全自动钢圈激光焊接机

使用说明书

Operating Manual

森川激光
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目录

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一．页面介绍 Page Introduction

1. 主画面 Main page

主画面为设备操作的主界面，可对设备进行动作初始化，报警复位，产量统计，速度计算等工作。如图 1 至图 4 所示。

The main page is the main interface of equipment operation, which can make action initialization, alarm reset, output statistics, speed calculation and so on. As shown in Figure 1 to Figure 4.

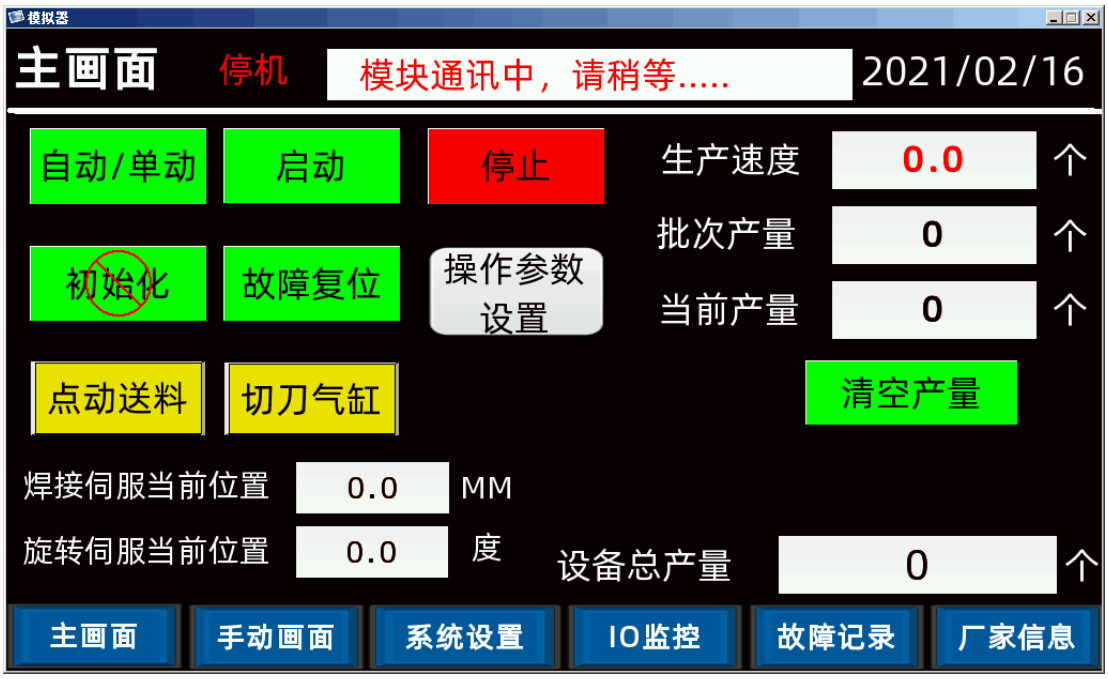


图 1

Figure 1

图 2

Figure 2

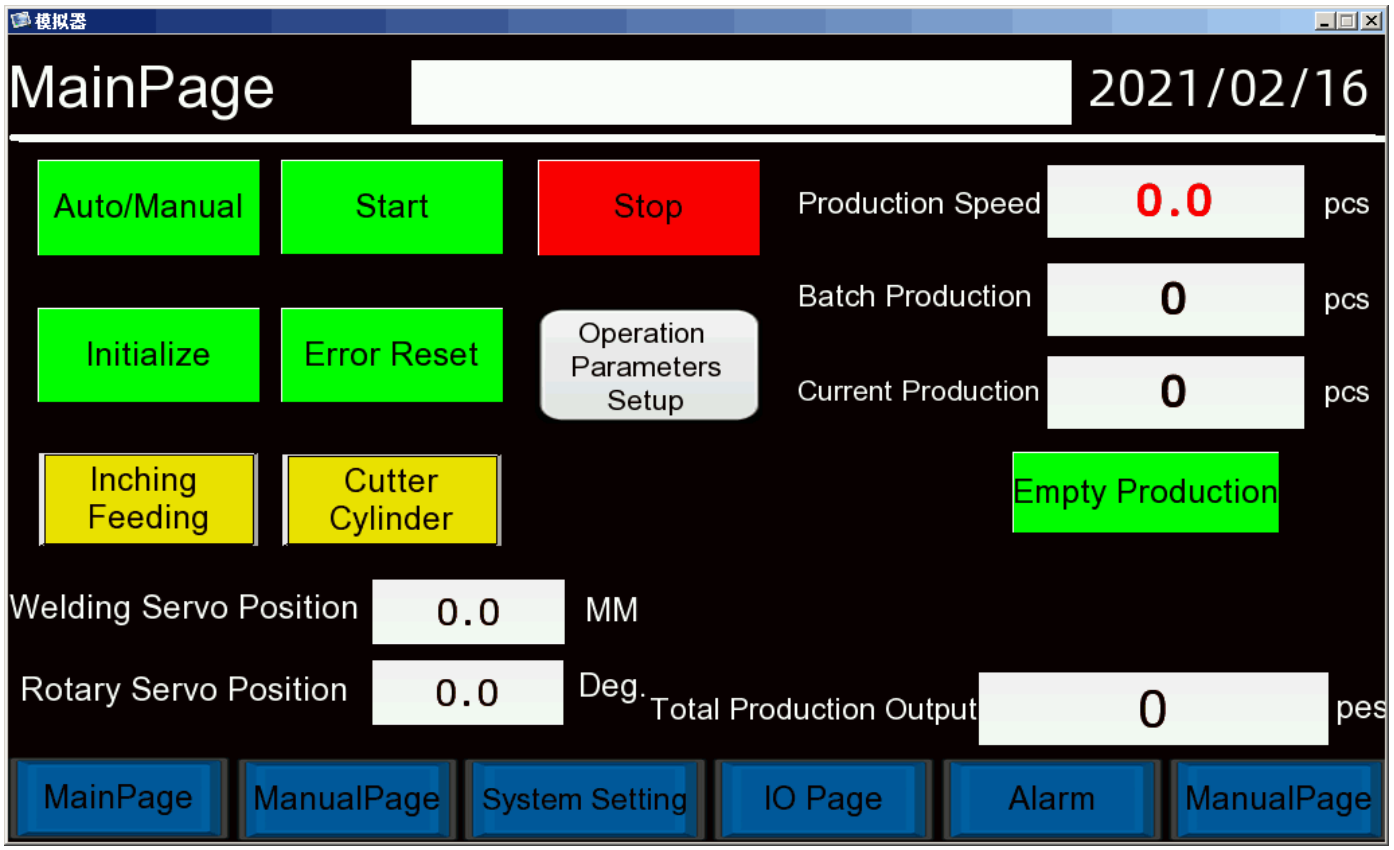


图 3

Figure 3

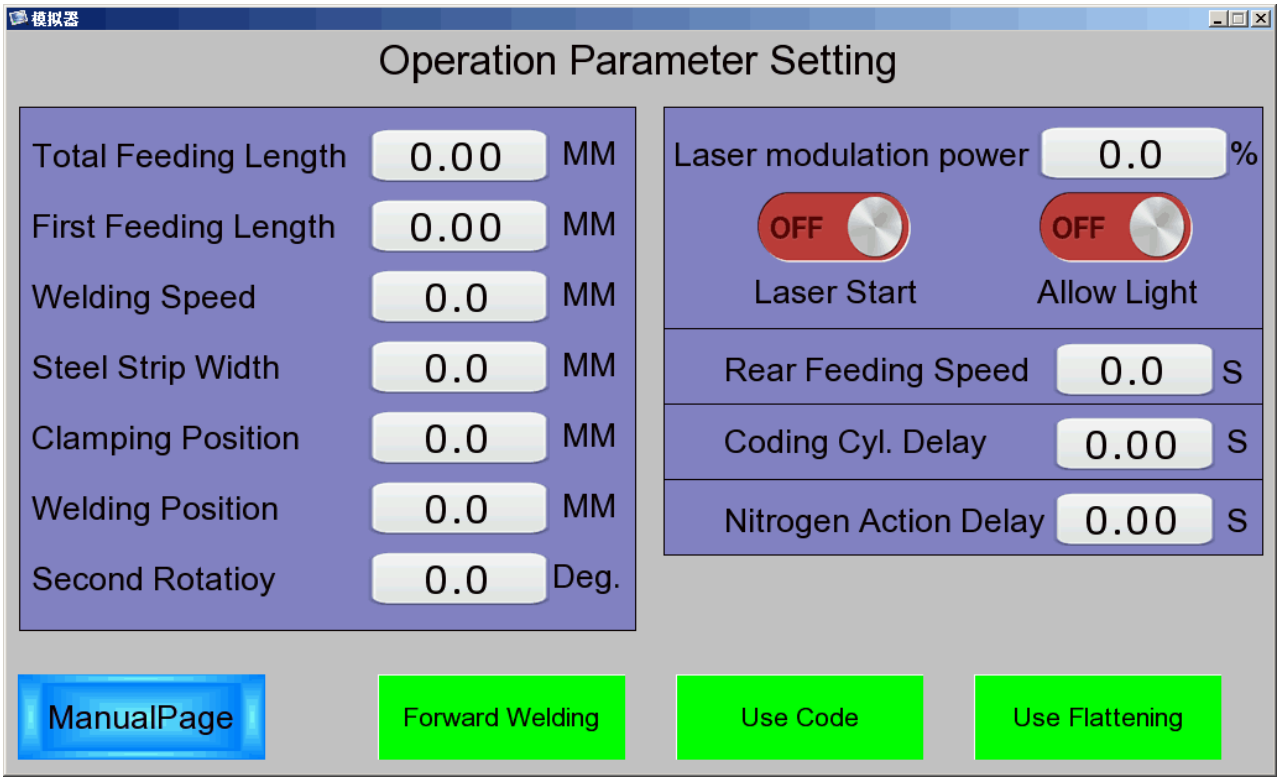


图 4

Figure 4

2. 主页面按钮说明：Key description of main page:

3. 自动运行/单动运行：切换设备运行状态，正常生产打到“自动运行”即可，若需要检查动作运行是否正常，可点击为“单动运行”，并按触摸屏“启动运行”或者设备上的启动按钮进行单步操作。

   Auto/Single: Switch the running state of the equipment, and click "Auto" for normal production. If you need to check whether the operation is normal, you can click "Single" and press "Start" on the touch screen or the start key on the equipment for single operation.

