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AND PARTS FOR LASER WELDING, CUTTING,  
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**PT. MAXIMA GLOBAL MULTITEKNIK**

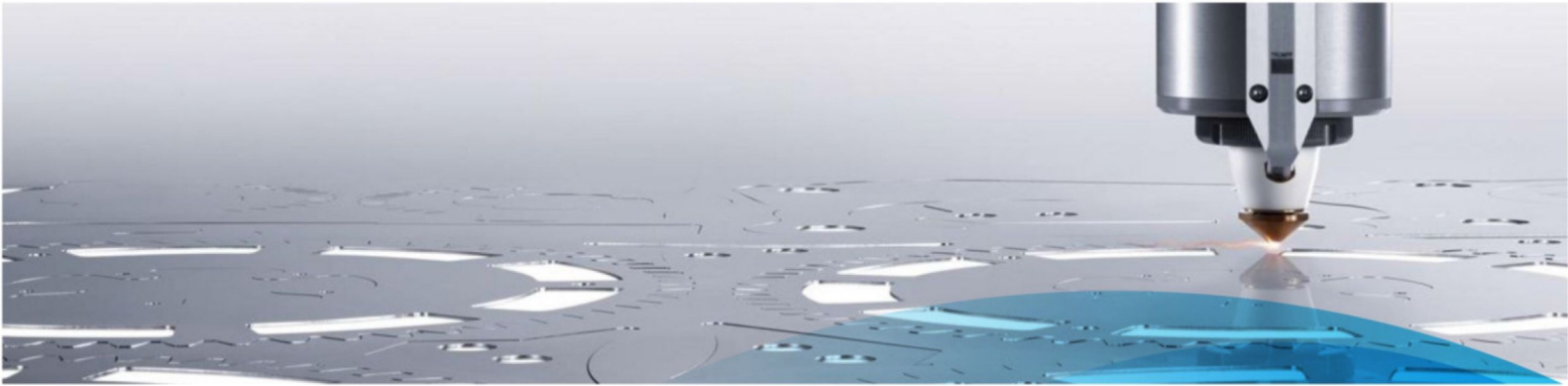
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# INTRODUCE

MAXIMA GLOBAL MULTI TEKNIK

*Penyedia mesin dan suku cadang untuk kebutuhan laser pengelasan, pemotongan, dan grafir terbaik yang hanya dapat dicapai melalui komitmen PT. Maxima Global Multiteknik, dengan dukungan seluruh mitra perusahaan dan penerapan manajemen teknologi efektif dan efisien.*



*PT. MGM (PT. Maxima Global Multiteknik) yang telah lebih dari 12 tahun berpengalaman pada bidang laser terus tumbuh dan berkembang sesuai dengan rencana strategis perusahaan. Banyak pengalaman dan proses pembelajaran yang telah dilewati dari tahun ke tahun yang untuk membuat perusahaan lebih maju dan tetap berkomitmen melayani kebutuhan pelanggan.*

*Kepercayaan yang diberikan dari berbagai pihak (pemerintah, swasta, maupun perorangan) telah membuat PT. MGM (PT. Maxima Global Multiteknik) menjadi perusahaan penyedia mesin dan suku cadang peralatan laser tersebar di berbagai sektor seperti pada bidang IT (elektronik komponen dan elektronik konsumen), packaging (rokok, medis, minuman dan makanan), auto part (komponen otomotif dan Interior otomotif), hardware (peralatan dan metal part), dan gift accessory (crystal, tekstil, kulit, dan perhiasan).*

*Komitmen PT. MGM (PT. Maxima Global Multiteknik) untuk menyediakan kebutuhan mesin dan suku cadang laser untuk konsumen yang tidak terlepas dari peran setiap anggota P T . MGM dalam melakukan perbaikan, perawatan, dan kegiatan kunjungan ke konsumen dengan berbagai manajemen dan keahlian pada bidang laser yang efektif, efisien, serta memperhatikan standar K3 (Keselamatan Kesehatan Kerja) dan lingkungan kerja.*

