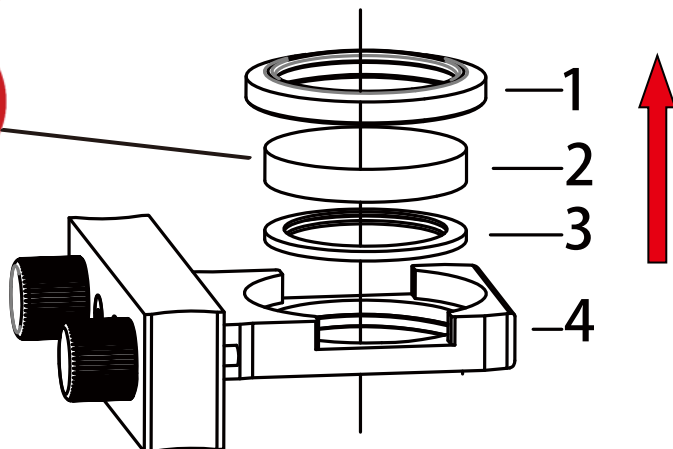
COOLING GAS



CUTTING GAS



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

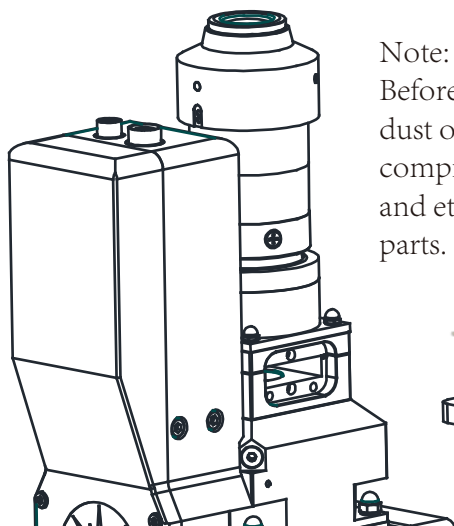


1 Fixing Ring 2 Protective Window 3 Seal Ring 4 Pedestal

Note: All the parts must be removed in the direction of the arrow, otherwise it may cause damages.

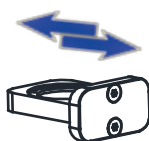
DO NOT operate with wrench or iron plier.





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



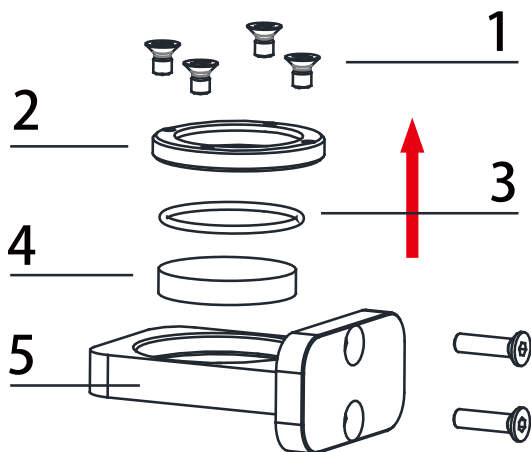
COOLING GAS



CUTTING GAS



Beware of Dropping

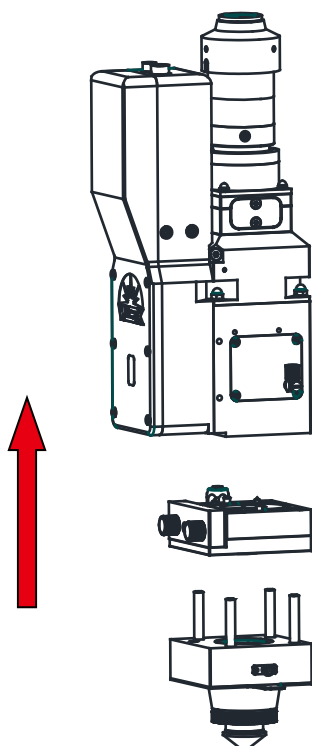


Before maintenance,
record the position and
orientation of the lens;
After maintenance,
assemble as the record

