Product Manual

Applicable model: CMA1530C-G-A
Version: 20151230
Copyright Statement

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Disclaimer and Responsibility Statement

Whole using the machine from our company, users are required to ensure integrity and independence of the product including but not limited to: mechanical, electrical, optical, control software and accessories. Unauthorized modification is strictly prohibited. It is a must to satisfy operating environment and operating specifications specified in the owner’s manual. For the followings:

1. Machine modified with no authorization (including but not limited to: add, remove, modify, unauthorized disassembly, replacing parts);
2. Use the machine in the environment failing to satisfy the operating requirements;
3. Operate disobeying the specifications of our company;
4. Unauthorized use the machine parts, accessories and auxiliaries on to other machine or in other places;
5. Viciously disassemble, destroy, decode hardware and software of the machine from our company

Our company shall not undertake any direct, indirect or joint responsibility. Our company reserves the rights to ascertain legal responsibility for the serious consequences or economic losses or reputation losses caused by what mentioned above.
Foreword

Thank you for choosing our laser equipment!

Before operating, please read this manual carefully to ensure proper use of our equipment.

Please keep this manual properly for future reference.

Due to different configurations, certain models do not have certain features listed in this manual. The actual product shall prevail.

Due to constant improvement, certain content of this manual might be inconsistent with the actual product, which shall prevail.

The symbol conventions in this manual:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚠️</td>
<td>Attention: The content requires special attention and the user must abide by, or else it will cause error or serious problems.</td>
</tr>
<tr>
<td>✔️</td>
<td>Tip: Prompt the user to pay attention or suggest the user to abide by, which will be more convenient and efficient.</td>
</tr>
<tr>
<td>⚠️</td>
<td>Alarm: For a particular case there is no dedicated staff to guide the operation could lead to catastrophic happens.</td>
</tr>
</tbody>
</table>
**Safety Precautions**

| **Attention** | Before using the machine, users are required to carefully read this manual and other operating requirements, strictly abide by the operating specifications. Professional are required for operating the machine. |
| **Alarm** | The machine uses class 4 laser (strong laser radiation). The laser radiation may possibly cause the following accidents: |
| | - Emblaze the surrounded flammable materials; |
| | - Generate other radiations and toxic or hazardous gas by processed objects during laser processing; |
| | - Direct irradiation of laser radiation cause harm to human body. Therefore, firefighting devices are required in the operating place of the machine. Stacking flammable or explosive objects near the machine is strictly prohibited. Good ventilation is a must. Only the qualified personnel are authorized to approach the machine. |
| **Tip** | The processed objects and discharged materials are required to satisfy requirements as per local laws and regulations. |
| **Alarm** | Laser processing is with potential risks. Users should carefully make sure if the processed objects are suitable for laser processing. |
| | - There is high voltage and potential risk in the laser machine. Unauthorized disassembly by unqualified personnel is prohibited. |
| | - Reliable earthing is required for the machine and related other machine before power-on. |
| | - During operating, removing any cover of the machine is strictly prohibited. |
| | - During operating, the operators are required to observe working status of the machine all the time. In case of any abnormality, it is immediately to disconnect power supply and take active and corresponding measures. |
| | - After power-on, special personnel are required for monitoring. Unauthorized leaving is strictly prohibited. |
| | - It is a must to disconnect the power supply before leaving. |
| **Alarm** | It is strictly prohibited to placing any unrelated all-reflective or diffusion reflective objects in the machine to prevent laser reflecting to human body or flammable materials. |
| **Attention** | The environment for the machine should be dry, free of interference and influences from pollution, vibration, high voltage and strong magnet. The operating ambient temperature ranges 5-40°C, and the humidity ranges 5-85% (no dew); |
| | - The machine should be far from electric appliances sensitive to electromagnetic interference; |
| | - Operating voltage: Three-phase AC380V/50Hz. Three-phase five-wire, 380V and 220V loads exist simultaneously. Power-on is strictly prohibited in case of unstable voltage of the power grid or unspecified voltage. |
| | - Voltage regulator should be provided by the customer. |
| **Attention** | Chapter of this manual for Safety Rules. Please refer to the chapter more details concerning safe operation of the machine. Users are required to carefully read and abide by all the requirements of safety. |
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Chapter 1 Product Introduction

1.1 Product Introduction

CMA1530C-GA optical fiber laser cutter is a professional device for metal sheet processing. Featuring high precision, high efficiency, non-polluting and smooth cut, it is ideal for sheet metal processing and manufacturing. It uses optical fiber laser and dual servo drive transmission, and the chassis is welded from square joint steel frame and is annealed to ensure high efficiency, high precision and high stability of machine running.

Instructions of equipment model:

<table>
<thead>
<tr>
<th>CMA1530C-</th>
<th>G-</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series: CMA: Series laser cutter 1530: Working area 1500mm×3000mm C: Steel structure</td>
<td>Function code: G: Rack and pinion drive</td>
<td>Serial Number: A: Version A of this series of device</td>
</tr>
</tbody>
</table>

1.2 Product parameters

<table>
<thead>
<tr>
<th>Model</th>
<th>CMA1530C-G-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting range (L × W)</td>
<td>3000mm×1500mm</td>
</tr>
<tr>
<td>Laser type</td>
<td>Optical fiber laser</td>
</tr>
<tr>
<td>Laser power</td>
<td>250W, 500W, 1000W (one optional)</td>
</tr>
<tr>
<td>Drive system</td>
<td>Gantry rack and pinion drive</td>
</tr>
<tr>
<td>Maximum speed</td>
<td>60m/min</td>
</tr>
<tr>
<td>Positioning accuracy</td>
<td>±0.15mm</td>
</tr>
<tr>
<td>Repeat positioning accuracy</td>
<td>±0.1mm</td>
</tr>
<tr>
<td>Graphic format supported</td>
<td>AI, DXF, PLT, Gerber, etc</td>
</tr>
<tr>
<td>Equipment power</td>
<td>4.5KW</td>
</tr>
<tr>
<td>Power requirement</td>
<td>Three-phase 380V/50Hz</td>
</tr>
<tr>
<td>Total mass</td>
<td>3000Kg</td>
</tr>
<tr>
<td>Dimensions</td>
<td>4480mm×2900mm×1740mm</td>
</tr>
</tbody>
</table>
### 1.3 Operating environment

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humidity</td>
<td>5%~85%, no dew</td>
</tr>
<tr>
<td>Temperature</td>
<td>±20℃</td>
</tr>
<tr>
<td>Power supply</td>
<td>Three-phase 380V/50Hz</td>
</tr>
<tr>
<td>Grounding</td>
<td>Grounding resistance should be less than 0.1Ω</td>
</tr>
<tr>
<td>Air pressure</td>
<td>86-106kpa, no strong electrical or magnetic field interference</td>
</tr>
<tr>
<td>Environment of the equipment</td>
<td>Dry, smokeless, no dust, no pollution, no vibration</td>
</tr>
</tbody>
</table>