4. 启动运行：设备运行启动开关

   Start: Equipment runs

5. 停止运行：设备正常停机开关

   Stop: Equipment normal stop

6. 初始化：设备初始化操作，一般在机器上电完成，或者故障复位完成后，需要

点击初始化才可运行设备

Initialization: The equipment initialization is usually completed after the machine is powered on or the fault reset is completed, and it is necessary to click Initialization before running the equipment

7. 故障复位：当设备故障发生，排除掉当前故障之后，可清除发生的报警

Fault reset: When equipment failure occurs, the alarm can be cleared after the current fault is eliminated

8. 运行参数设置：可对运行参数进行设置，如送料长度，首次送料长度，夹料位置，焊接宽度，焊接速度等

Operation parameter setting: The operation parameters can be set, such as feeding length, first feeding length, clamping position, welding width, welding speed, etc

9. 生产速度：可查看当前设备运行速度

Production speed: Can view the current equipment running speed

10. 批次产量：当设备当前产量达到批次产量时，设备会自动进行停机操作

Batch output: When the current output of the equipment reaches the batch output, the equipment will be automatically shut down

11. 当前产量：当前设备产量计数

Current Output: Current equipment output count

12. 清空产量：清空当前产量

Clear output: Clear the current output

13. 焊接伺服当前位置：查看当前焊接伺服位置

Current position of welding servo: View the current position of welding servo

14. 旋转伺服当前位置：查看当前旋转伺服位置

Current rotary servo position: View current rotary servo position

15. 面板按钮说明：如图 5，图 6 所示。

Panel key description: As shown in Figure 5 and Figure 6.

图 5

Figure 5

图 6

Figure 6

电源开关：设备电源启动开关

Power: Equipment power

启动运行：设备运行启动开关

Start: Equipment runs

停止运行：设备正常停机开关

Stop: Equipment normal stop

电源指示：设备 220V 电源指示

Power indication: 220V power indication

故障报警：设备报警蜂鸣指示灯

Fault alarm: Alarm buzzer indicator

急停开关：按下按钮，设备紧急停止

Emergency stop switch: Press the key to stop the equipment urgently

工作照明：工作台照明灯启动旋钮

Work lighting: Start knob of workbench lighting

16. 手动画面 Manual screen

在该页面中可以对设备上的各动作进行点动测试，包括气缸和伺服。如图 7 至图 10 所示

Can perform inching tests on various actions on the equipment, including cylinders and servos. As shown in Figures 7 to Figures 10