*Kiprah PT. MGM (PT. Maxima Global Multiteknik) dalam keunggulan mesin dan perbaikan mesin - mesin laser tidak akan berjalan dengan baik tanpa adanya dukungan dan kerja sama yang baik dengan seluruh mitra kerja perusahaan (penyuplai, pihak perbankan, dan SDM yang memiliki kompetensi tinggi).*

*Sebagai wujud dari rangkaian proses pembelajaran dan pengalaman perusahaan melalui manajemen teknologi dan keunggulan mesin, maka kami siap untuk memenuhi kebutuhan mesin laser dan memberikan pelayanan yang terbaik.*

# MAX 200

## *Welding Series*



## **1. General Introduction**

### **1.1 Advantages**

A high ratio of welding depth to spot diameter results in slender welding seam, small affected area, little thermal distortion, and fast welding.

The welding seam is smooth, therefore there is little or no need to polish the seam after welding.

The welding seam is in high quality with no gas bubbles left behind. The process can even improve the impurity of the mother material.

The welding spot is very small and can be positioned accurately.

Two of the same material or different materials can be welded.

## 1.2 Welding materials and Applications

The laser welder can weld the same material like titanium, nickel, tin, copper, aluminum, chromium, niobium, gold, silver, steel and their alloys. And it can weld two different materials, like copper-nickel, nickel-titanium, titanium-molybdenum, brass-copper, low carbon steel-copper. It also can be applied widely to mobile phone batteries, sensors, clocks, watches, jewelry, electronic components, eye glasses, crafts precision instruments and medical apparatus etc.

## 1.3 Technical data

MAX 200	
Laser Type	YAG
Laser Wavelength	1064nm
Maximum laser output power	200 W
Maximum laser peak power	10 KW
Maximum laser pulse energy	100 - 120J
Pulse Width	0.1~20ms
Pulse frequency	0.1~20Hz
Spot Diameter	0.3~2.0mm
Weldign Depth	0.05mm-3mm
Number of waveforms	60 Set
Targeting Positioning	Microscope coaxial observation system
Electricity Demand	220V/11A (50/60Hz)
Power consumption of the whole machine	4 KW
Cooling method	Integrated water cycle heat exchange forced air cooling
Weight Machine	150 KG
Size Machine	761 565 555 mm



## ***2.1 Procedures of Turning on and off the machine***

### **2.1.1 Procedures of turning on the machine**

**Note that you should not turn on the machine in 10 seconds after shutting down it. It may cause some abnormal phenomenon.**

- a. ON the switch power and emergency button in the working condition.
- b. Make sure pump button in bottom position
- c. Unlock the key. The monitor show the logo picture, then wait until voltage, water flow and water temperature shows Normal! .
- d. And turn ON in the top right corner of the panel
- e. Use keystroke to set the welding data you need (the default setting is 00 set), then the machine is ready

### ***2.1.2 Procedures of turning off the machine***

- a. Turn OFF in the top right corner of the panel
- b. Chose Yes into form shutdown
- c. Lock the key when you see the shut down prompt screen
- d. Wait 10 second for cooling machine
- e. OFF the switch power

### ***2.1.3 Procedures for filling water the machine***

- a. Press pump button in up position
- b. And Filling Aquades (non mineral water ) into water in until alarm full beep