### 1.4 Equipment composition

#### 1.4.1 Compositions of the machine

![Composition Diagram](image.png)

<table>
<thead>
<tr>
<th>Number</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Warning light</td>
</tr>
<tr>
<td>②</td>
<td>Operator station</td>
</tr>
<tr>
<td>③</td>
<td>Cutting head</td>
</tr>
<tr>
<td>④</td>
<td>Lower exhaust fan port</td>
</tr>
<tr>
<td>⑤</td>
<td>Optical fiber laser port</td>
</tr>
<tr>
<td>⑥</td>
<td>N₂, O₂ port</td>
</tr>
<tr>
<td>⑦</td>
<td>Electrical interface</td>
</tr>
<tr>
<td>⑧</td>
<td>Chiller interface</td>
</tr>
</tbody>
</table>

---

Company Headquarters: No. 28 East Industrial Road, Songshan Lake High-Tech Industrial Development Zone, Dongguan, Guangdong, China
1.4.2 Auxiliary equipment

<table>
<thead>
<tr>
<th>Auxiliary Gas (provided by the user)</th>
<th>Fan</th>
<th>Water chiller</th>
</tr>
</thead>
</table>

Fig.1-2 Accessories

1.5 Control system

See Optical Fiber Laser Cutter Software User Manual for the instructions
Chapter 2  Safety Rules

This chapter mainly introduces safety warnings for protecting personnel and the machine, and makes an introduction to signs used in the owner’s manual. The machine is already equipped with sufficient safety guarantee, yet it is still with certain risk. All the operators are required to carefully read through and well understand the safety rules.

2.1 Refer to safety standards

Laser processing equipment and operations shall be in accordance with both two national standards, which are GB7247-87 Radiation safety of laser products, equipment classification, requirements and user guide, and GB10320-88 electrical safety of laser equipment and facilities.

2.2 Product safety

The following conditions are required to be satisfied to ensure safe work:
- Abide by operation manual and instruction signs;
- Operators and maintenance personnel have received training held by machine manufacture;
- In case of operation by couples of person at the same time, division of responsibility should be made and followed;
- No admission to the working area for the unauthorized personnel;
- Avoid any working method breaking the safety rules;
- Timely eliminate all the failures possibly causing lower safety coefficient;
- Abide by maintenance regulations of the machine.

2.3 Safe equipment

Safety machines are used for protecting personnel, and unauthorized disassembly, bridge-group or by-pass connection are strictly prohibited; in case of failure with the safety machine, professional are required for repair. If part replacement is needed, the product with same model, specification and from the same manufacture is required; otherwise, written consent from the manufacturer is required.

2.4 Safety awareness

The machine can be operated only by skilled personnel or under supervision of them. Improper use or operation may possibly be very dangerous and cause damage to the machine. Therefore, the followings are strictly prohibited:
- Placing heavy objects or stepping on the working table of the machine;
- Used for processing the materials unapproved by manufacturer;
- Staying of unauthorized personnel in the dangerous area (It is the responsibility of operators to ensure keeping unauthorized personnel away from the working area.);
- Block of using emergency stop button (Regular check is required to ensure a good condition for the emergency stop button).

2.5 Requirements for personnel

After trail operation, maintenance personnel from the manufacturer may perform training on the operators. It is the responsibility of machine owner to have operators trained at corresponding level.
2.5.1 Definition of terms

All the personnel using or operating the machine are called User in the manual;

Different requirements are for different users. Users are classified into the followings:

- **Owner**
  
  Owner means the authorized person or representative to sign contract with the manufacturer. With authorization, the owner has rights to sign the agreement with binding force of law;

- **Operator**
  
  Operator means the personnel trained for operating the machine. Training of the operator includes participation of training held by the manufacturer.

- **Maintenance personnel**
  
  Maintenance personnel mean the technicians having received formal training for machine and electric engineering. The maintenance personnel are responsible for daily maintenance of the machine, and repair at low level if needed. Training on the maintenance personnel contains participation training held by manufacturer.

2.5.2 Qualifications

The operator is required to accept guidance and training of the owner, and the operator is responsible for the safety of a third party in the working area; the personnel required for further training and guidance are required work or operate the machine under supervision of the operators.

2.5.3 Responsibility

It is a must to clarify the related responsibilities of each performance (operation, maintenance, parameter setting), and carry it out. Unclarified responsibilities will cause safety hidden risks.

Owner is required to provide operation manual for the operators and maintenance personnel, and ensure that they have read and understood the operation manual.

2.5.4 Personal protective devices

When technology or measures fail to absolutely avoid risk of health, the owner is required to provide personal protective devices for operator and maintenance personnel. For example,

- Steel cap boots;
- Protective gloves
- Laser-proof goggle
3.1 Equipment installation

3.1.1 Unpacking steps
The package of CMA1530C-GA cutter consists of four parts: master unit box, chiller box, optical fiber laser box, and fan and accessories box.

3.1.2 Out of box audit
After unpacking, examine the equipment and accessories to ensure that the product has no accident during transport. Check the following items:

- Check on equipment model
  Please make sure that equipment model is just what purchase.

- Check in equipment appearance
  Please make sure that the equipment is free of scratch, damage, distortion and corrosion by appearance.

- Check interior of equipment
  Open cross beam organ cover, and check if there are any accidentally detached parts, thread residue or internal damage.

- Spare parts and accessories
  Please confirm that the equipment model is the one you ordered, open the auxiliary chassis and laser tube crate, check if any part is missing or doesn’t match according to the packing list, and check the accessories for damage and deformation.

Attention
Do not unpack the crate without permission.
To unpack, first obtain permission from customer service or business personnel of Han’s Yueming Laser, or else the company doesn’t assume any responsibility for any accidents.

Attention
If any problem occurs after unpacking, please inform the customer service or business personnel of Han’s Yueming Laser, or directly call Han’s Yueming Laser. Do not handle without authorization.

3.1.3 Preparation for installation
Preparations for installation are as below:

- Preparation of power supply
  The site requires 380V/50Hz three-phase five-wire power supply.

- Preparation of cooling water
  The cooling water shall be distilled water free of impurities.

- Preparation of gas supply
  According to the actual needs of the process, CMA1530C-GA metal cutter requires nitrogen of a pressure not lower than 2.5Mpa (25kg) and oxygen of a pressure not lower than 1Mpa (10kg) for cutting use. The equipment has two interfaces for nitrogen and oxygen. In addition, the equipment also requires compressed air of a pressure not lower than 1Mpa (10kg) for lifting platform of discharging and receiving.

