

Fractional (CO₂) Laser Equipment

User Manual



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Preface

The CO₂ laser system is an intelligent laser treatment instrument .This machine is featured by compact structure, beautiful appearance, reliable performance, convenient operation and perfect safety .The technical specifications of the product have achieved the advanced international standard.

The instrument can be applied to general surgery, gynecology, otolaryngology .dermatology and cosmetology etc for different treatment such as cutting, vaporizing, cauterizing and solidifying .It can be used in ward and private clinics for its portability and compactness.

This machine is applicable to extensively dermatology, gynecology, otorhinolaryngology, dentistry, general or beauty surgery for incision, vaporization, cauterization and solidification treatment.

Beauty use	any pigmented nevus, spot, acne, syringoma, lipomyoma, hemangioma, scar, xanthelasma, lower blepharoplasty, tattoo,eyebrow excision assistance, wrinkle removal surgery.
Medical use	any pigmented nevus, spot, wart, nasal polyp, hypertrophy of turbinates, snoring, hemangioma, scar, skin tag, hemorrhoids and fistula, helosis, bromhidrosis, cervicitis, cervical erosion, vulva vitiligo,circumcision, tattoo,condyloma acuminatum, ect.
Physiotherapy	exposure to beam expander(selective) cures numbness of skin, peri-arthritis of neck, peri-arthritis of shoulder, arthritis, etc

WARNING

This instrument generates high voltages and laser radiations within the cabinet. Operators must pay much attention to safety during operation. Operations safety instructions are specified in this manual. Any improper use, adjustment or maintenance may cause laser radiation hazards or high-voltage electric shock.

Operation Principle of the System

1.1 CO₂ laser system

The CO₂ laser with a specific wavelength of 10.6 nm can be absorbed by human body tissue (no matter what color the skin is) by nearly 100%. Through laser emitter, the micropulsed laser beam shoots on the target skin in nanometer level to achieve a controllable precise treatment. The dimension of shooting area only can be measured in nanometer, which is precise enough for operators to control and adjust the treated depth and layer according to the clinical diagnosis.

The energy of CO₂ laser is even and steady. Its focused energy aims only at target tissue without any injury to surroundings. It is the heat and electromagnetic effect of the laser that people use to conduct non-blood or less-blood cutting, cauterizing, gasification and accurate microsurgery so as to avoid skin burnt. During the treatment, biochemical reactions of optical-thermal accelerate collagen reproduction and skin recovery, after exfoliation of the tiny scar; fresh and smooth skin can be regenerated.

The device outputs invisible laser. In order to operate with more ease, red semiconductor laser has been added to indicate.

1.2 Description of the mainframe

Most advanced microprocessor is employed to control (touch screen) relevant laser power, thus drives output from the sealed-off CO₂ laser. Operation is visible and easy, and its humane interface is quite easy and user-friendly.

1.3 Main cabinet

1. CO₂ laser and compound light source
2. Switch source with high voltage and constant current
3. Main control panel
4. Cooling system
5. Footswitch
6. Articulated arm

1.3.1 CO2 laser and indicator light



Sealed-off laser is made from glass tube with length of 1255mm and CO₂ to be its gas. Optic lens are stuck to each end whose sides are equipped with electrodes and water cooling tube. When the laser electrodes are connected to high-tension current, the CO₂ gas will be simulated to produce laser with laser outputs from germanium optic lens. The indicating light is visible so as to show the position of laser output.

1.3.2 Laser main power supply

The laser main power supply consists mainly of high-tension switch power that is used to ignite CO₂ laser tube.

1.3.3 Main control panel

The microprocessor-based main panel is used to control all functions by touching the thin film switch .Time and power are displayed digitally, which is clear and accurate.

1.3.4 Cooling recycle system

The laser cooling system is a closed circulating loop .The coolant (distilled water or ion water) is circulated by a pump.

1.3.5 Footswitch

A footswitch is used to control laser output .When the footswitch is pressed, the

shutter opens and laser emits from the articulated arm.

1.3.6 Articulated arm

The laser beam delivery system consists of light –weight, spring-balanced, 7-joint articulated arm. The working radius of the articulated arm at full extension is 110 cm.