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



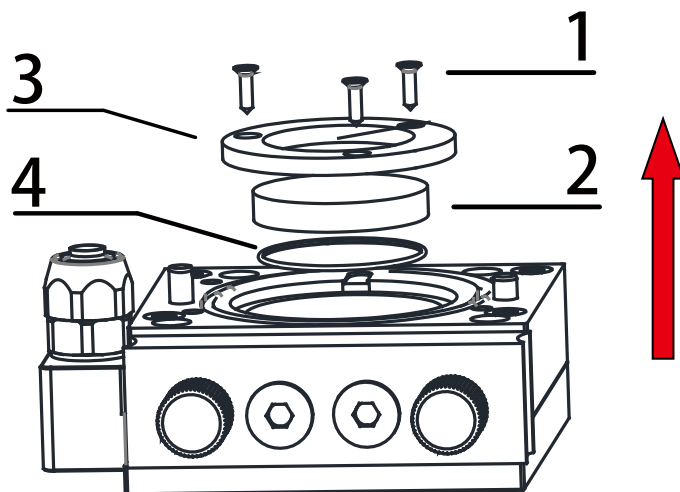
COOLING GAS



CUTTING GAS

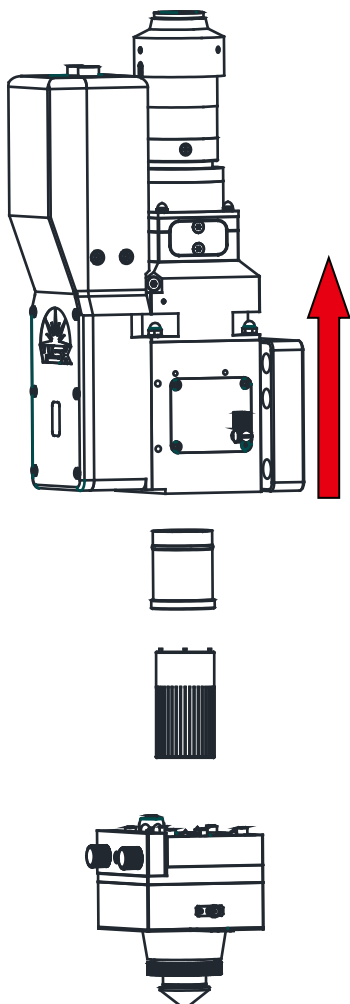


Beware of Dropping



1 3-M3 Screw 2 Protective Window

3 Gland 4 0-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.



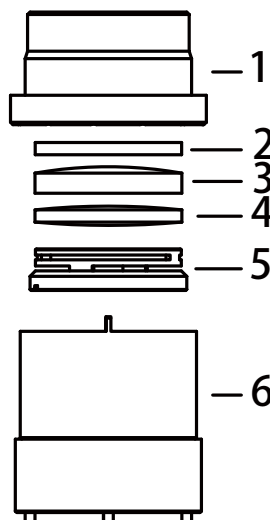
POWER



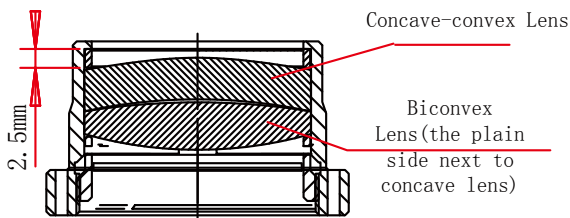
COOLING GAS



CUTTING GAS

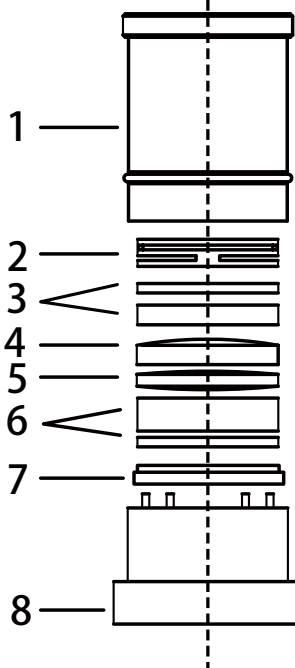
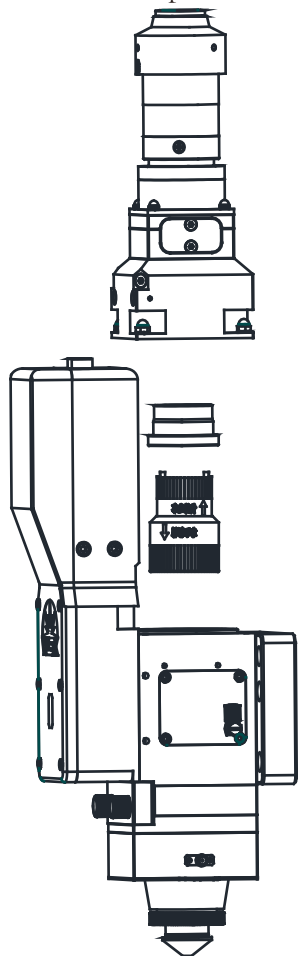


1. Before maintenance, record the position and orientation of the lens; After maintenance, assemble as the record
2. Twist to the end and then turn backward 1/5 circle to prevent the lens being affected by temperature variation.



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.



POWER



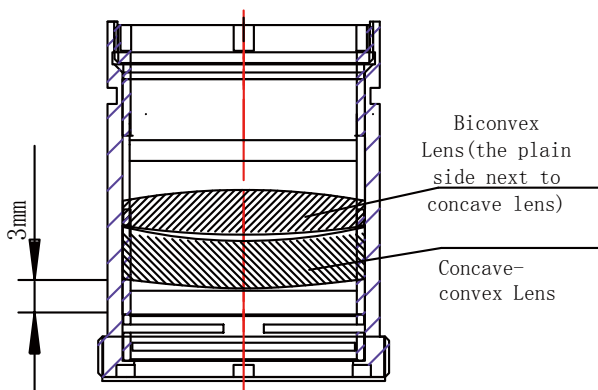
COOLING GAS



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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