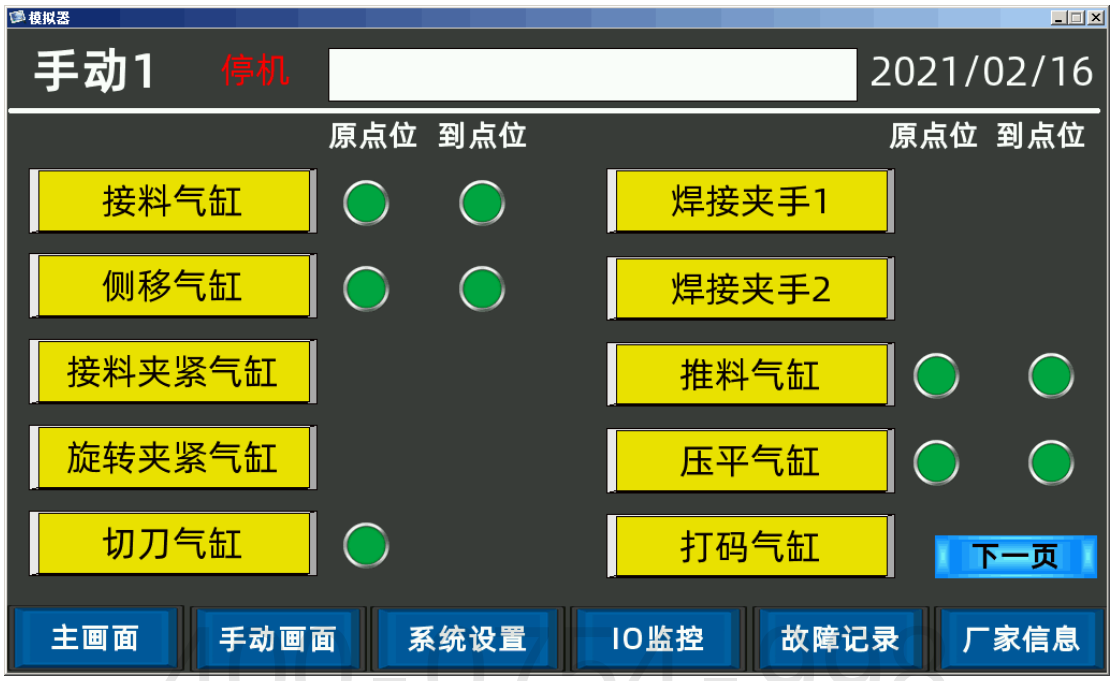


图 7

Figure 7

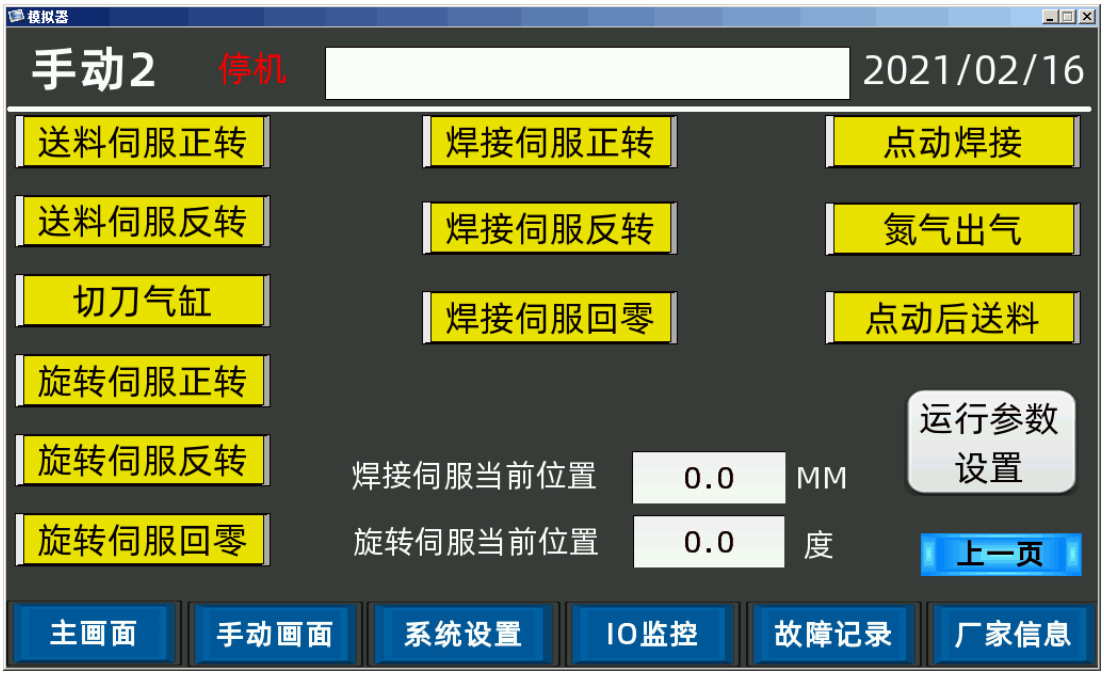


图 8

Figure 8

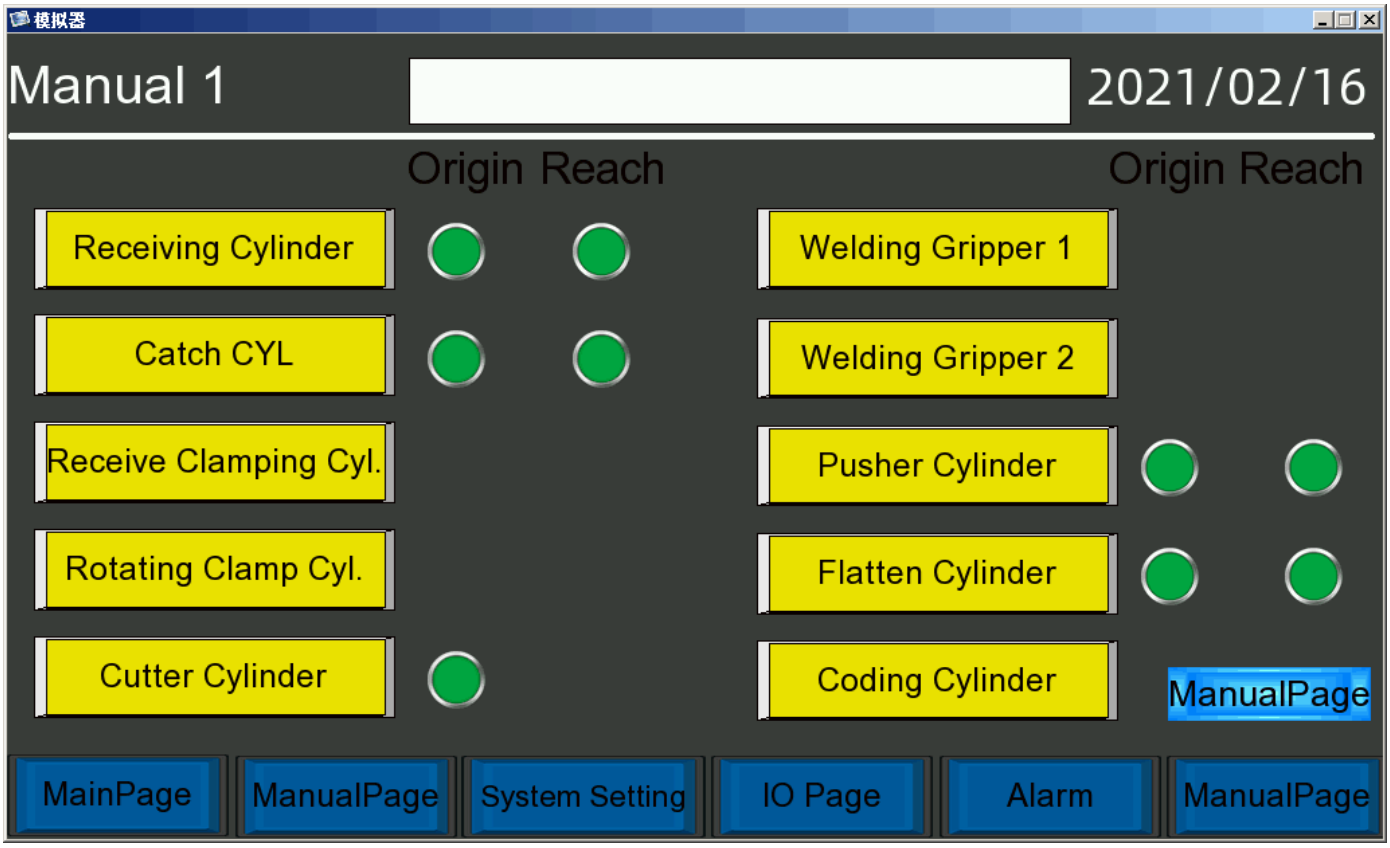


图 9

Figure 9

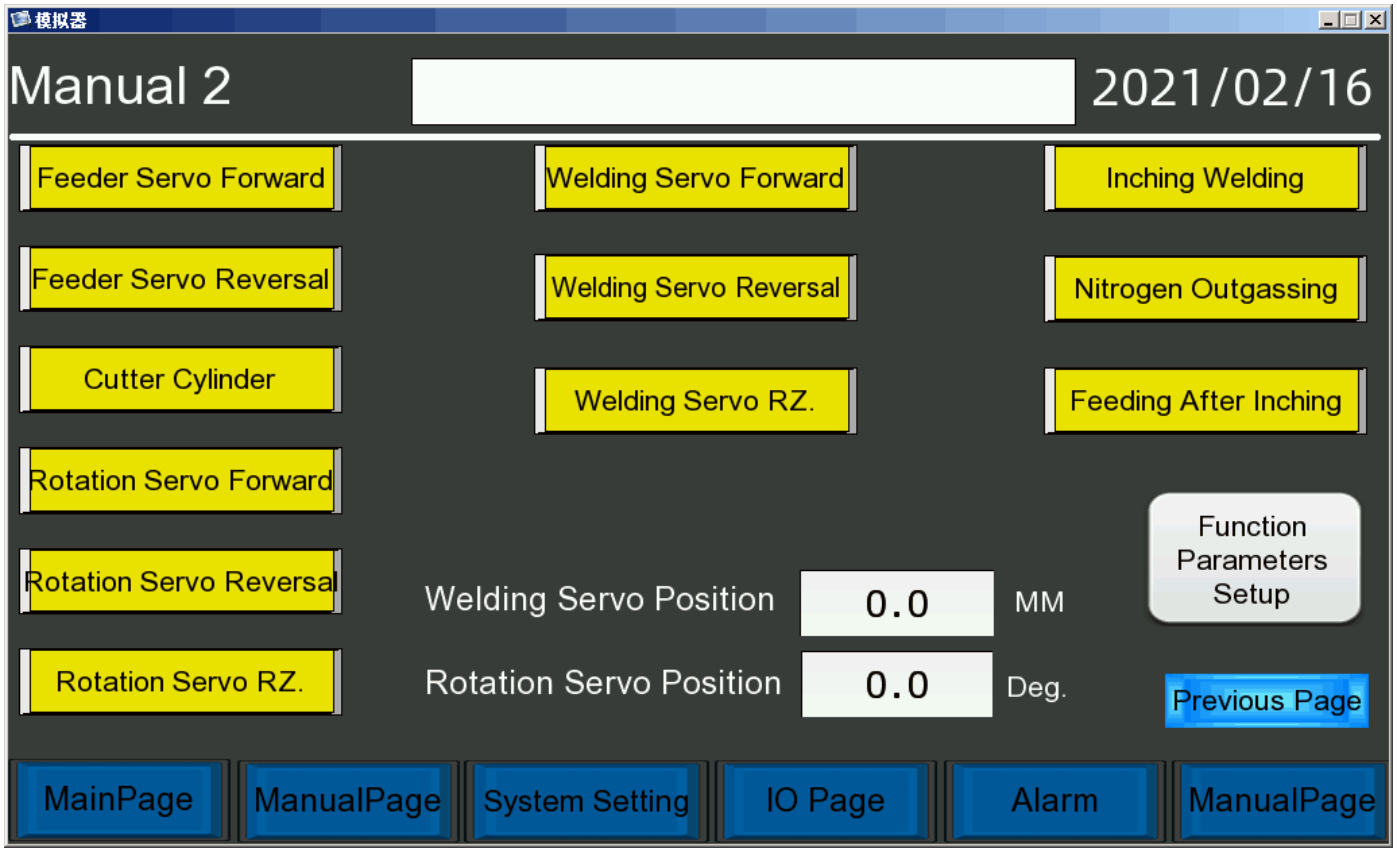


图 10

Figure 10

17. 设置画面 Setting screen

该组画面中，可对设备动作的延时时间，超时时间以及补偿角度进行调整，还可对伺服运行参数进行设置，如图 11 至图 14 所示

The delay time, timeout time and compensation angle of equipment action can be adjusted, and the servo operation parameters can also be set, as shown in Figure 11 to Figure 14