Pre-startup Preparations

2.1 Unpack and inspect

After unpacking, please check that the instrument is not damaged, with circuit lines well connected and accessories available (see the accessories list)

2 .2 Connect articulated arms

Connect the articulated arms with the mainframe and screw up the helicoidal

2 .3Pouring coolant

A. Watering:

Unscrew the water inlet and air outlet orifice; add the water into water inlet orifice by funnel until water overflows .After watering, screw down the cap screw of both orifices.

B. water-relief:

Unscrew the water-outlet hole and spillway hole to let water comes out from the water-outlet hole, and then tighten up the helicoidal of both holes.

*remarks: Put containers to receive water that comes out from the spillway hole when adding water.

Warning

Never turn on power when the tank is empty.

Cooling water must be used with purified water or distilled water, No running water.

2.4 Checking power voltage

Ensure that the power voltage complies with the requirement of the instrument .Socket is in working order.

2.5 Connecting power cable

Plug the two terminals of the power cable into the power input socket and the power socket. (Make sure the ground socket is in working order)

2.6 Footswitch connection

Plug the footswitch cable into the socket on the rear part on the instrument .push in alignment on the notch until a tone is heard which means a successful lockup.

2.7 Commissioning operation

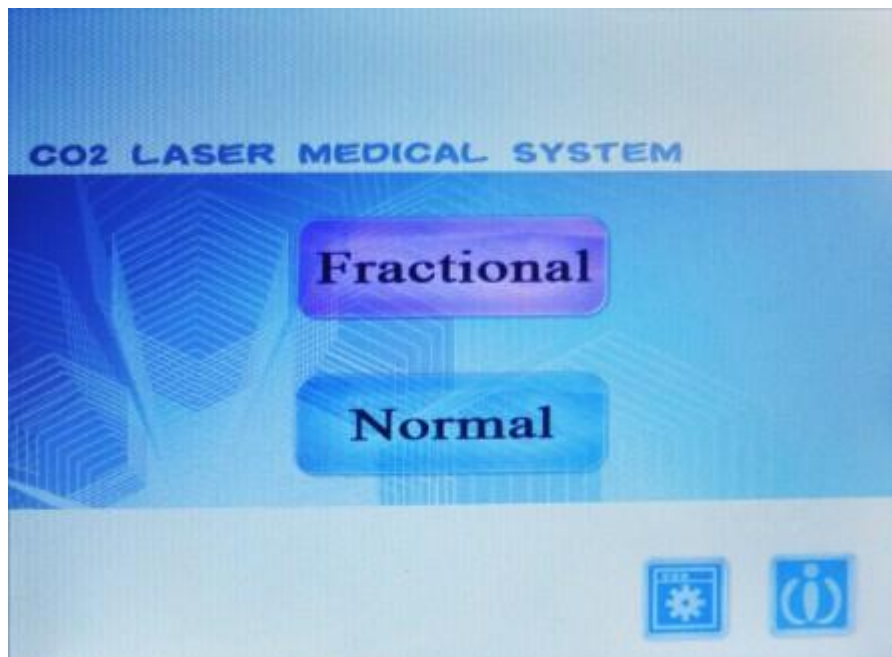
After 10 minutes of trial operations of the instrument, cut off the power supply temporarily.