## 3. Construction

### 3.1 Optical system

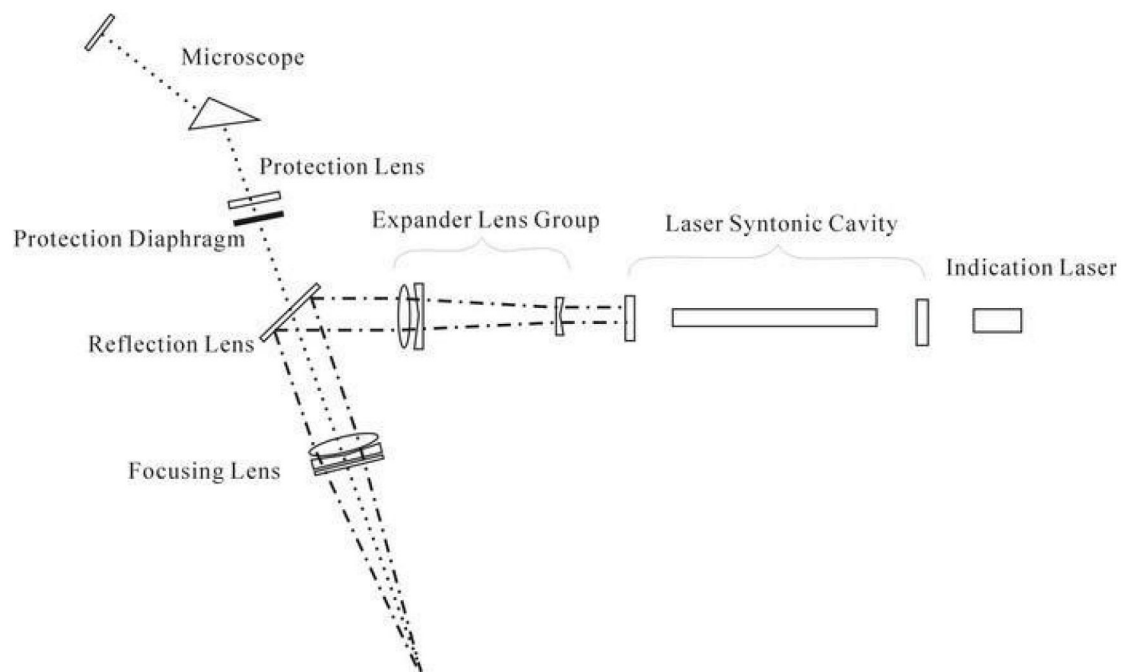


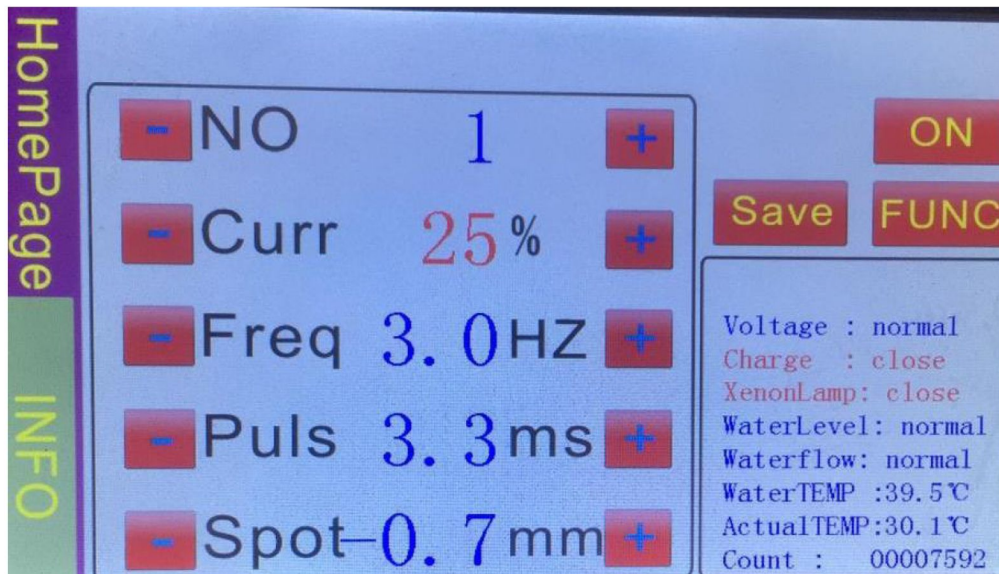
Figure  
2

### 3.2 Adjustment of the machine

#### 3.2.1 Laser spot calibration

Calibration of laser spot is to adjust parallelity between total reflection lens, partial reflection lens and uprightiness between these lens and laser rod with red indicator, so as to maximize the output energy contained in laser spot and ensure it to transit the central hole.

## 2.2 Software operation



### Parameters of Row 1

**Current:** voltage adjustment range (0% ~ 100%),

**Pulse:** trigger pulse width (0.1ms ~ 20ms), precision of 0.1ms

**Frequency:** pulse frequency (0.1Hz ~ 20Hz), 00 means output once, 0.1 ~ 20 means continuously output, adjust alternation 0.1Hz. The three Volt, ms, H parameters are limited by automatic power protecting calculation.