图 11

Figure 11

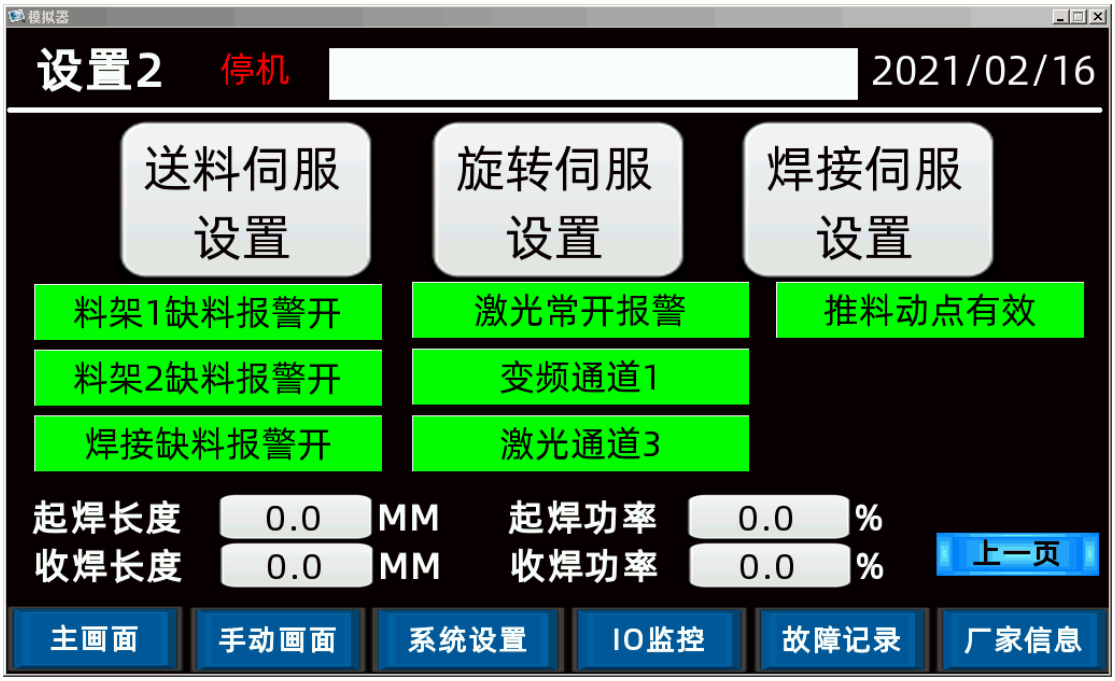


图 12

Figure 12

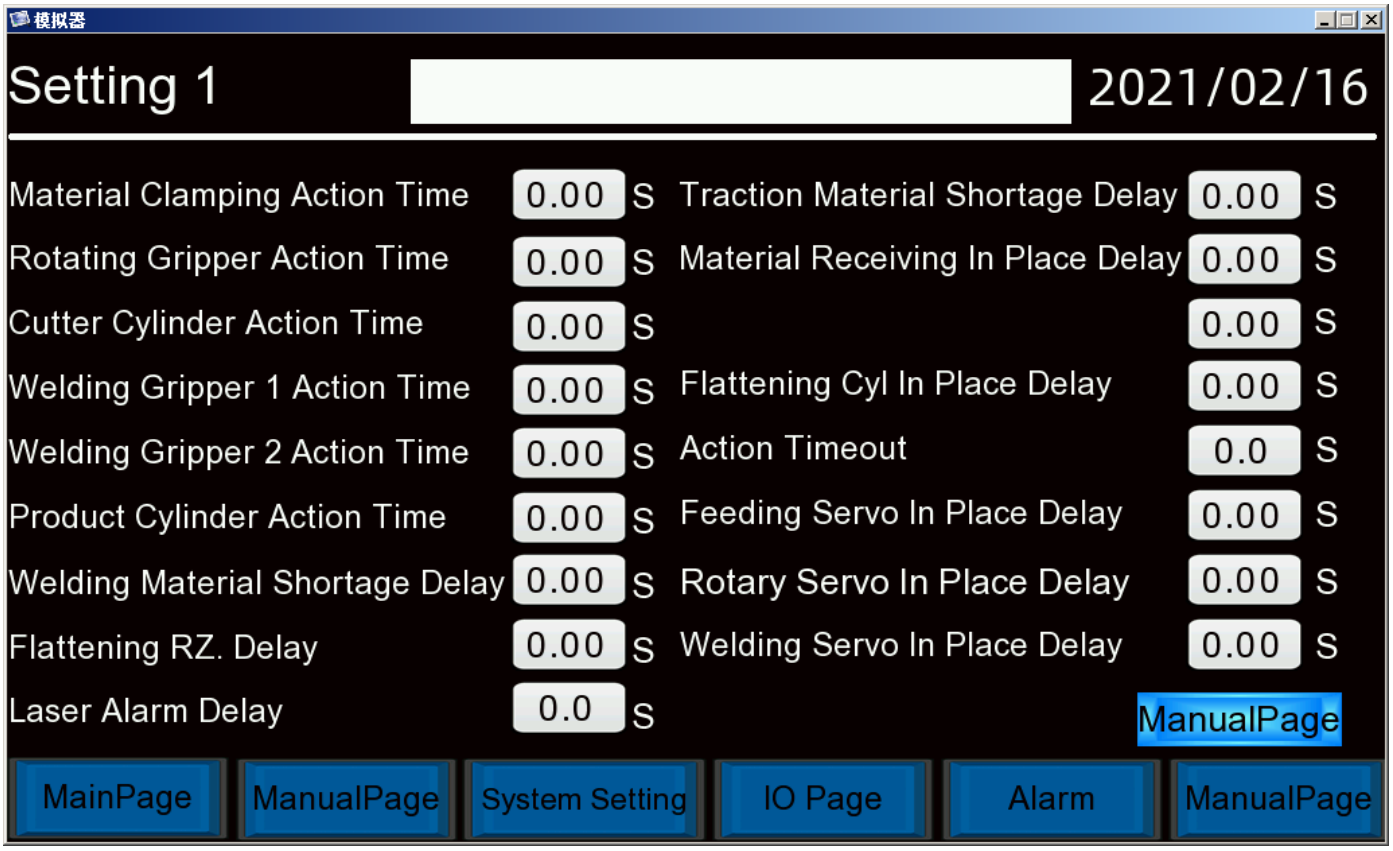


图 13

Figure 13

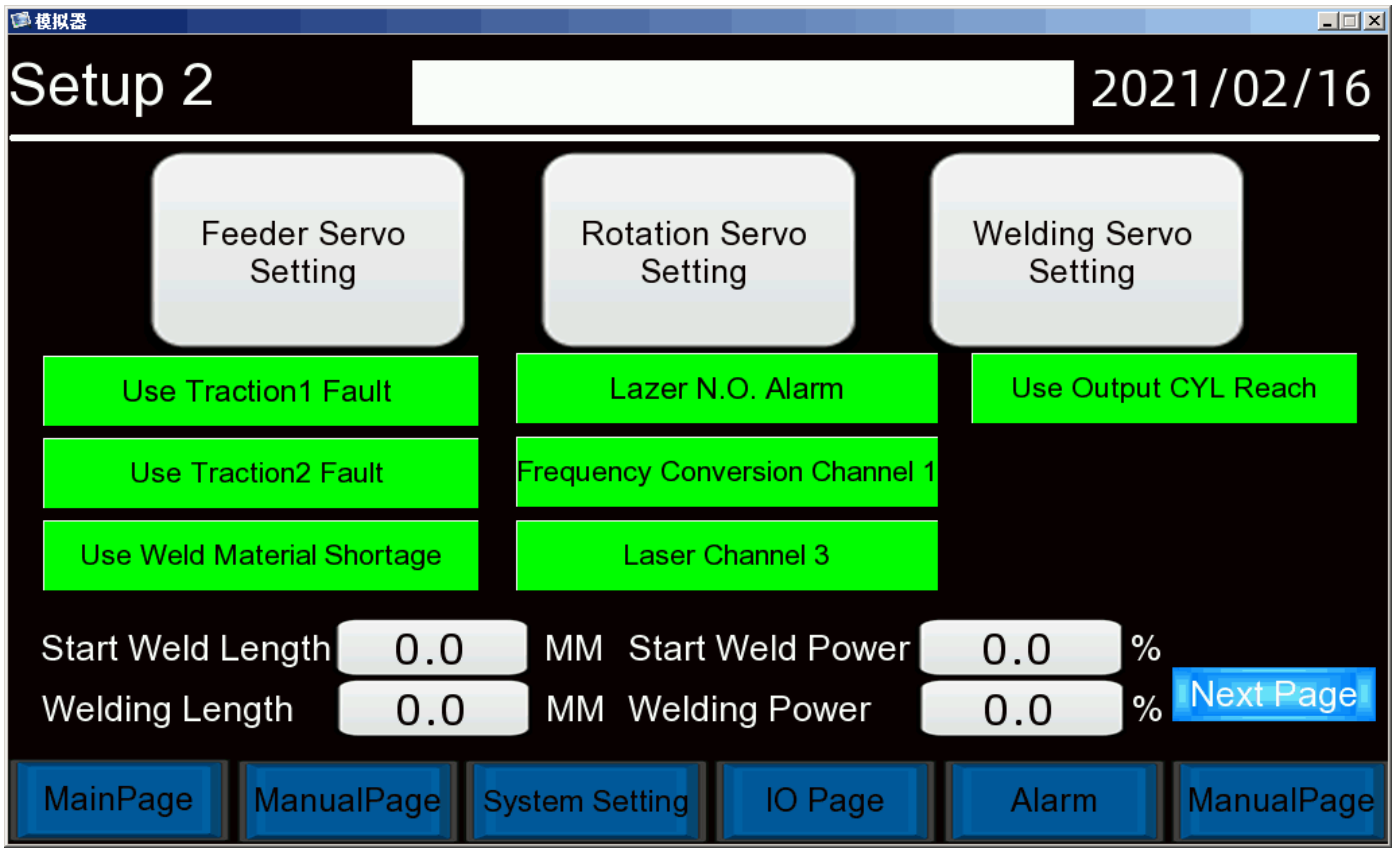


图 14

Figure 14

18. IO 监控 IO monitoring

该画面中可对设备的所有输入输出点的信号状态进行查看，用于检查设备信号是否正常。如图 15 至图 22 所示。

The signal status of all input and output points of the equipment can be viewed to check whether the equipment signal is normal. As shown in Figures 15 to 22.