3 Operation Procedures

3.1 Startup interface



3.2 Function selection interface



Fractional

3.2.1 Click into the fractional mode interface

Normal

3.2.2 Click into the normal mode interface.

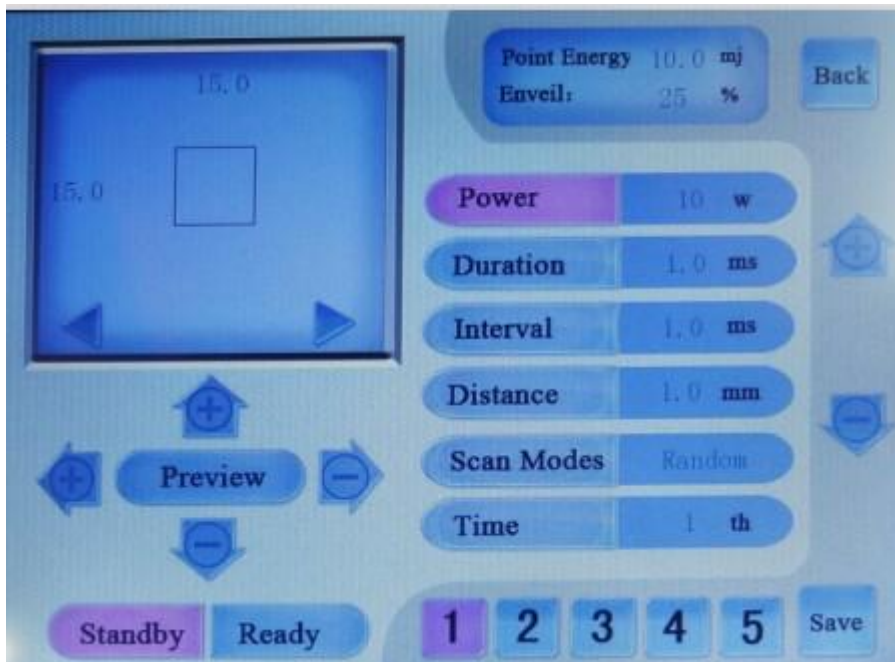


3.2.3 Click into the settings interface



3.2.4 Click into the system information interface.

3.3 Fractional mode interface:



Power

3.3.1 Press to adjust power, the scope is from 0 to 30w.

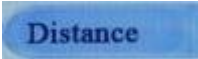
Duration


3.3.2 Press to adjust the duration, the scope is from 0.1 to 10ms.

Interval

3.3.3 Press to adjust interval, the scope is from 1 to

5000ms

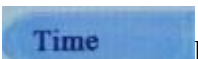
3.3.4  Press to adjust the distance between the spot to control the density of spots. The scope is from 0.1 to 2.6mm.


3.3.5  Press to change the mode, there are three scanning modes:






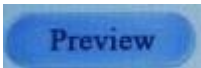
Sequential pattern: The scanning spot is from this side to the other side.


Shuffle mode: no order, shot at random.

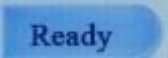
Halve mode: In the same line, the distance between scanning spots should be keep in a half of the fraction.


3.3.6  Press to adjust the scanning times, the scope is from 1 to 20th

3.3.7  Press 1-5 to select the storage space and all the parameters of the current page will be saved when press "Save". When using the machine, you can press 1-5 and do not need to setting parameter.

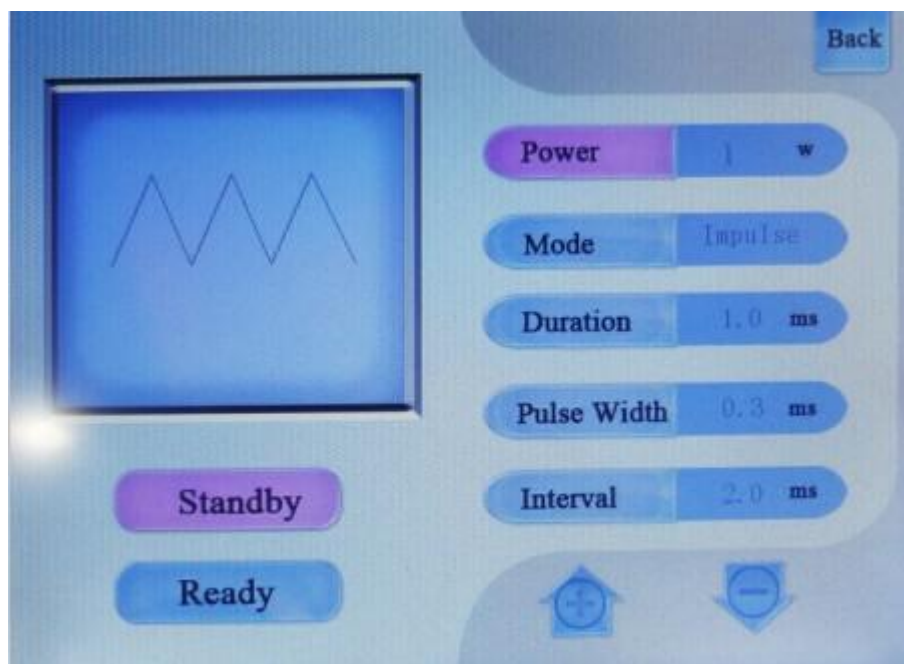
3.3.8  Push  or  to adjust vertical length, the scope is 0-20mm, push  or  to horizontal length, the scope is 0-20mm. Press , will come out the diagram that you selected.