- Preparation of equipment placement area
  The site requires a mounting area of the following size.
Fan   Water chiller   Laser components   Machine tool body                1500 (recommended)
Nitrogen cylinder                                                       1200 (recommended)
Unit: mm

Fig. 3-1  Equipment Placement Plan
Personnel

The installation personnel are professional service commissioner of Han's Yueming or operating personnel of agents trained by Han's Yueming. To install the machine independently, the client must have accepted full installation training by Han's Yueming Laser and have master the points of installation of laser-related equipment.

Tools

The related tools for installation are attached to the equipment. In addition, users should prepare some installation and testing tools if necessary, e.g. screwdriver, multimeter, big wrench, level meter, etc.

Attention

While the service commissioner is installing, the client must accompany throughout. Equipment installation and commissioning are part of the training, and the user needs to master.

3.1.4 Equipment level adjustment

Level adjustment requires a level meter of 0.02mm accuracy. The adjustment precision is 0.1mm, and the adjustment method follows:

1. Suspend the six foot cups in the middle of the equipment, and make the four diagonal foot cups bear force;
2. Remove the organ protective cover in X and Y direction, place the level meter on 4 corners of the guide rail in X and Y direction of the equipment for checking. The side that the air bubble on the level meter leans to is the high point, determine the height of the four corresponding corners, select the lowest point, and rotate the other three foot cups counterclockwise to make the corner fall down; repeating the above steps until the level error of 4 corners < 0.1mm.
3. Rotate the six foot cups in the middle clockwise to make the foot cups contact with the floor and bear force slightly.

3.1.5 Mounting fan and air duct

The fan uses three-phase 380V/50HZ power supply. The user need to prepare 3P10A leakage protector and cables not smaller than 4*1.5mm² for electrical wiring of the fan; after mounting the fan, connect one side of the PVC duct to the exhaust port of the fan and connect the other side to the lower exhaust port of the optical fiber laser cutter (Fig. 1-1), and fix with hose clamps.

3.1.6 Installing laser

- Open the package of the optical fiber laser, place the laser on the holder, pass the QBH tip of optical fiber through the cutting head of the equipment through upper towline, and then mount the QBH tip to the cutting head; pay attention to internal mounting direction;
- Insert the power cable of the laser into the [LASER POWER] port of the electrical interface of the equipment (Fig. 3-3), and connect the cable from [CABLE] port of the electrical interface (Fig. 3-3) to the signal input port of the laser.
Attention

Be careful when moving and installing the laser. It is prohibited to force installation or knock at the laser; otherwise, it will affect the stability of the laser power and cause light spot quality declines and even laser damage!

The cable bending radius of the optical fiber laser is not less than 200mm, or else it will break the cable and cause laser damage!

Do not remove the protective cover of the optical fiber tip during mounting, or else it will cause pollution and damage the tip!

3.1.7 Installing water cooling system

- Fill distilled water into the chiller until the water level reach the yellow area;
- Connect the [INLET] pipe and [OUTLET] pipe of the cutter to [OUTLET (H)] and [INLET (H)] interface of the chiller; connect the [INLET] pipe and [OUTLET] pipe to left and right chiller interface of the cutting head in the principle of L-in R-out;
- Then, connect the [INLET] and [OUTLET] interface of the laser to [OUTLET (L)] and [INLET (L)] of the chiller with water pipe.

3.1.7.1 Mounting instructions for 500W optical fiber laser

The fiber optic cable and laser of the 500W optical fiber laser are integrated and are used to cool down the laser and QBH tip of optical fiber respectively. Be sure to use distilled water free of impurities. It is prohibited to use tap water.
Fig. 3-5  Water and Circuit Interface of Maxphotonics 500W Optical Fiber Laser

1. Fiber optic cable
2. Purified water inlet
3. Purified water outlet

Fig. 3-6  Chiller Interface

1. Chiller water inlet
2. High-temperature water outlet: connect to inlet of the water pipe of the master unit
3. High-temperature water inlet: connect to outlet of the water pipe of the master unit
4. H indicates high-temperature water
5. L indicates low-temperature water
6. Low temperature water inlet: connect to water outlet of the optical fiber laser
7. Low temperature water outlet: connect to water inlet of the optical fiber laser

Note
Ensure that the height of cooling water inside the tank is in predetermined range.
To ensure normal circulation of the cooling water of the laser, a flow switch is mounted on the water outlet pipe. For water-cooled laser, ensure normal water circulation, or else it may cause damage to the laser. Thus, in routine maintenance process, pay attention to the cleanliness of purified water and water pipe to prevent clogging filter of the pump, which will cause poor water circulation of laser tube and damage the laser tube.
3.1.8 Installing air pump

The user needs to prepare pressure regulating valve. The gas circuit control of the cutting head has been installed in the factory. The user only needs to connect nitrogen, oxygen and air to the corresponding interface respectively, of which the oxygen is adjusted to high pressure and low pressure by regulator filter. Adjust into different pressure according to different process requirements, as shown in Fig. 3-7:

![Gas Interfaces](image)

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oxygen input interface</td>
</tr>
<tr>
<td>2</td>
<td>Air input interface</td>
</tr>
<tr>
<td>3</td>
<td>Low pressure oxygen regulator filter</td>
</tr>
<tr>
<td>4</td>
<td>High pressure oxygen regulator filter</td>
</tr>
</tbody>
</table>

**Note**

The equipment is equipped with two sets of high/low pressure digital display regulator valve and filter valve, featuring precision pressure regulation and gas drying. It is mainly used to regulate oxygen pressure while cutting carbon steel. If compressed air pipe is used to pass through the device, the pressure mustn't be greater than 0.8MPa.

3.1.9 Installing power supply system

The power supply of the master unit is three-phase five-wire system. To ensure stable operation of the equipment, install voltage regulator to the power supply, connect the three-phase 380V/50HZ power to input terminal of the regulator and connect the output terminal to corresponding cable port (R, S, and T are live wires, N is neutral wire, and PE is ground wire).

**Note**

The internal power supply of the equipment has both three-phase 380V and single-phase 220V loads. When connecting the power cable, do not reverse the live wire and neutral wire, or else it will lead single-phase 220V load to 380V voltage and burn the electrical components.

3.1.10 Equipment grounding

This equipment has proposed stringent requirements on the safe grounding of user power supply system, which must comply with local safety standards:

- R, S, T: phase wires of 380V system; the wires must be equipped with safe electrical switch (mounted on phase wires).
- N: commonly known as the neutral line, supply power to electrical equipment with phase wire.
PE: safe ground wire, shells of all electrical equipment (grounding terminal) are connected to this wire to ensure safety. Ground resistance should be less than 5Ω.

The user must consult the professional electrical installer (electrician), and the professional electrical installer should check and confirm if the grounding wire is connected safely!

Attention

Poor grounding will lead to high equipment failure rate, and may lead to other accidents! Han’s Yueming Laser does not assume any responsibility and obligation for any resulting faults and accidents.