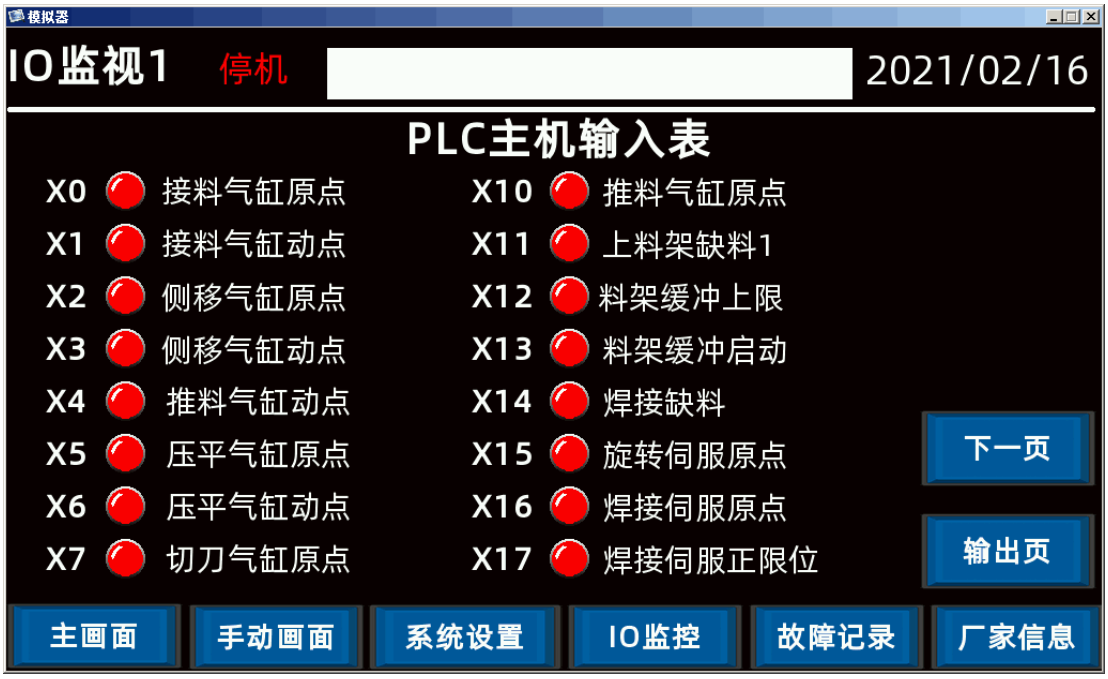


图 15

Figure 15

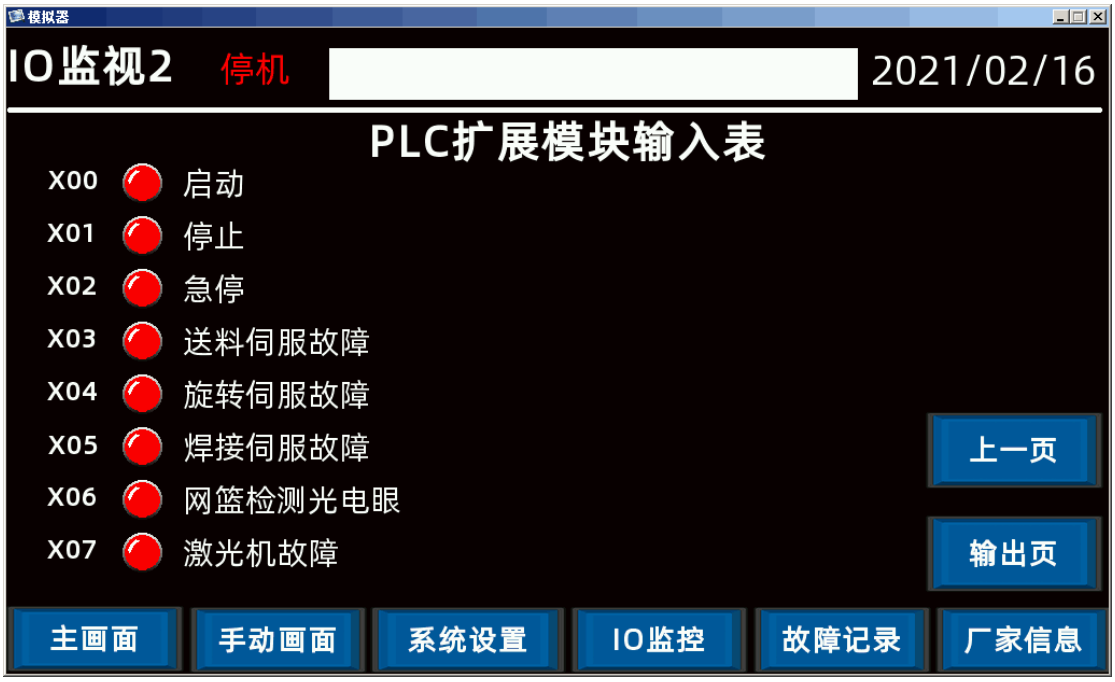


图 16

Figure 16

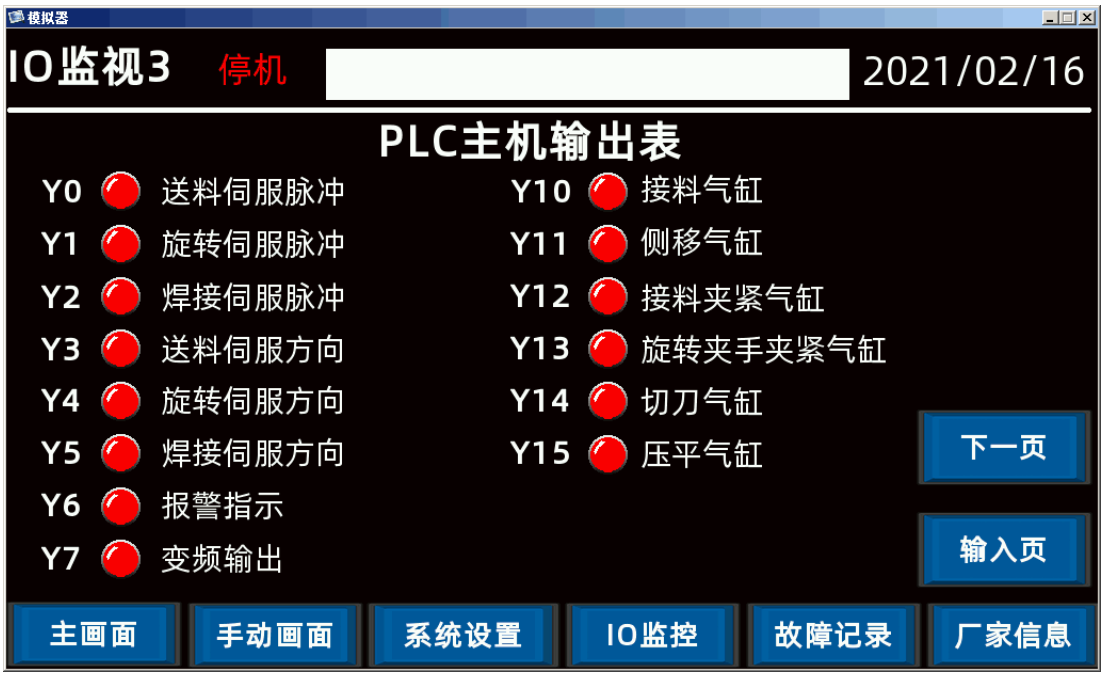


图 17

Figure 17

图 18

Figure 18

图 19

Figure 19

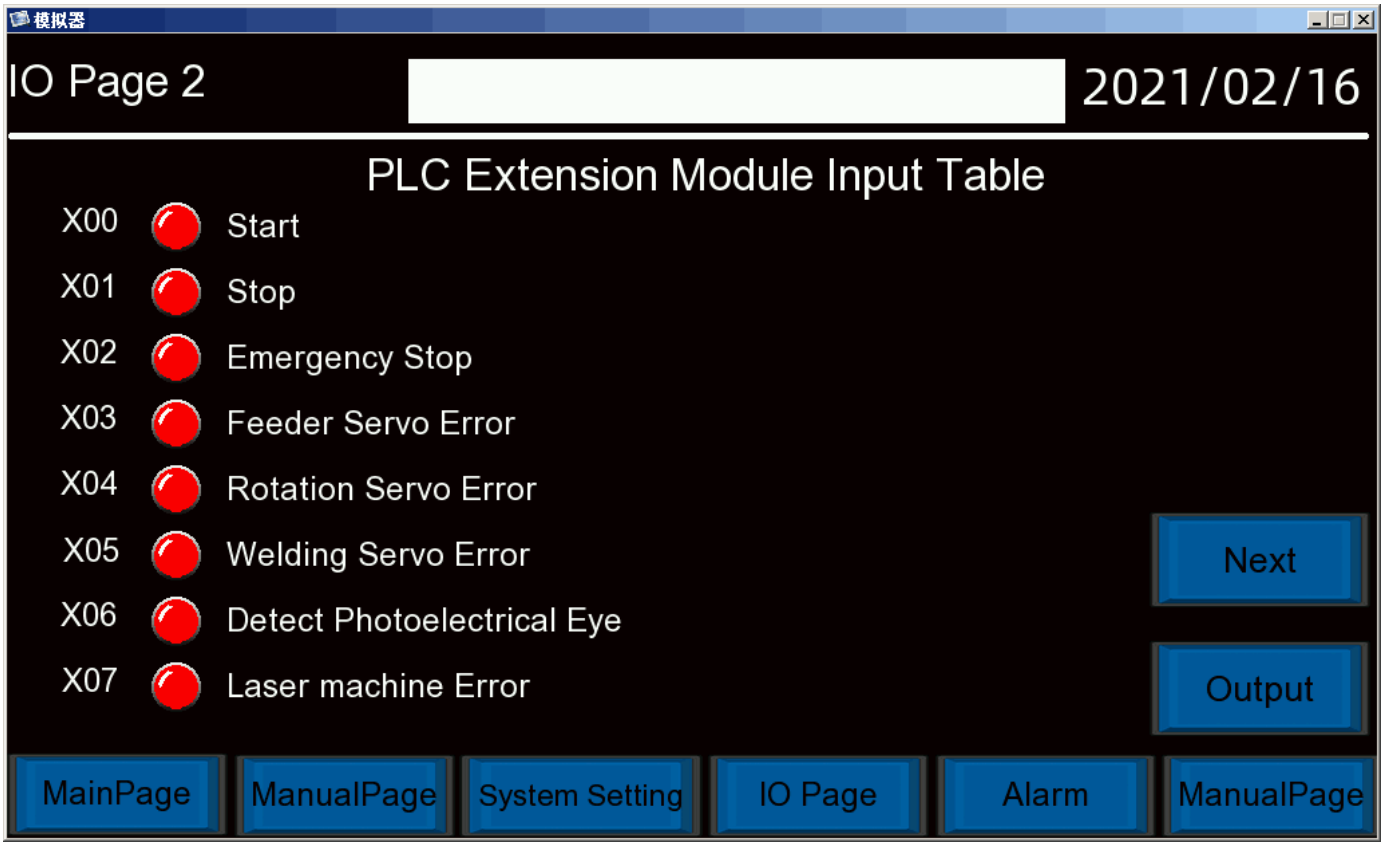


图 20

Figure 20

图 21

Figure 21

图 22

Figure 22

19. 报警画面 Alarm screen

该画面可以存储设备上电后发生的报警情况，另设复位按钮可在故障排除之后对设备进行复位。如图 23，图 24 所示。

This screen can store the alarm situation after the equipment is powered on, and another reset key can reset the equipment after troubleshooting. As shown in Figure 23 and Figure 24