3.3.9  These buttons are used for scanning pattern.

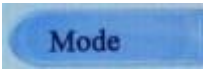
3.3.10  After the parameters were set, press the ready button, aim at the place, step on the foot switch, there will come out the light.

3.3.11  Click to back to the main interface.

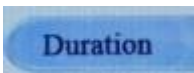
3.4 Normal mode interface:



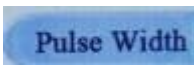
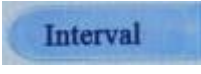
3.4.1  Press to adjust the power, the scope is from 0 to 30w.

3.4.2  Press to change the mode, there are three scanning modes:

3.4.2.1 Single mode: step on the foot switch once, there just a beam of

laser. Press  to control the time, the scope is from 1 to 100ms.

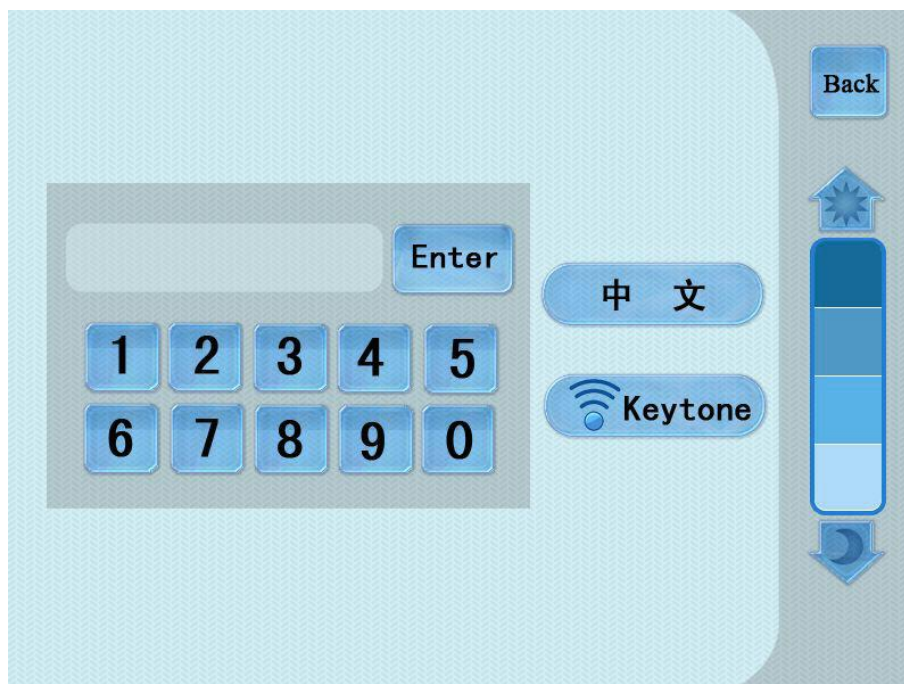
3.4.2.2 After stepping on the foot switch, there will be continuous emission pulse. Loosen

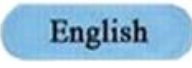
3.4.2.3 Normal mode: After stepping on the foot switch, there will be continuous emission pulse. Click  and  to adjust the pulse width and interval. It is super-pulsed when pulse width and interval is small.