If there is no safe grounding wire in the power supply systems, be sure to follow the method below to install safe grounding grid by professional electrical installer:

- The grounding device must be rooted into a humid place around the house with 2-4 pieces of 4*35*1500mm angle steel, every piece is 1m from others, and then unearth each of angle steel with 3*30mm flat iron and create a good grounding grid.

- Lay the ground grid and then measure its resistance to ground, which is 3-5 ohms typically.

- After measuring the resistance, connect to the outgoing terminal of the grounding grid with a piece of RVV2.5mm² copper wire, and the other end to the safe grounding wire of the cutting machine and the grounding hole of the outlet, as shown below:

![Equipment Grounding Diagram](image)

3.1.11 Software and equipment drive installation

The motherboard drivers are attached to the CD and had been installed in the factory, so that it can be used directly. PC uses optical fiber laser cutter software. Please refer to the Optical Fiber Laser Cutter Software User Manual on the CD for instructions on software installation and use.

Attention

Please properly keep the CD and software encoder encryption dog attached. In case of missing, please cont our company for purchasing.

Reinstallation of the software may cause parameter loss of the system. Please perform backup of the related parameters before reinstalling the software or system.

The user shall protect the computer security, and do not insert unknown USB disk to prevent virus. For common computer hardware and software failures, the user should have basic capabilities to process.

The user shall not install other software on the computer or use the computer for other purposes. The company is not responsible for the consequences therefrom.
3.1.12 Other auxiliary part installation

Some types of machine are attached with other auxiliary parts, as per request from customers, and these parts should be installed by our customer service personnel. Moreover, users shall install scanner, printer and other equipment prepared by themselves.

3.2 Description of Operation Panel

As shown in Fig. 3-9:

- **Emergency stop button [EMERGENCY]**: Press this button to activate the emergency stop function. When the button is pressed down, the power will be cut off, and the equipment enters “Stop” state; to release emergency stop, rotate the button clockwise.

- **Key switch [LOCK]**: When the key switch is activated, the computer starts, and other power supplies can be turned on; rotate to the right to unlock, and rotate to the left to lock. If the equipment won’t be used, it is recommended to remove the key switch and keep it properly to prevent personnel without permission from operating the equipment.

- **Main power switch [POWER ON/OFF]**: The button is a self-locking illuminated pushbutton switch; press it to turn on the chiller and electric motors of each axis, and the indicator turns on; press the button again to turn off the chiller and electric motors of each axis, and the indicator turns off.

- **Laser power switch [LASER POWER]**: The button is a self-locking illuminated pushbutton switch; press it to turn on the laser power, and the indicator turns on; press the button again to turn off the laser power, and the indicator turns off.

- **Cylinder lifting button [AIR CYLINDER]**: The button is a self-locking illuminated pushbutton switch; press it to turn on the indicator; move the equipment to the end and trigger the in-position sensor, the electromagnetic valve of the cylinder is turned on, the cylinder drives the roller to rise for loading and unloading; press the button again to lower the cylinder, and the indicator turns off.

- **USB interface [USB]**: The interface is connected to the USB interface of the computer, and is used by USB disk.

![Operation Panel Diagram](Fig.3-9 Operation Panel Diagram)

| Tip | When the emergency is eliminated, rotate the emergency stop button clockwise to reset it naturally and release the emergency stop state; Other buttons are available only after the key switch is activated; Cylinder lift button is only used for loading and unloading; Cylinder lift is jointly controlled by the cylinder lift button and in-position sensor, and the cylinder rises only when both are effective. |

3.3 Equipment debugging

After installation, the equipment needs debugging and processing test. Equipment debugging mainly completes state detection of each module of the machine, including motion module, laser module and electrical I/O module.

Company Headquarter: No. 28, East Industrial Road, Songshan Lake High-Tech Industrial Development Zone, Dongguan, Guangdong, China.
3.3.1 Switching sequence

3.3.1.1 Switching on sequence

Turn on the main power → turn on the key switch → turn on the power switch → turn on the laser power → open gas source → open air cylinder switch

3.3.1.2 Switching off sequence

Close the cylinder switch → close gas source → turn off laser power → turn off the power switch → turn off the computer → turn off the key switch → turn off the main power

Attention: Please turn on/off the equipment as required, or else it may cause equipment malfunction.

3.3.2 Movement debugging

3.3.2.1 Stroke, limit and reset

Setting stroke of each shaft of the machine will play the function of breadth protection (equals to software limit). The travel parameters for each axis have been set up. Improper travel settings may cause the equipment unable to work in full breadth or cutting head over-limit and collision.

Limit switch is the hardware sensor equipped on limit position of the two ends of each shaft. After detecting limit triggering signal, the movement shaft will perform emergency stop to avoid “overreaching”. Minimum one limit switch is needed for each shaft to indicate limit position of the current shaft. The installation position of limit switch may differ due to different types of machine, so the triggering signal. Therefore, configuration is needed.

Zero point of the machine is a referential point of a certain hardware fixed in processing breadth. Generally, after power-on, “reset” is needed for the machine to create coordinate of lathe. The machines from our company generally take the limit switch position of each movement shaft as the zero point of the machine.

Attention: At ex-factory, configuration of parameters for stroke, limit and reset has been already performed. Unauthorized change of parameters by user before making clear its meaning is prohibited. Otherwise, failure of the equipment may possibly be caused.

3.3.2.2 Motor shaft movement

When the equipment is powered on properly, start the computer, and run software SmartCutting STD. In standby mode, the six direction keys on the software interface control the motion of cross beam and the cutting head. If the four directions of X-axis and Y-axis and up/down motion of Z-axis are normal, then the motion of X-axis, Y-axis and Z-axis motor is normal. If the motor shaft has any problem in motion, please contact customer service staff of Han’s Yueming Laser.

3.3.3 Laser debugging

Laser debugging contains two aspects: light emitting test and light route adjustment. The followings are the details for them.

3.3.3.1 Light emitting test

After normal power up, press the laser power switch on the right side cover, and then set the light emitting energy and time directly on the control panel, and test if the laser emitting function is normal. If there is no laser emitting from the spot spray laser tube, it means that there is problems with the laser emitting, and check is required. In case of laser emitting found from the laser tube, but no laser emitting from the cutting head, it means improper position of the light route, and adjustment of light route is needed.

If there is no laser emitting, first check the setting of laser parameters. Improper laser parameters may cause equipment malfunction or laser power cannot be adjusted. If the laser parameters are determined correct and there is no emitting still, you need to check the hardware problem.
Tips

The control panel of some types of machine is equipped with ammeter. With the ammeter, you can check if the power is normal.

3.3.3.2 Light route adjustment

As the center of the laser head is fixed, the nozzle center can be changed through adjustment screws on the cutting head to make it correspond to the laser center. Paste a layer of tape on the nozzle, then emit laser, and check if the hole punched on the tape by the laser coincides with the nozzle center; adjust the 4-faced screws repeatedly until the laser center coincides with the nozzle center.