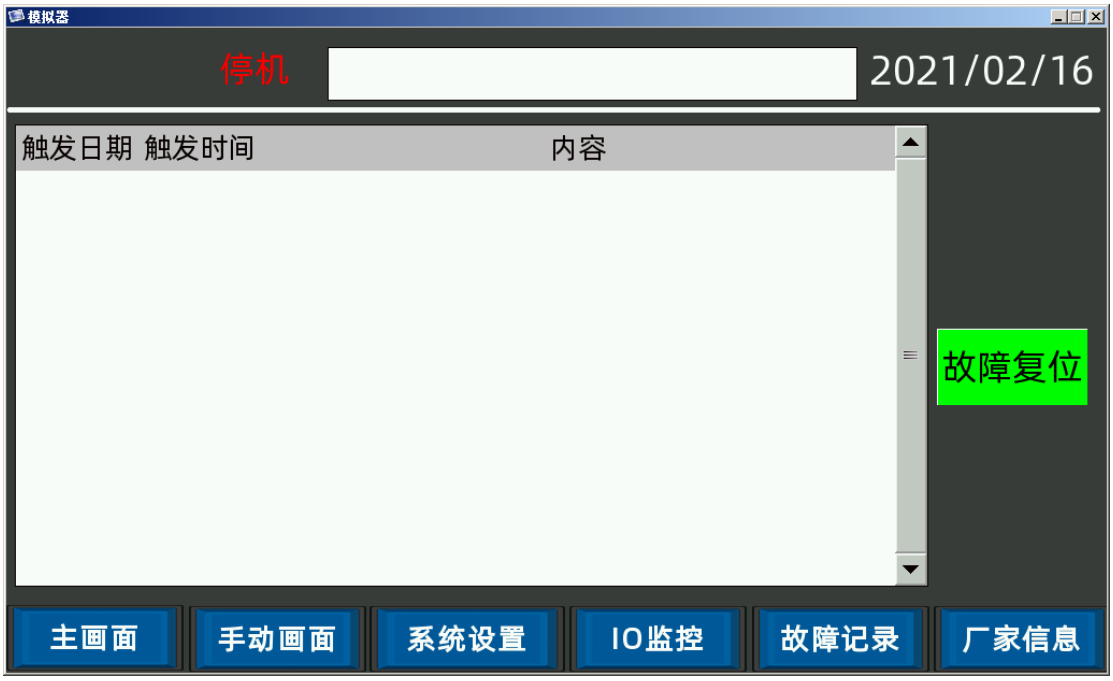


图 23

Figure 23

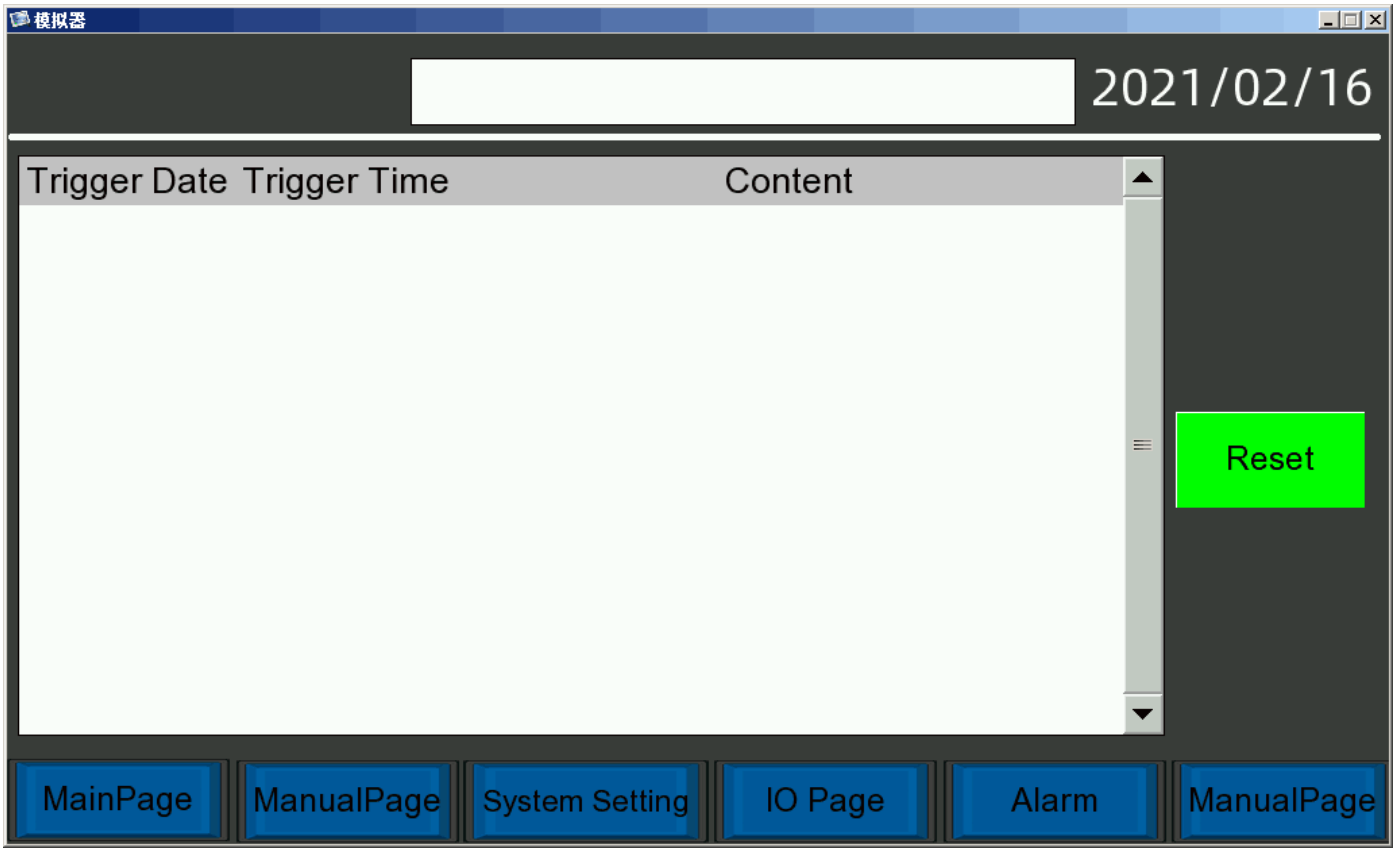


图 24

Figure 24

二． 上电准备 Power-on Preparation

1. 设备正式运行前，需检测 IO 点是否都处于正确位置，如若位置都是正确，则可在手动界面里看到原位点下所有的灯都为绿色，且在对应按钮按下的时候原点信号熄灭，到位点信号灯为绿色时，方可确定原位点以及到位点都处于正常状态，在确认伺服都是正常状态之后，可进行下一步操作;

   Before the equipment is officially put into operation, it is necessary to check whether IO points are in the correct position. If the position is correct, can see in the manual interface that all the lights under the original point are green, and when the corresponding key is pressed, the original point signal goes out, and when the in-place point signal light is green, you can determine that the original point and the in-place point are in a normal state. After confirming that the servo is in a normal state, you can proceed to the next operation;

2. 参数设置，在设置画面里，对三个伺服的速度，加速度，减速度，回零速度等进行设置，同时需要根据实际情况设置各动作到位时间，超时时间，各报警延时等参数，最后需要在“主画面——运行参数设置”画面中对运行参数相关画面进行正确设置，设置画面如图 25 到图 32 所示;

   Parameter settings. Set the speed, acceleration, deceleration and zero return speed of the three servos. It is necessary to set the parameters such as the in-place time, timeout time and alarm delay of each action according to the actual situation. Finally, it is necessary to correctly set the relevant pictures of operation parameters in the "Main Page-Operation Parameter Setting" picture. The setting pictures are shown in Figures 25 to 32;