**Spot:** focal offset for reference, refer to the moving range of the beam expander (0 ~ 20mm), precision of 0.1mm.

**No:** can save 50 settings, the default settings the 01

## **.1.1 Adjustment of the laser**

Adjustment of the Nd: YAG laser should be patient and careful. The procedure is showed as follow:

Take off the sealant of the laser rod. Turn on the indicator and you will see a red light at the end of the laser rod. Cut a white paper of 10mm width and use it to check whether the facular of the indicator on the center of the laser rod. If there is some offset, you need to adjust the orientation of the indicator so that the red beam can shot on the center of the laser rod on one side and output on the center of the other side.

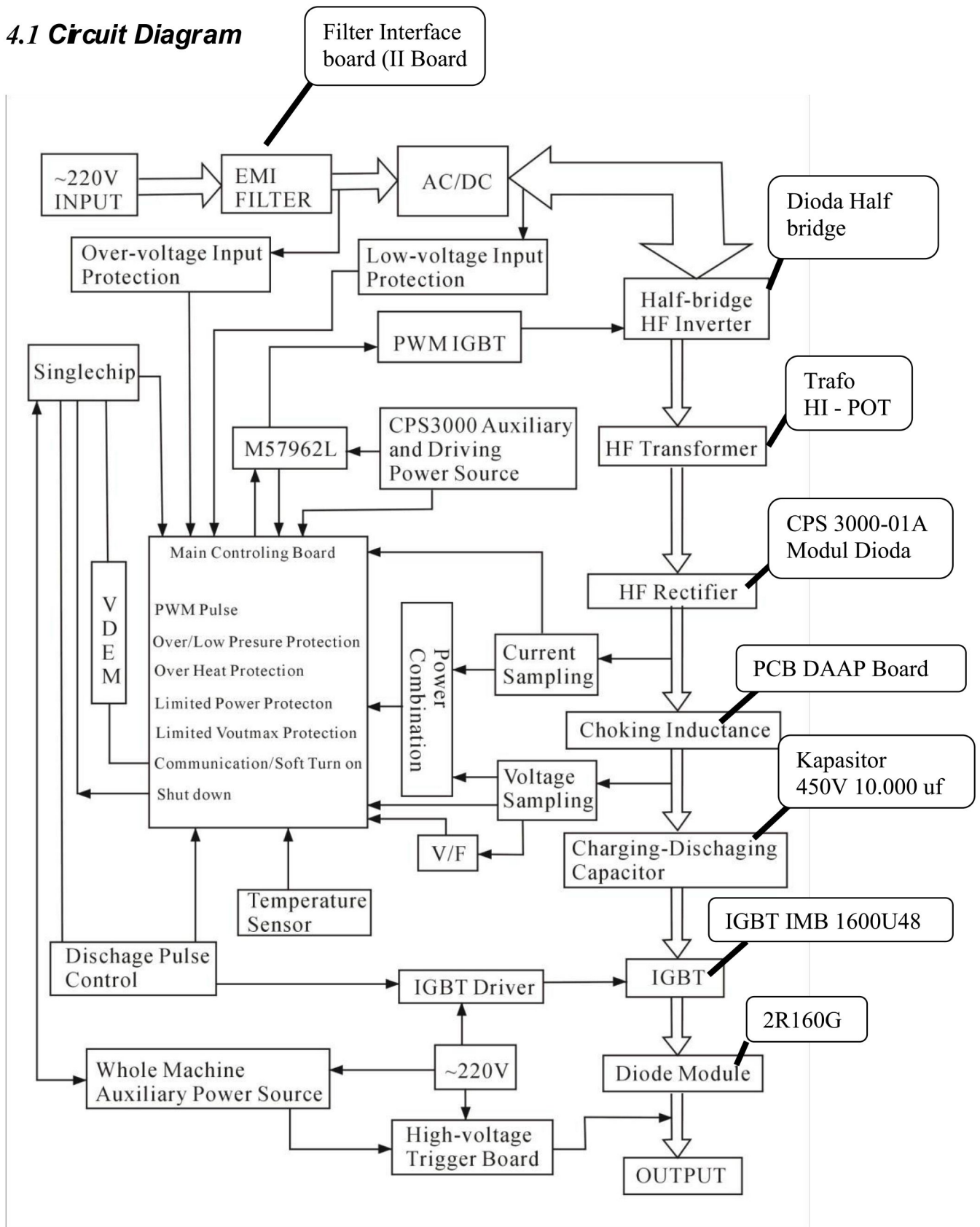
1. The beam output from the indicator shoots on the surface of the Nd: YAG laser rod will be reflected. Use a white paper to catch the reflecting beam around the indicator side. If it's not in the superposition with the output beam from indicator, then we should adjust the bolt of the basement of the laser pump to make the reflected beam and output beam in superposition.
2. Install the total reflection lens, use bolt 1 & 2 to adjust its orientation to make the reflected beam from the lens travel along the primary path. Then the reflected facula of the lens and the facula of the Nd: YAG laser rod will be in superposition.
3. Install the partial reflecting lens, use bolt 3 & 4 to adjust its orientation to make the reflected beam from the lens travel along the primary path. Then the reflected facula of the lens and the facula of the Nd: YAG laser rod will be in superposition.
4. Switch on the power. When you see Ready on the monitor, adjust the voltage to about 250V, frequency of 1Hz, pulse width of 2ms to output laser. Place a light sensitive paper between partial reflector and beam expander to see whether it has output laser. If it hasn't the repeat procedure of 1, 2, 3, 4, 5. When the laser facula is found, then slightly adjust blot 1, 2, 3, 4 to make the laser facula the roundest and brightest.