![Optical Path Centering Diagram](image)

**Fig.3-10 Optical Path Centering Diagram**

Attention

Laser is invisible light and with direct harm to human body. While adjusting the light route, the operator is required to pay great care. The operator is not permitted to make adjustment until having received professional training. During adjustment, pay attention to the lens to have them free of pollution by smoke and dust.

3.3.4 Processing commissioning

After the above steps, the motion and laser commissioning are finished, and commissioning can now begin.

- First start the equipment in power-up sequence;
- Then, prepare the materials to be processed, and place the materials on the work surface horizontally;
- Import or draw graphics to be processed;
- Set the processing parameters (layer parameters) and related data processing technology (such as path optimization);
- Adjust the focal length of the cutting head according to the material;
- Move the laser head to the processing start
- Start processing.
Chapter 4 Equipment Operation

4.1 Preparing Graphics

- Save the graphics to be processed in a format supported by PLT, DXF, GBX or AI with graphics software;
- Run the cutting software SmartCutting STD, click [File] ➔ [Import] in the top left corner, select the type of processing graphics to import the graphics into the software;

4.2 Processing

- After setting the graphics, follow the power-on sequence and check if the laser power is turned on, if the gas supply is turned on, and if the cutting gas is proper;
- Position the cutting head to start working position by moving the four arrow keys of X-axis and Y-axis;
- Click [Follow Borders] and check if the material under processing is placed in the format, and if the cut graphics exceed the processing format;
- Then click the [Start] button to start processing.

4.3 Description of metal cutting process

We backed up the [Sample Parameters], [Factory Parameters Backup], and [Worktable Blade Drawings] on the F disk of the computer. The user can open the [Sample Parameters] file, and the cutting parameters are automatically imported to your computer for reference.

Description of file naming rule:

<table>
<thead>
<tr>
<th>Sample</th>
<th>3mm stainless steel</th>
<th>K-3.5</th>
<th>N2 1.5Mpa (O2 high 0.5 low 0.2Mpa)</th>
</tr>
</thead>
</table>

Name of processing graph:
Sample: This processing graph

Material thickness and name:
3mm stainless steel
The material is 3mm thick stainless steel

Scale value of cutting head:
K-3.5
Adjust the scale to -3.5

Name and size of cutting gas:
N2 1.5Mpa:
Cutting gas is 1.5Mpa nitrogen
O2 high 0.5 low 0.2Mpa:
High pressure oxygen pressure is 0.5Mpa
Low pressure oxygen pressure is 0.2Mpa

Note
The parameters depend on the specific model. Please refer to the specific parameters of each equipment

Below are a few terms of process:
4.3.1 Focus
The focus indicates the minimum diameter of laser beam. It is jointly determined by [Scale Value] of the cutting head shown in the figure above and [Cutting Height] in [Process Parameters] of the software, and the energy density at the focus is the maximum. According to the cutting material, the focus can be on the workpiece, in the workpiece or below the workpiece, as shown below:

![Focus Position](image)

**Fig.4-1 Focus Position**

Focus position depends on the type of cutting gas:

<table>
<thead>
<tr>
<th>Type of cutting gas</th>
<th>Type of laser cutting</th>
<th>Focus position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td>Gas cutting</td>
<td>On the workpiece</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>Melting cutting</td>
<td>Below the workpiece</td>
</tr>
<tr>
<td>Compressed air</td>
<td>Flame and melting cutting</td>
<td>In the workpiece</td>
</tr>
</tbody>
</table>

Note
Focus position changes with the lens condition. If the lens is dirty or old, the focus position will shift up. The motion range is up to several millimeters, depending on the age or the extent of the dirt. Therefore, it is very important to clean the lens regularly.

4.3.2 Cutting speed
During laser cutting, the cutting speed is selected according to the material and thickness of the cutting plate, and different cutting speeds have great impact on the quality of laser cutting. Select the appropriate cutting speed to improve the efficiency of laser cutting and get a good cutting quality.

- Impact of high laser cutting feed rate on cutting quality:
  - May be unable to cut, and sparks spatter.
  - Some areas can be cut off, while some areas can’t be cut off.
  - The entire cutting section is rough, but no melting stains are generated.

- Impact of laser cutting feed speed too slow on the cutting quality:
  - Cause excessive melting of the cutting plate and cutting section is rough.
  - Cutting seam is widened accordingly, and the entire area is melted in small rounded or sharp positions and can’t achieve ideal cutting effect.
  - Cutting efficiency is low, which affects the production capacity.

The feeding speed can be determined according to the cutting sparks: Generally, the cutting sparks spread from top to bottom; if the sparks tilt, the feeding speed is too fast; if the sparks are few, do not spread and gather together, the feeding speed is too slow. Proper cutting speed is shown in the figure below, the cutting surface is stable, and the lower section doesn’t produce melting stains.
4.3.3 **Laser cutting gas and pressure**

During laser cutting, select the cutting gas according to the material of the cutting plate. The cutting gas and its pressure have a great influence on the laser cutting quality. The main effects of cutting gas: combustion supporting and heat dissipation, blowing off melting stains promptly, preventing melting stains bounce up into the nozzle, and protecting the focusing lens.

**Impact of cutting gas and pressure on the cutting quality:**
- Cutting gas helps heat dissipation and combustion supporting, blowing off melting stains, resulting in better quality cutting section.
- If the pressure of the cutting gas is insufficient, it will result in the following effects on cutting quality: melting stains are produced when cutting, and the cutting speed can’t satisfy the productivity.
- If the pressure of the cutting gas is too high, it will result in the following effects on cutting quality: the cutting surface is rough, and the seam is wide; it will also cause part melting of the cutting section, and can’t form a good cutting section.

**The impact of cutting gas pressure on perforation:**
- If the gas pressure is too low, it is difficult for the laser to penetrate the cutting plate and the punching time increases, resulting in low productivity.
- If the gas pressure is too high, it may cause melting of penetration point and form larger melting points, thus affecting the cutting quality.
- During laser drilling, high gas pressure is generally used for punching sheet parts, and lower gas pressure is used for punching thick parts.
- When the laser cutting machine is cutting general carbon steel, the thicker the material, the lower pressure of the cutting gas. When cutting stainless steel, although the cutting gas pressure doesn’t change with the thickness of the material, the cutting gas is always in high pressure state. In short, the cutting gas and pressure of laser cutting should be adjusted according to the actual situation of cutting, and use different cutting parameters according to the specific circumstances in the specific application.

4.3.4 **Laser cutting power on cutting quality**

In laser cutting, the laser power also has certain influence on the cutting quality. The cutting power should be determined according to the material and thickness of the cutting plate, and improper power can’t obtain good cutting section.