图 25

Figure 25

图 26

Figure 26

图 27

Figure 27

图 28

Figure 28

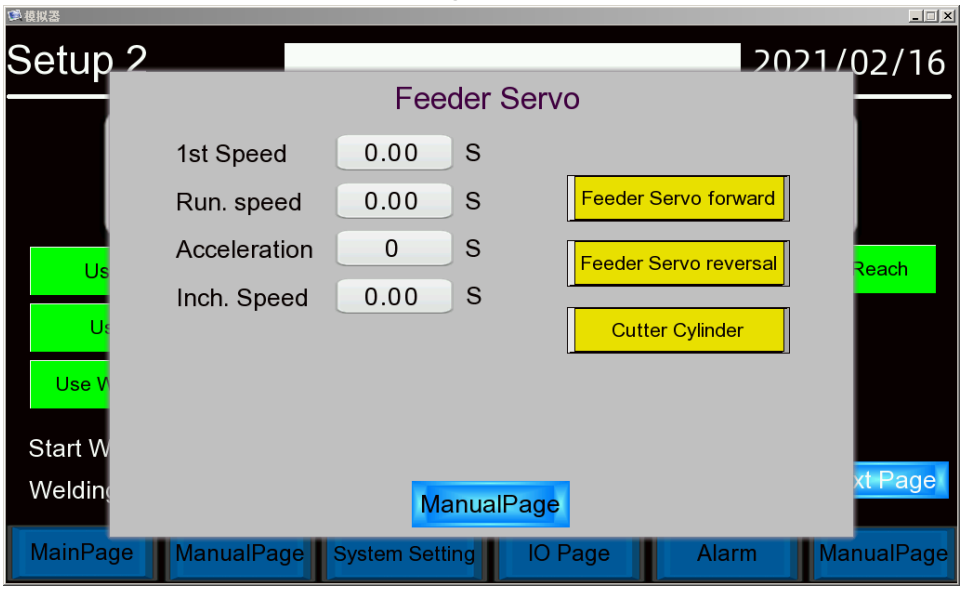


图 29

Figure 29

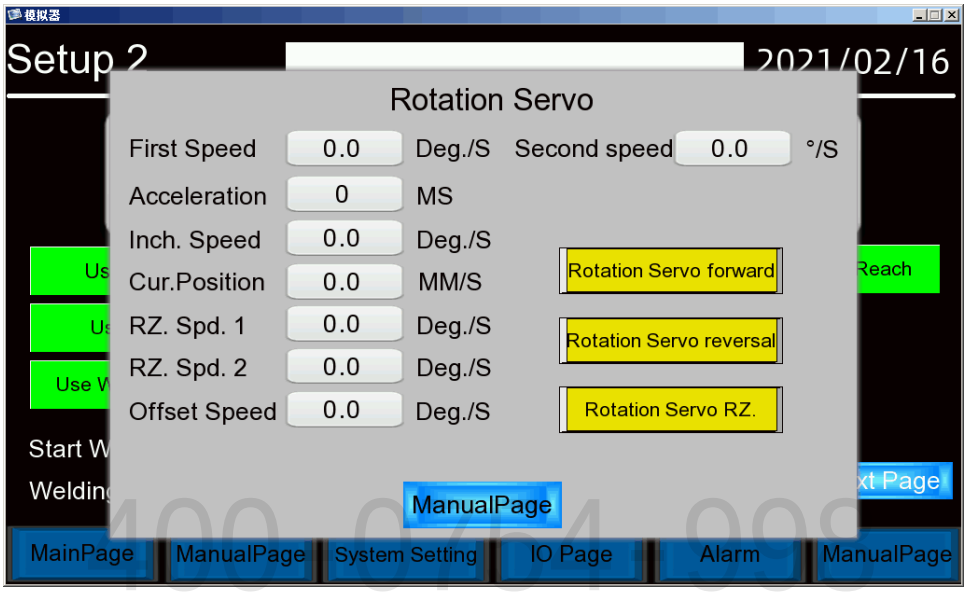


图 30

Figure 30

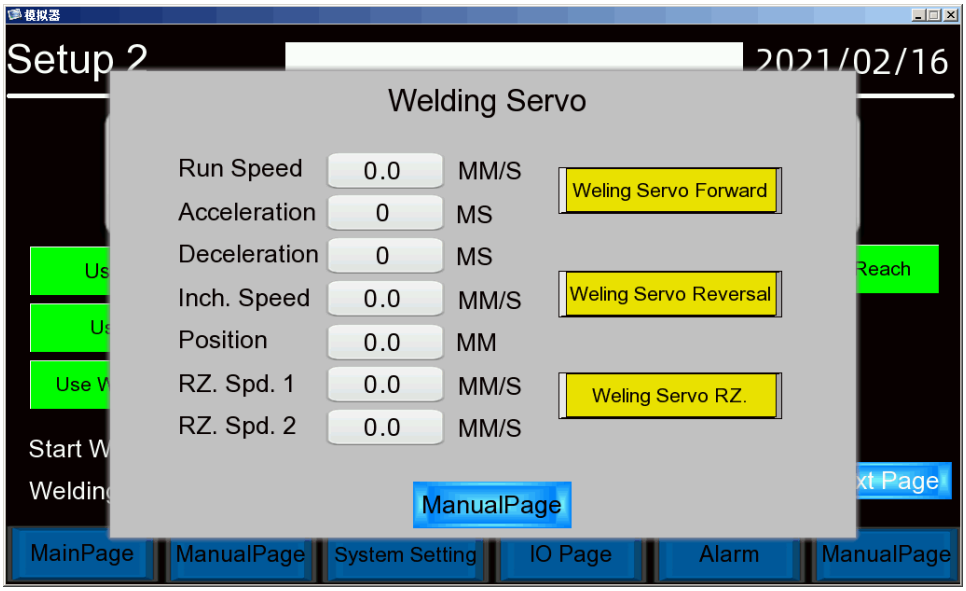
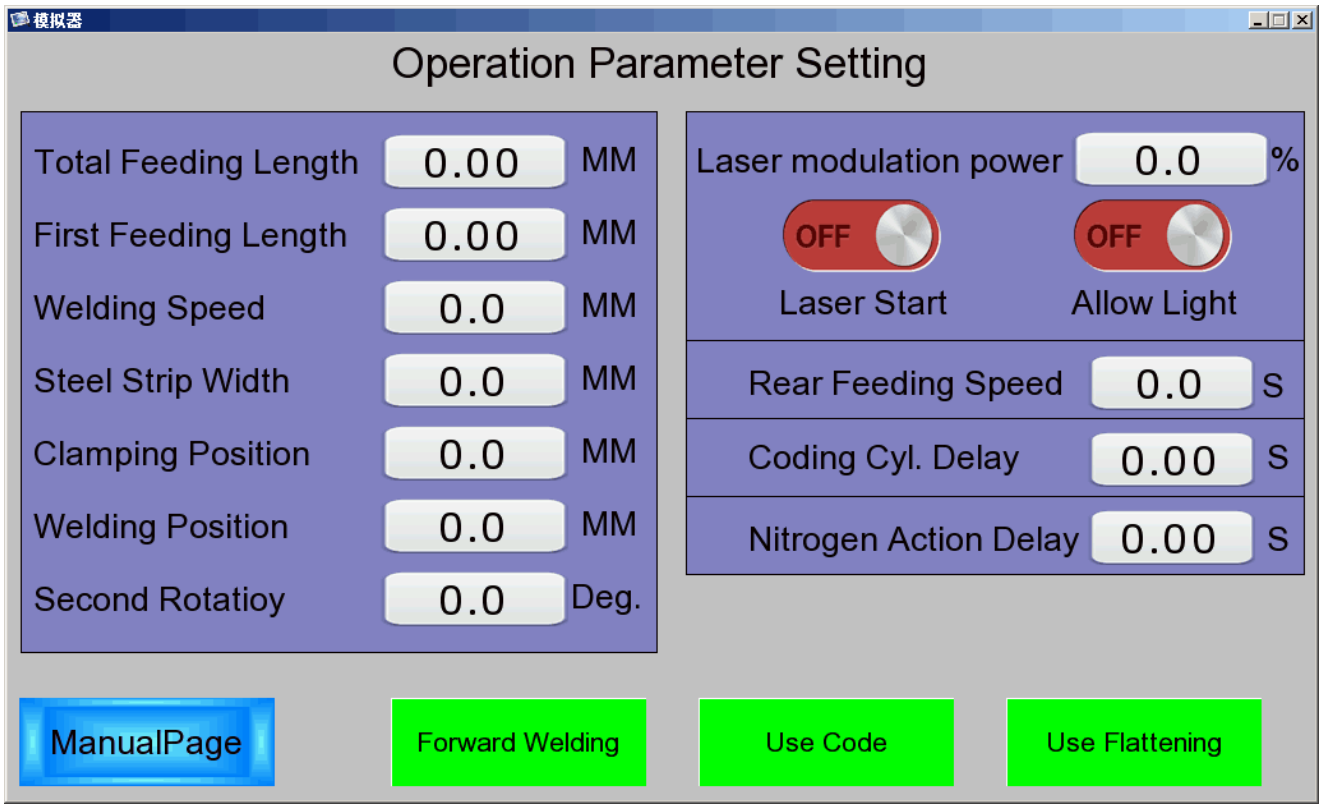


图 31

Figure 31



3. 初始化操作，在主画面上点击“初始化”按钮，气缸会依次复位，之后进行伺服复位操作，待操作完成，触摸屏左上角显示停机状态时，即可准备启动设备。

Initialization: Click the "Initialization" key on the main page, and the cylinders will be reset in turn, and then servo reset operation will be carried out. When the operation is completed and the shutdown state is displayed in the upper left corner

of the touch screen, the equipment can be ready to start.

图 32

Figure 32

三．报警 Alarm

当报警发生时，屏幕上方会出现当前报警发生的情况，也可在报警页面查看，待处理好设备故障之后，可点击复位按钮以复位故障。

When the alarm occurs, the current alarm will appear at the top of the screen, which can also be viewed on the alarm page. After handling the equipment failure, you can click the reset key to reset the failure.

１．XX 气缸原点/动点报警：先检查气缸是否有动作，若无动作可检查 IO 点输出和继电器输出是否有问题，如有动作，则需要检查传感器是否故障。如图 1-1 所示。

1. XX cylinder origin/moving point alarm: Check whether the cylinder has action first. If there is no action, check whether there is any problem with IO point output and relay output. If there is action, check whether the sensor is faulty. As shown in Figure 1-1.

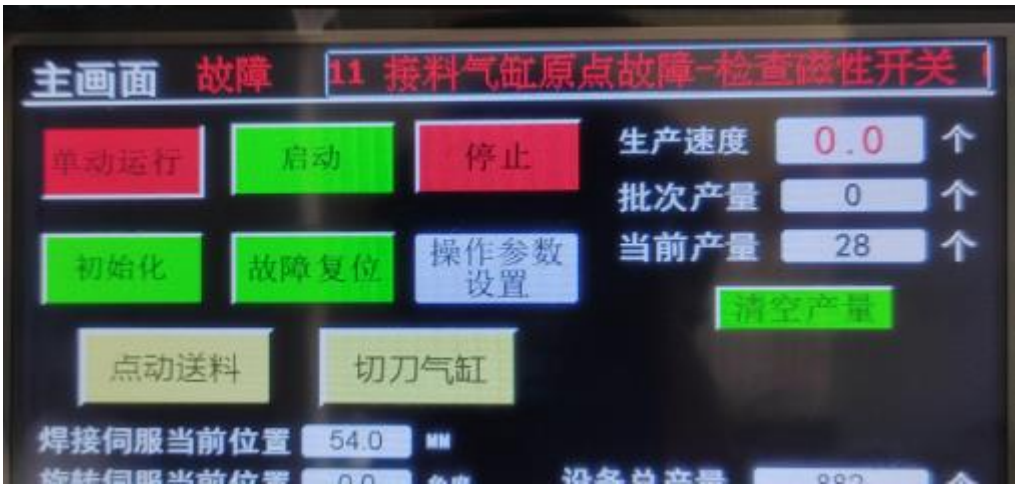


图 1-1

Figure 1-1

2 . XX 伺服故障：先检查对应伺服驱动器面板的报警故障码，翻看伺服驱动器说明书查看对应故障码排除故障。或联系本公司售后配合处理。如图 1-2 所示。

2. XX servo fault: First check the alarm fault code of the corresponding servo driver panel, and look through the servo driver manual to check the corresponding fault code to eliminate the fault. Or contact our company for after-sales cooperation. As shown in Figure 1-2.

图 1-2

Figure 1-2

3 .设备初始化旋转夹一直转个不停，检查旋转原点是否故障。如图 1-3 所示。

3. The equipment initialization rotating clamp keeps rotating, and check whether the rotating origin is faulty. As shown in Figure 1-3.

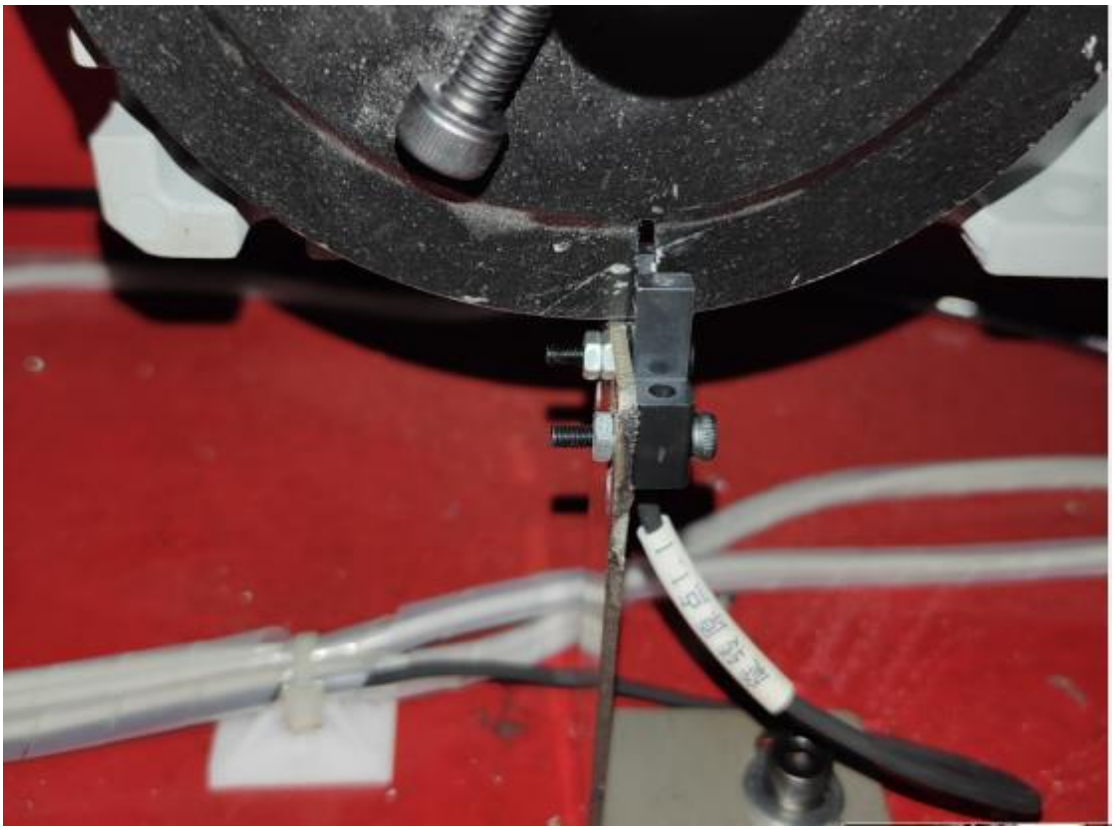


图 1-3

Figure 1-3

4 .缓冲上限报警：检查料架启动的接近开关是否故障。导致电机不送料。或检查变频器面板是否显示故障码，翻看说明书找出对应故障码排除故障。或联系本公司售后配合处理。如图 1-4，1-5 所示。

4. Buffer upper limit alarm: Check whether the proximity switch started by the material rack is faulty. Causing the motor not to feed. Or check whether the inverter panel shows fault codes, and look through the instructions to find out the corresponding fault codes to eliminate faults. Or contact our company for after-sales cooperation. As shown in Figures 1-4 and 1-5.

图 1-4

Figure 1-4

图 1-5

Figure 1-5

6．激光机正常开机状态：如下图所示：

6. Normal startup state of laser machine: as shown in the following figure:

激光机不出光不报警:

The laser machine does not give light and does not give an alarm:

万能表检查一体机触摸屏 10V 模拟量电压是否正常。（10 功率对应 1V 电压）如图 1-6 所示。

The universal meter checks whether the 10V analog voltage of the touch screen of the all-in-one machine is normal. (10 power corresponds to 1V voltage) as shown in Figures 1-6.