## **.1.2 Adjustment of the reflector**

The reflector is between beam expander and the focal lens. It's installed in 45 degree oriented. There are three bolts for adjustment. Adjust them to make the laser beam shoots on the center of the focal lens.

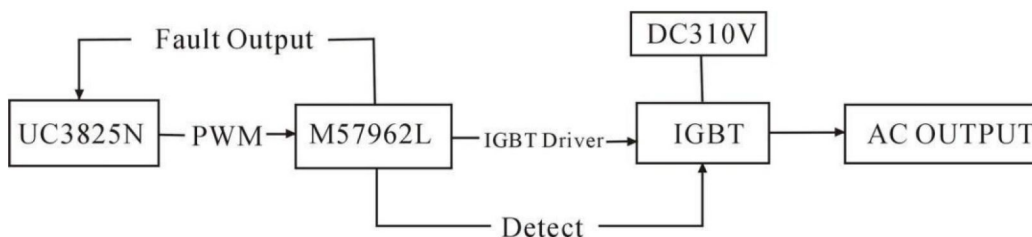


### 4.1 Circuit Diagram



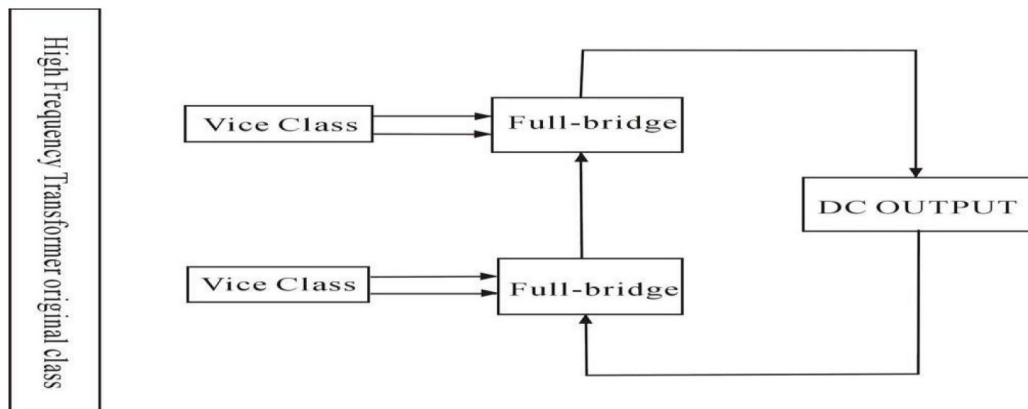
## 4.2 Circuit Instruction

1. Over/Low voltage protection: first over voltage sampling N1A (LM324), go through N1D (LM324), LED2 lit (protection); then low voltage sampling N1B, through N1C, LED1lit. Result of the comparison with these two will be sent to UC3825N SS (SOFT START) pin.
2. CPS3000 auxiliary and driving power source: two of -8V and two of +15V power supply for two of IGBT driver M57962L; +12V output for the power supply board RELAY1, RELAY2; positive and negative 18V supply for the main control board.
3. Half-bridge inverse:

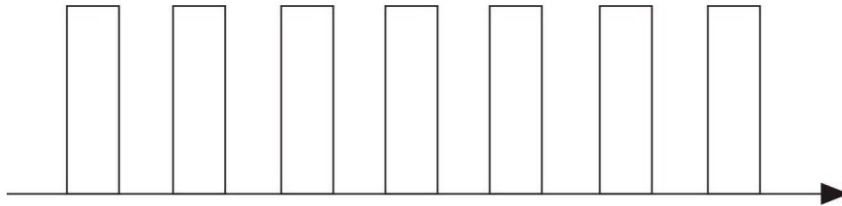


Feedback result send to UC3825N SS (SOFT START) pin

4. Current sampling: High frequency rectifying board sampling, the result of the comparison by N17A (LM358) controls VPWM, then form a limitation signal of the current (N18A, LED1) and a current signal of power limitation.
5. Voltage sampling: main control board sampling, the result of the comparison by N17B (LM358) controls VPWM, then form a signal of over/low voltage (N16A, LED3; N16B, LED5), a current signal of power limitation, over voltage and over heat signal (N8A) LED4 to control UC3825N shutdown pin.
6. Power limitation protection: current signal of power limitation and voltage signal of power limitation are combined by multiplier MC1495 to form a power sampling, the result of the comparison by N17B (LM358) controls VPWM, power sampling forms a signal (LED2, LED5) of power limitation through N18B.
7. High frequency rectify:



8. Trigger pulse width control: after LINE4 import  $-DD$ , +12V, laser pulse, ON/OFF (singlechip soft start and shut down the machine) signal from singlechip JP2 to trigger pulse width detecting board X5, laser pulse input to the IGBT driver, control IGBT conducting duty cycle, that means output laser pulse width (MS) and pulse (Hz), ON/OFF imported to main control board X14 control UC3825N SS (SOFT START) pin.



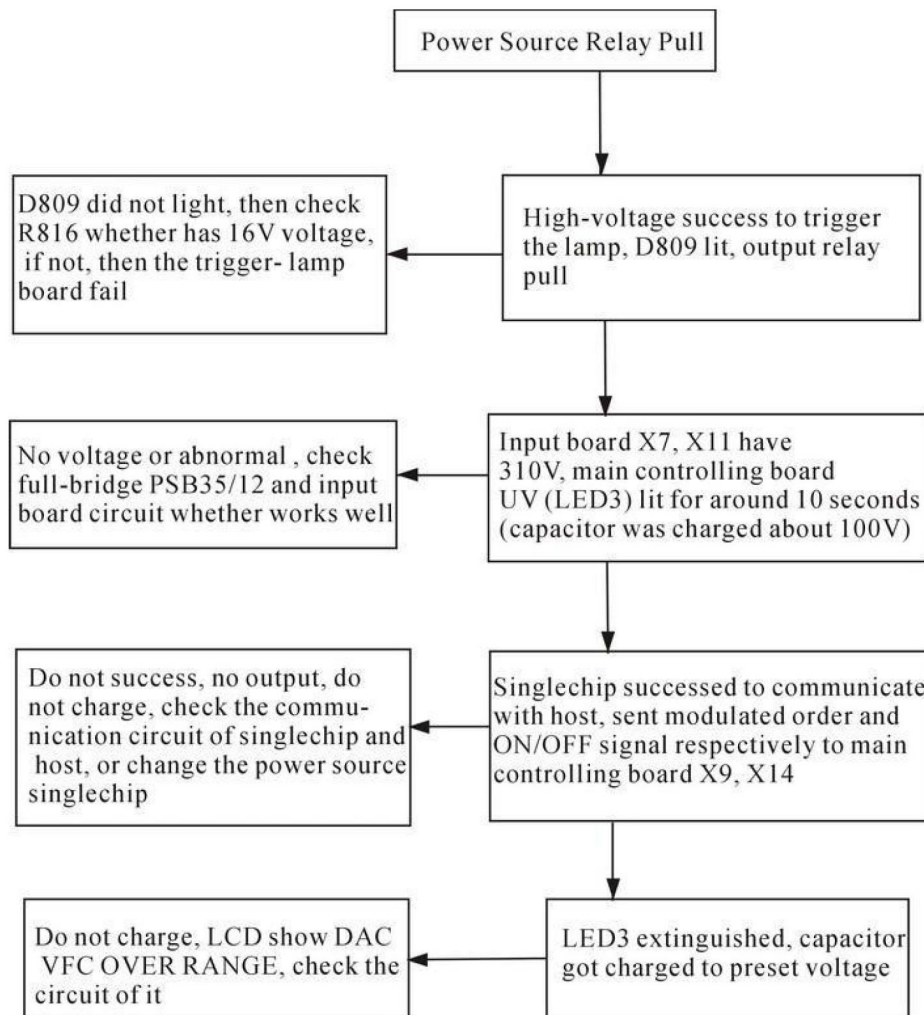
9. High voltage trigger: pulse width modulator U801 produce modulated pulse of U802, U802, switch transformer produce trigger high voltage. Success to trigger, relay J801 pull, D809 light, relay of power output pull.
10. Singlechip: communicate with the main machine, sending the modulated voltage VDEM order, receiving the V/F signal and triggering lamp control.