- In laser cutting, the laser power is too small and can’t cut.
- If the laser power is set too high, the entire cutting surface melts, the seam is too large, and can’t obtain good cutting quality.
- If the laser power is set too low, it will produce melting stains, and produce scar on the cutting section. Therefore, set the appropriate laser power with appropriate cutting gas and pressure to get good cutting quality and prevent melting stains.
Chapter 5  System Maintenance and Care

To ensure normal use of CMA1530C-G-A, it is necessary to perform routine care and maintenance on equipment. Since the whole machine tool is assembled with high-precision parts, be careful in the routine maintenance process, operate in strict accordance with the rules of each part, and perform maintenance by dedicated personnel to avoid damage to components.

5.1 Prepare the following accessories

- Cotton swab: 2 bags.
- Degreasing cotton: 5 bags.
- Alcohol: 500ml, purity > 99.5%.
- Acetone: purity > 99.5%, water < 0.3%, capacity: 500ml.
- Lens cleaning wipes: 5pcs
- Inflatable ball: 1pcs.
- Dropper needle: 1pcs (medical).
- Disposable latex gloves: 1 pair.
- Multimeter: 1pcs.

5.2 List of Wearing Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Material code</th>
<th>Material name</th>
<th>Specification</th>
<th>Qty.</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>05020200554</td>
<td>Focus lens</td>
<td>f=120mm</td>
<td>1</td>
<td>Stains on the surface can’t be removed, and need to be replaced</td>
</tr>
<tr>
<td>2</td>
<td>03029002172</td>
<td>Nozzle</td>
<td>Ø1.5mm</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>03029002394</td>
<td>Nozzle</td>
<td>Ø3mm</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>05021200054</td>
<td>Protection glass (YAG)</td>
<td>3</td>
<td>Stains on the surface can’t be removed, and need to be replaced</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>05021200065</td>
<td>Collimator lens combination</td>
<td>1</td>
<td>Stains on the surface can’t be removed, and need to be replaced</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>04410200918</td>
<td>High temperature cable</td>
<td>1</td>
<td>If the alarm can’t be cleared and sheet sensor is insensitive because the cable is disconnected or connector is in poor contact, it needs to be replaced</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>04100600011</td>
<td>Sensor</td>
<td>1</td>
<td>If the alarm can’t be cleared and sheet sensor is insensitive and can’t be eliminated after cleaning the ceramic ring nozzle, replace it</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>06530300057</td>
<td>5 inch deionized filter element</td>
<td>1</td>
<td>Used by water chiller with three filter elements, and the filter elements must be replaced every three months</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>06530300068</td>
<td>5-inch wound filter element</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.3 Mechanical maintenance

Mechanical maintenance mainly includes maintenance of linear guides, gears and racks, and couplers. Mechanical maintenance requires the following aspects:

- After completing use every day, cleaning all parts of the equipment.
Lubricate the linear guides, gears and racks regularly with grease;
Make irregular check on the equipment to mainly check if there is poor contact of the joints. In case of abnormality, timely treatment is needed to avoid causing serious problems.

5.3.1 Maintenance of linear guides, gears and racks
As the core components of the equipment, linear guides, gears and racks mainly have a guiding and supporting role. To ensure high precision of the equipment, the linear guides, gears and racks must have high guiding precision and good motion smoothness. As the workpieces being processed will produce large amounts of corrosive dust and smoke during equipment operation, although we have made necessary protection for linear guides, there is the possibility that the smoke and dust will deposit on the surface of the guides, which has a great impact on the processing accuracy of the equipment, and will form corrosion spots on the surface of the rails, gears and racks and shorten the life of the equipment. To ensure normal and stable operation of the equipment and the quality of processed products, perform routine maintenance properly for linear guides, gears and racks.

Cleaning and maintenance:
Turn off the equipment, move the cross beam and the laser head to one end, wipe along the linear guide back and forth repeatedly with non-woven cloth until the linear guide, gears and racks are bright and clean; then, move the cross beam and the laser head to the other end, and wipe repeatedly in the same method. Finally, smear a little grease on the surface.

According to the frequency of use, periodically (every 15 days to two months recommended) check if the lubricant of linear guide, gears and racks is insufficient; use lubricating oil with oil viscous force about 32-150cst its.

Procedures:
\* Stop the equipment and disconnect the power supply;
\* Open the corresponding guard, and expose the oil nozzles of linear guide slide, gears and racks;
\* Aim the filler of the grease gun at the nozzle of the slider as shown on the manual of the grease gun, and apply oil;
\* Put back the guard;
\* Connect the power, and start the equipment.
\* Supply grease.

It is recommended to lubricate the linear guide, gears and racks every 70km or not more than three months, or else it will cause abnormal wear to the sliders and affect equipment accuracy and life; before lubricating, turn off the equipment, open the protective cover, and use grease gun to supply grease to the nozzle of the slider. The recommended viscous force of the grease is 40~120cst.

5.3.2 Fasten screws and coupling
After working for a certain period, the screws at movement joints and the coupling of the movement system may be loosen causing low stability of mechanical movement. Therefore, during movement of the machine, you should observe if there is abnormal sound or other abnormality with the movement parts. In case of problems found, timely fastening and maintenance are needed. Meanwhile, the screws of the machine should be tightened one by one with tool after a certain period of use. The first fixation should be performed roughly one month later after using.

5.4 Electrical inspection
Mainly check the stability of routine supply voltage, and keep the electrical cabinet of the machine tool clean and well-ventilated. Check the integrity and safety of the lines, check if the emergency stop button functions normally, test the function of the limit switch and home switch of each axis, and check if the sensor and the drive work normally. Check if the state of button switches, indicators and warning lights is normal, diagnose and eliminate the failures of the servo system.

5.4.1 Limit switch
Minimum once a month to make check on the effectiveness of limit switch of the X-axis and Y-axis. The limit switch plays the role of restraining the limit position of the movement to avoid machine impact (overreaching) causing damage to the machine. It is a must to make regular check on working state following the steps below:

\* Start up the machine to have the laser head reset;
Operate the machine to make the movement shaft move to the limit positions. If the movement shaft stops at the limit position, it means a normal operation of the limit switch. If it keeps moving while reaching the limit position, it means that the limit switch is out of order.

Tips

In case of hard impact occurs, please immediately press the emergency stop button to stop the machine, and find a solution for it.

5.4.2 Emergency stop button

Emergency stop button is a safety emergency component of the laser cutting machine relating to the safety of personnel, property and equipment. The functions must be tested in the following steps within the maintenance intervals specified on this manual.

- Turn on the laser cutting machine and perform the cutting operation;
- Press the emergency stop button. If all of the power supplies to the electrical load of the equipment are cut off, the emergency stop safety circuit is working properly. If one machine has two or more emergency stop switches, check one by one this way;
- Reset the emergency stop button and restart the device;

5.5 Light route maintenance

The light route system of the laser cutting machine consists of the reflection of the reflector and focusing of the focus lens. The focus lens doesn't have offset problem in the light route. However, the light route may offset after a long period of work or due to mechanical vibration. Although the reflector will not offset when the machine is under normal use, it is recommended that the user shall check whether the light route is normal each time before the machine is working.