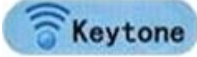
3.4.3 After the parameters were set, press the ready button, aim at the place, step on the foot switch, there will come out the light

3.4.4  Click to back to the main interface


3.5 Settings interface



3.5.1  click to change the language, Chinese or English

3.5.2  click to open or switch off the voice

3.5.3  ; Adjust the strength of indicator light

3.5.4  After entering password, enter into the calibration interface (operate by technician)

3.5.5  Click to back to the main interface

3.6 Protection interface

3.6.1 When galvanometric scanner is breakdown, there will come out the protection interface



3.6.2 When water pump do not work or other reasons that lead to the cooling water do not flow, there will come out water-break warning



interface

3.6.3 When the door of operation room do not close or the instrument door is opening, there will come out chain protection warning interface



4. Indicator light

In view of the invisibility of the 10.6 nm CO₂ laser ,a visible red diode laser emitting coaxially with CO₂ is provided to help the operator locate laser beam conveniently .Press the key ,the red light emit ,and a green indicator flashes .Press the key again ,the red light stops emitting ,and the green indicator extinguishes .

5. Precautions

5.1 Never let the laser beam be directed to human eyes or healthy skin.

5.2 To prevent human eyes or skin from being hurt by the reflected of laser light,

never allow the laser beam, be directed to any smooth reflective surface, such as stainless steel device surface, mirror surface, etc.

5.3If 75%, alcohol is used to clean or sterilize relevant part of the instrument, don't use the instrument till the alcohol vaporizes. Never operate the instrument in the presence of flammable anesthetics.

5.4In order to prevent the focus lens of the handpiece from being polluted and to keep a clear view of the surgical area, a smoke evacuator is recommended to the operator. The handpiece and focus lens must be cleaned every 3 months.

5.5The laser beam generated by this instrument is hazardous to eyes in the area within 35cm from the instrument (when someone is staring directly at the laser) operators must use safety eyewears when operating.

5.6This instrument generates high voltage inside; NO attempt should be made by NON-professional to open the cabinet of the instrument to avoid electric shock risk.

5.7 If the instrument gives out abnormal smell or sound, stop operation at once. Cut off the power first before any inspection.

Notice: The laser tube is made of glass. Take care to the handle to avoid damage.

5.8 keep the instrument in an environment with the temperature between 1°C~5°C and the relative humidity between 10%~80%.

5.9 Empty the water tank before transportation to prevent the laser tube from being frozen to break.

5.10 Don't leave around laser tube and the instrument recklessly when the instrument recklessly when their service lives end. Recycle according to the local environment protection regulations.

5.11To avoid improper use of the instrument, remove the key from the key switch and keep it properly when the instrument is not in use. The instrument generates high voltages within the power supply and laser tube. Please refer to professional personnel for maintenance to avoid electric shock.

5.12Operation room should be equipped with a dust or fume exhauster, because the dust arising during operations may be mixed with biological tissue particles.

6. Maintenance

The instrument generates high voltages within power supply and laser tube. Refer to

professional personnel for maintenance to avoid electric shock.

6.1 Lens cleaning

The output power may drop slightly after the instrument has been put into use for half a year. This may be caused by the stained focus lens of the Handpiece .Wipe the lens gently with moistened cotton ball once or twice .Be sure not to damage the lens.

6.2 Cabinet cleaning

If there is dirt on the cabinet, wipe gently with moistened cotton cloth and some detergent or toothpaste .DO NOT use over-wet cloth in case the water leaks into the inner part of the instrument ,causing short circuit and damage

Notice: For each using, please clean and sterilize the Handpiece by 75% surgical alcohol. And the surgical alcohol must be volatilized before use.

6.3 Power calibration

The practical laser output power and the preset panel power must be calibrated each year with standard laser power meter within validity period by trained of professional personnel.

6.4 Fuse replacement

Open the fuse holder with a screwdriver and removal the original fuse .Before replacement ,check and ensure the new fuse is identical in type and specification to the original one (250v/3.1ZA) to avoid damage arising from unfit fuses.

6.5 Blade sterilization


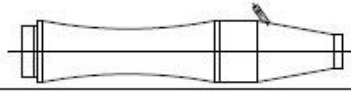
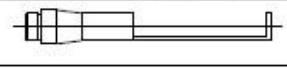
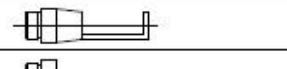

Blade must be sterilized after use.