### 4.3 Course of Starting the Machine

Power source relay pull, high voltage trigger board work to trigger the lamp, success, then relay J801 pull, D809 lit, power-output relay pull. At the same time, input board over/low voltage protection circuit detect input voltage, CPS3000 charge if it's normal. Input board X7, X11 have 310V voltage, singlechip communicate with the host, if success, singlechip output modulated voltage order and ON/OFF signal severally go to main control board X9, X14, UV (LED3)



lighting for 10 sec. When voltage of charge/discharge capacitor rises up to about 100V, LED3 extinguished.



#### 4.4 Frequent failure

1. Electrify relay pull and then drop, the winding connection of the two relay was wrong;
2. Misinformation about the water pressure, optical coupler T402 pull up high-level voltage only have 2.4V, change a new one will be 3.6V;
3. Expander motor heat, connection of the motor was wrong, abnormal about the driver, the connection of the driver was wrong;
4. Red indicator don't light, the current of the indicator was distributed, remove the indicator (only happen in the old version);
5. The lamp don't light, wrong connection of the potentiometer, illumine or adjust the lamp, the voltage fluctuates, the power source of the laser cause the external voltage fluctuates, need to

change the circuit;

6. Gas valve don't work, Q305 on the PCB fail (happen in the old version);
7. Power source of the laser disturb the keypad, screen, filter, on the input pin of the keypad connect a 104 capacitor (only happen in the old version);
8. Trigger the lamp then the power source relay drop immediately, first judge the power source of the laser works well (use the self-detect), remove the electrical wire of the laser lamp, relay drop too, judge that was not triggering lamp cause the power source relay drop, after LCD showing LOAD OK but without PASS1 OK, PASS2 OK, then go to READY! Judge it's communication fail. Electrical wires connection of the communication was wrong.
9. Shortcut panel, feet switch fail, or automatic output that is the power source disturb.
10. Gate failure: normally, when started the machine the gate will take an action and make a sound. One is the motor of the gate fail. Two controlling signal of the gate at P404 (pin 2 and 4) interchange;
11. Distortion of the LCD when start the machine, LED fail;
12. Detecting no gates when started the machine: one is the motor of the gate isn't well welded; two is the limitation signal wire of the gate is staved; if everything work well it must be the main controlling board damaged.
13. No light after the lamp is triggered: check whether the IGBT is failed, C6 must have 19.5V voltage to supply.

# Sample





# PT. MAXIMA GLOBAL MULTITEKNIK

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