The optical lens of the equipment has a mirror reflection and focusing effect on the laser beam. Although we have taken adequate protective measures, the material surface may release large amounts of corrosive gases and dust when cutting materials that easily produce dust with laser, and the lens can't completely avoid dust pollution. In addition, the lens is expensive and is easily damaged in the case of improper use, which isn't covered by free warranty of the manufacturer. Therefore, regular cleaning and maintenance of the lens are necessary. If the lens is damaged or seriously polluted, replace it in time. It is recommended to check and clean the lens before starting the equipment every day.

Lens being contaminated will produce the following consequences:

- Effective power of the laser beam is reduced, the power loss is increased, and the output power is unstable;
- The focal point of the laser beam shifts;
- If seriously polluted, the reflector and focusing lens may be broken down or the coating may be burnt by the laser beam, and become invalid completely.

Any bonding material will increase the absorption rate of the lens and reduce the service life. Therefore, it is necessary to prevent damage and contamination to the lens in the process of placing, installing and cleaning the lens, and the following measures should be taken:

- Do not use suction devices or inflatable devices to avoid scratching the lens surface;
- Do not directly contact with the film with tools or body; instead, separate the tool or body with lens cleaning paper and grip the edge of the lens;
- Do not clean the optical lenses with water or detergent. The surface of the lens is coated with a special film, which will be damaged by these materials.
- Do not apply too much pressure when installing or replacing reflectors or focusing lens, or else it will cause distortion of the lens, thereby affecting the beam quality;
- Detect and clean the lens in a dry and clean place. A proper operator station should have several layers of non-woven fabrics or lens cleaning paper;
- The operator should avoid sweat or breathe gas contacting with lens reflective surface, and keep other potential contaminants away from the work environment.

Note

Do not directly touch the surface of optical lens (protective glass, focusing lens, etc.) with hands, as this will cause scratches easily. If there is grease or dirt on the lens and seriously affects the use, clean the lens in time;
- Do not clean the optical lenses with water or detergent. The surface of the lens is coated with a special film, which will be damaged by these materials.
- Do not put the lens in dark and damp place, or else it will cause lens aging.
5.5.1 Correct leaning method

- To clean the lens with lens paper: Blow off the dust from the lens surface with a blower; clean the lens surface with alcohol or lens paper, place the lens paper on the lens surface flatly, drip 2 to 3 drops of high purity alcohol or acetone, pull out the lens paper towards the operator slowly, repeat the above operation several times until the lens is clean; if the lens is dirty, fold the lens paper two or three times, repeat the above steps until lens is clean. It is prohibited to drag dry lens paper on the lens directly.

- To clean the lens with cotton swab: first blow the dust on the lens with the spray gun; then remove dirt with clean cotton swab; make circular motion around the center of the lens with new cotton swab moistened with high-purity alcohol or acetone, wipe the lens, and replace another clean swab after one circle, repeat the operation until the lens is clean; wipe the lens with clean cloth, remove scars on the lens, be careful not to scratch the lens; take the cleaned lens to a place with plenty of light and observe; if the lens has good reflection, the lens has been cleaned; if the reflection of the lens is poor, continue to clean the lens; install the cleaned lens in the holder according to the method described above. It is prohibited to operate with used cotton swab.

- Storage of optical lens: Optical lenses should be properly stored to keep the lens quality intact. Storage temperature is 10~30°C. Do not place the lens in the freezer or a similar environment, or else it is easy to damage the lens when it is taken out; the temperature of the storage environment must not be greater than 30°C, or else it will affect the coating of the lens surface. Put the lens in the box in an environment without vibration, or else it will cause deformation of the lens, thus affecting the performance of the lens.

5.6 Auxiliary parts maintenance

5.6.1 Blower cleaning

For every 15 days, it is to clean the air pipe, and blower to prevent foreign matters accumulated from lowering effect of air out. Check if there is leakage, foreign matter, perform repair or maintenance. Long-term use of blower will cause plenty of solid dust accumulated inside it causing large noise and lower effect of air exhaustion ventilation and smell elimination. In case of insufficient suck force causing unsmooth smoke expelled, firstly power it off, remove the air-in pipe and air-out pipe from the blower, remove dust inside them, and then turn the blower upside down, and push the blade of it till it getting clean, and then assembly the blower ready for use:

![Blower](image)

5.6.2 Water chiller maintenance

Water quality and temperature of the cooling water will directly relate to lifespan of the laser tube or radio frequency tube. Cooling water must the purified water at temperature below 35°C; the cooling water must be kept clean and regularly replaced (minimum once a month). Check if the cooling water gets muddy, with deposit, at over high temperature, or water replacement required; during processing, frequently check water level to ensure sufficient water or if the water temperature is over high (higher than 35°C).
Steps of replacing cooling water:
- Power off the machine and stop the laser device;
- Unscrew valve of water outfall of the water chiller for a thorough drainage of water from the water chiller;
- Wipe the precipitate with a clean towel;
- Open protective cover of the water chiller and pour purified water into the water chiller;
- Start up the machine, it will start work when the laser tube is filled up with water and formed to circulation.

5.6.3 Platform maintenance
Cutting waste is easy to accumulate on the worktable of the equipment after long-term use and may damage the blade. Therefore, please clean up the waste in time. If the blade is damaged seriously, replace it in time. Cut with corresponding material, or else the cutting quality of corresponding position can’t meet the standard.

5.7 Maintenance cycle
- The maintenance period of laser, chiller in accordance with the maintenance cycle stated on the manual.
- Lubricate the guide rails, screws, and racks (XYZ axis) once every 15 days (lubricants of 1# viscosity coefficient recommended);
- Replace the cooling water of chiller once every 45 days (Watsons barreled purified water recommended; tap water prohibited);
- Optical lens of the machine: Clean the focus lens every 45 days, and clean the protective glass once a day;

5.8 Runtime maintenance
Before running the machine tool, check machine tool every day as required. If there is abnormal sound when the machine tool is running, shut down and check immediately. After the machine is running, shut down in required sequence, clean the work table of the machine tool and around machine, and do not place unrelated items on the work table or console of the machine.
- Regularly check the lubrication of the moving parts of the machine tool, ensure sufficient lubrication of X-axis rail, Y-axis rail, Z-axis rail and screw seat, ensure the accuracy of the machine tool, keep lubrication of all moving parts and extend the life of X-axis, Y-axis and Z-axis rails;
- Check the air pipe and water pipe for damage weekly; if damaged, inform Han’s Yueming Laser for maintenance;
- Clean the debris and dust from the air inlet and outlet, and filter screen of the machine tool weekly;
- Check the level of the cooling water weekly, and fill up in time if insufficient;
- Check the pollution of the reflector and focusing lens surface every two weeks, and clean the optical lens in time to ensure its service life;
- Check the outer optical path once every month; the optical path directly affects the cutting results;
- Check the filter in the gas path once every month, and remove the water and debris from the filter;
- Regularly check if external cables are scratched, and if the interfaces in the power distribution cabinet loose;
- After the machine tool is installed and used for six months, readjust the level of the machine tool to ensure the cutting precision.
5.9 Maintenance of long-term shutdown