7. Accessories

Standard configuration, different accordingly to customers' requests

User manual	1
Articulated arm	1
Power line	1
Foot switch	1
Switch lock key	2
Fuse ($\Phi 5 \times 20$, 5A)	2

Standard blade:

DWG NO.	FIGURE
JH-DT-01	
JH-DT-02	
JH-DT-03	
JH-DT-04	
JH-DT-05	

Remarks: apply 75% alcohol to disinfect and wait until it volatilize completely before each use

8. Troubleshooting Guide

Please refer to professional personnel for maintenance

1. **SYMPTOMS:** After the main power is on, either the panel does not light , or the water pump does not work,(when the water pump works ,there are slight vibration and sound)

POSSIBLE CAUSES:

- a. The power plug has not been properly.
- b. The emergency stop switch is pressed down.

ACTIONS:

- a. Check the two plugs at the two ends of the power cable.
 - b. Replug properly the red mushroom shaped button of the emergency key in the indicated direction to have the emergency key connected.
2. **SYMPTOMS:** NO laser beam emits out though the instrument seems running normally.

POSSIBLE CAUSES:

- a. The plug of the footswitch is not properly inserted.
- b. The setting of the control panel isn't suitable.
- c. When the instrument is used for the first time, after water is filled the cover is not closed tightly .The interlock keys are not pressed down .The joint of the articulated arm is loosened.

ACTIONS:

- a. Insert the plug of footswitch tightly according to operator's manual.
 - b. Set the panel again according to operator's manual.
 - c. Close the cover and press the interlock keys. Screw the joint tightly.
3. **SYMPTOMS:** No laser emits; The instrument alarms.

POSSIBLE CAUSES:

The instrument has been working for too long and the coolant is too hot

ACTIONS:

Stop running the instrument. Wait till the temperature of the cooling water goes down below 25 °C ,then restart the instrument .

4. **SYMPTOMS:** The instrument makes big noise when running.

POSSIBLE CAUSES: The instrument is not well-balanced

ACTIONS: Place the instrument on a stable and flat surface.

5. **SYMPTOMS:** Red pilot beam does not converge or dose not emit from the end of the tube. CO2 laser is off the center.

POSSIBLE CAUSES: The articulated arm is either damaged inside or not working normally. No laser emits or output power drops significantly.

ACTIONS: Refer to professional personnel for service

**Note: Operators are Not allowed to adjust the components listed below:
Laser tube, articulated arm, diode pilot beam, microprocessor board.**

9. Technical Parameters

Name	Sealed off CO2 laser
Laser Mode	Low-valance mode
Wavelength	10.6 microns
Output power	0~30w cont adjustable
Focus Spot Diameter	0.4mm
Divergence	4 Mrad
Lens Focal Distance	F=100 mm

Power Instability	±10%
Delivery System	Spring-balanced 7-joint articulated arm
Operation and control	Touching switch Microprocessor-controlled
Pulse Duration	0.05~1s
Working Modes	Continuous, Single pulse, repeat pulse and super pulse
Display	LCD display
Cooling system	Closed loop circulating water
Power supply	~230v,50/60Hz(see supply circulating water)
Input power	350VA
Environment Temperature	5~40℃
Relative Humidity	<85%
Gross weight	85KG
Atmospheric pressure	86.0kpa~106.kapa
Warning up time	5min
Electromagnetic requirement	No electromagnetic Field interface
Other working conditions	No obvious vibration or airflow
Dimension and weight	The machine packing cases 50*80*110 (CM) 70KG The handle part packing cases 75*20*14 (CM) 15KG

10. Warranty & Service

The instrument is a well designed, user friendly laser surgical system with high quality .It performs perfectly under normal use and maintenance .Within **One year** from the data of purchasing; any damage caused by manufacturing or components defects can enjoy free repairing service.

Such service is valid only if the instrument is properly used .Any damage cause by improper use of the instrument, such ad using unfitted power supply and wrong

accessories, operating in a manner other than specified in this operators manual ,damages caused by transportation ,accidents unauthorized installation or maintenance, etc, such free service will be invalid immediately .The free service does not include accessories transportation fee and door-to-door service charge of professional personnel.

11. System internal structural chart