If the machine tool will be shut down for long time, please lubricate the moving parts of the machine and wrap in rust-proof paper. For other parts, regularly check for rusting, process the rusting parts (add dust cover if possible), regularly clean and check the machine.
# Chapter 6 Troubleshooting

<table>
<thead>
<tr>
<th>No</th>
<th>Failure</th>
<th>Analysis Method</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The equipment can’t be turned on</td>
<td>Check if the emergency stop button is pressed down</td>
<td>Release the emergency stop button</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Main contactor in electrical box trips</td>
<td>Reset the main contactor</td>
</tr>
<tr>
<td>2</td>
<td>Optical fiber can’t emit laser</td>
<td>Water-cooling system isn’t turned on normally</td>
<td>Turn on the water circulation system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water protection is not triggered</td>
<td>Check if the chiller is working properly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Laser system is not turned on</td>
<td>1. Press the power button on the console of the optical fiber laser;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Press the emit button on the optical fiber laser</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Laser power damage</td>
<td>Replace the switching power supply of same specification</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Laser damage</td>
<td>Replace the laser</td>
</tr>
<tr>
<td>3</td>
<td>Equipment alarm</td>
<td>If motherboard parameters are correct</td>
<td>Correct motherboard parameters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Device alarm signal triggered</td>
<td>Check the alarm signal source of the equipment</td>
</tr>
<tr>
<td>4</td>
<td>Floating head alarm</td>
<td>Z axis isn’t reset, nozzle is loose, amplifier signal cable is loose</td>
<td>1. Z-axis homing process;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Check if the nozzle is loose;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Check if the amplifier signal cable is loose or damaged</td>
</tr>
<tr>
<td>5</td>
<td>Z axis positive limit overtravel</td>
<td>Software control problem</td>
<td>Click the “0” button in BCS100 monitoring interface</td>
</tr>
<tr>
<td>6</td>
<td>Processing graphics isn’t fully processed</td>
<td>“Only process selected graphics” is selected in the operation software interface</td>
<td>Deselect “Only process selected graphics”</td>
</tr>
<tr>
<td>7</td>
<td>Soft limit alarm when cutting sheet</td>
<td>Z-axis soft limit stroke is too small</td>
<td>Set the Z-axis soft limit stroke to a large value</td>
</tr>
<tr>
<td>8</td>
<td>Cutting head stops working when cutting sheet</td>
<td>High pressure bends the sheet, resulting in Z axis hardware limit alarm</td>
<td>It is recommended to encrypt the steel blade</td>
</tr>
<tr>
<td>9</td>
<td>Laser is intermittent when the equipment is in operation</td>
<td>Check if the water circulation is smooth</td>
<td>Clean the chiller, and clear the pipe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check if the power supply voltage is stable</td>
<td>Attach regulator to the input power</td>
</tr>
<tr>
<td>10</td>
<td>Reverse direction of motor shaft movement</td>
<td>If lines from the drive to the motor are connected improperly, and drive parameter settings are correct</td>
<td>Check electric earthing and drive parameter settings</td>
</tr>
<tr>
<td>11</td>
<td>Fail in movement of motor shaft or twittering of it during movement</td>
<td>Coupler and expansion sleeve are loose</td>
<td>Check if the coupler is loose</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improper setting of motor parameters</td>
<td>Set to the correct movement parameters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Damaged drive or motor</td>
<td>Change the drive or motor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change the drive or motor</td>
<td>Reconnect the motor and drive line</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>----------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td><strong>12</strong></td>
<td>Chiller flow alarm</td>
<td>Tank level is too low</td>
<td>Check the display window of water level gauge, add water to the green level, and check water circulation piping for leaks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chiller isn’t cooling and exhausts cold air</td>
<td>Check if the connector on inside cylindrical capacitor of the chiller is loose</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air filter clogging, improper cooling</td>
<td>Remove and clean the dust screen regularly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air outlet or inlet poorly ventilated</td>
<td>Ensure proper ventilation of the outlet and inlet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Severe low or unstable voltage</td>
<td>Improve supply line or use regulator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thermostat parameters set incorrectly</td>
<td>Re-set control parameters or restore factory settings</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Cooler turns on/off frequently</strong></td>
<td>Ensure that the chiller has sufficient cooling time (five minutes or more)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Excessive heat load</strong></td>
<td>Reduce heat load, or use a model of larger cooling capacity</td>
</tr>
</tbody>
</table>

**Ultra-high water temperature alarm**
Chapter 7  Transportation, Shipment and Storage

7.1 Packaging

The chiller, laser and accessories of laser cutting machine are packed in wooden cases. Other parts are wrapped with PE foam and protective film to protect external objects damaging any part of the laser cutting machine.

7.2 Transport and shipment method and precautions

- Do not climb or stand on the crate, or place any heavy objects on the crate.
- Do not drag or carry the product with cables connected to the product.
- Do not impact or scratch the panel and the display.
- The crate should be protected from moisture, exposure in the sun and rain.
- When lifting the machine, handle gently to avoid collision. The wire rope shouldn’t scratch the machine while lifting; if unavoidable, isolate with soft objects.

7.3 Storage conditions, period and precautions

The storage environment of the machine should avoid the rain, moisture, inclining, rodents, potholes and other hazards and ensure good ventilation. The storage ambient temperature should be -10°C ~ +40°C, and relative humidity is not higher than 85%. For the transport and storage less than 24 hours, the ambient temperature shouldn’t exceed 60°C. It is prohibited to store in open air for a long time. If temporary storage is required, in addition to the above requirements, check the storage conditions and packaging state to ensure the machine from damage.
Chapter 8 Appendix

8.1 Flat Equipment Installation Diagram

![Diagram of Flat Equipment Installation](image)

- **Fan**
- **Water chiller**
- **Laser components**
- **Machine tool body**
- **Nitrogen cylinder**

Unit: mm

- Fan
- Water chiller
- Laser components
- Machine tool body: 1500 (recommended)
- Nitrogen cylinder: 1200 (recommended)

Fig. 8-1 Flat Equipment Installation Diagram
8.2 Main Circuit Electrical diagram

Fig. 8-2 Main Circuit Electrical Diagram
Postscript

All final right of interpretation of this manual belongs to GD HAN’S YUEMIGN LASER GROUP CO., LTD; we will do our utmost efforts to ensure the accuracy of the contents of this manual. We do not assume any responsibility caused by misspellings and typing errors. Your comments will be highly appreciated.

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