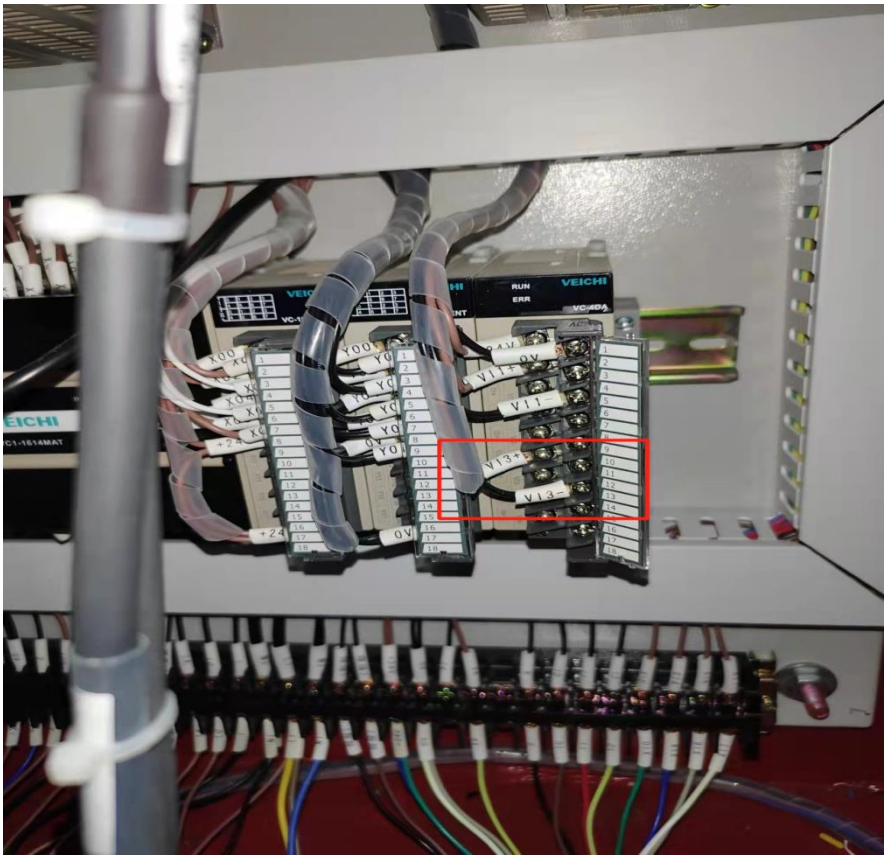


图 1-6

Figure 1-6

激光机连接电脑，打开监控软件查看功率显示跟激光触摸屏设置的功率是否匹配。如图 1-8 所示。

Connect the laser machine to the computer, and open the monitoring software to see if the power display matches the power set by the laser touch screen. As shown in Figure 1-8.

图 1-8

Figure 1-8

检查使能信号出光 24V 电压是否稳定。触摸屏手动点动出光才能测量 24V 电压，如图 1-9,1-10 所示。

Check whether the 24V voltage of the enable signal is stable. The touch screen can only measure 24V voltage by manually clicking out the light, as shown in Figures 1-9 and 1-10.

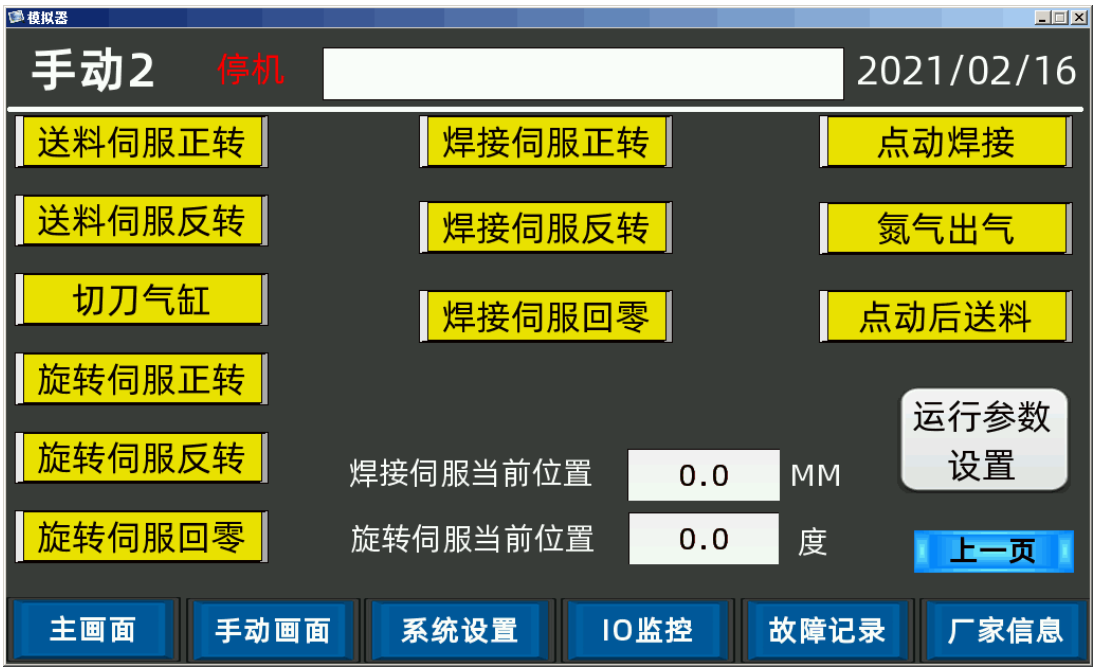


图 1-9

Figure 1-9

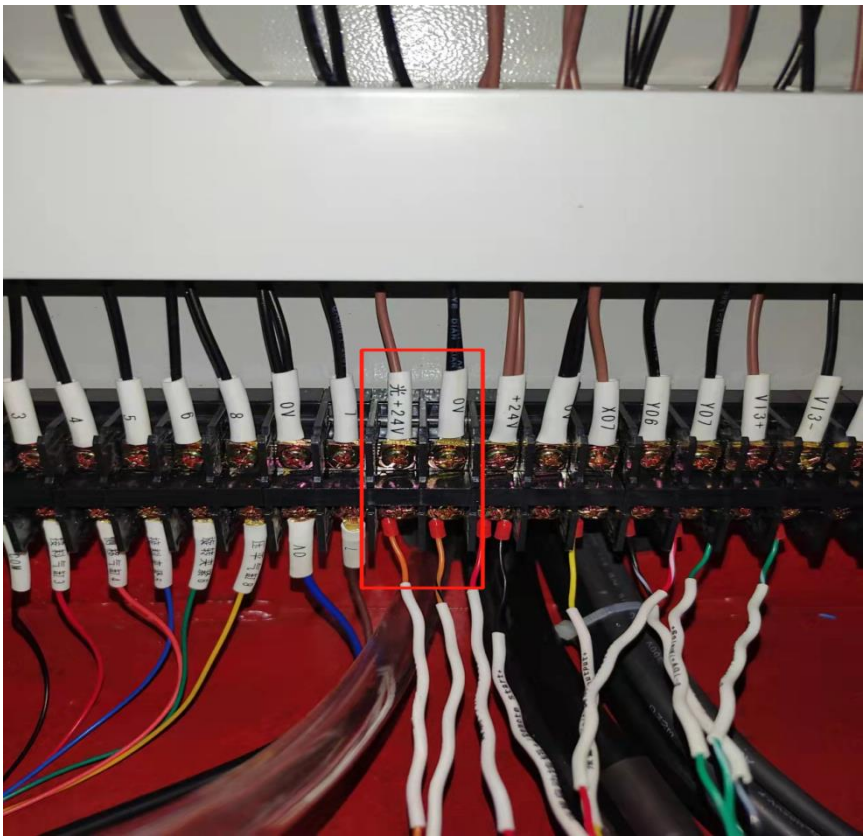


图 1-10

Figure 1-10

激光机报警，先检查冷水机水位&温度正不正常，再打开监控软件检查什么故障，如图 1-12,1-13 所示。

Laser alarm, check the water level & temperature of the chiller is abnormal, and then open the monitoring software to check what fault, as shown in Figure 1-12, 1-13.

图 1-12

Figure 1-12

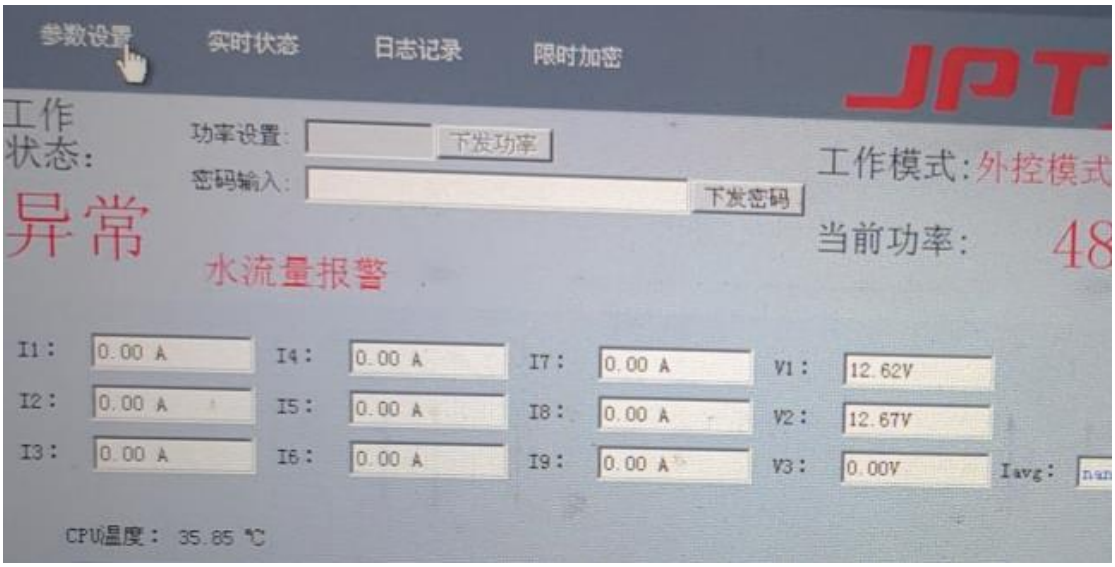


图 1-13

Figure 1-13

7．冷水机故障处理： Troubleshooting of chillers:

液位保护：检查水位，看水位会不会低于黄色标志线。如图 1-14 所示。

Liquid level protection: Check the water level to see if it is lower than the yellow mark line. As shown in Figure 1-14.

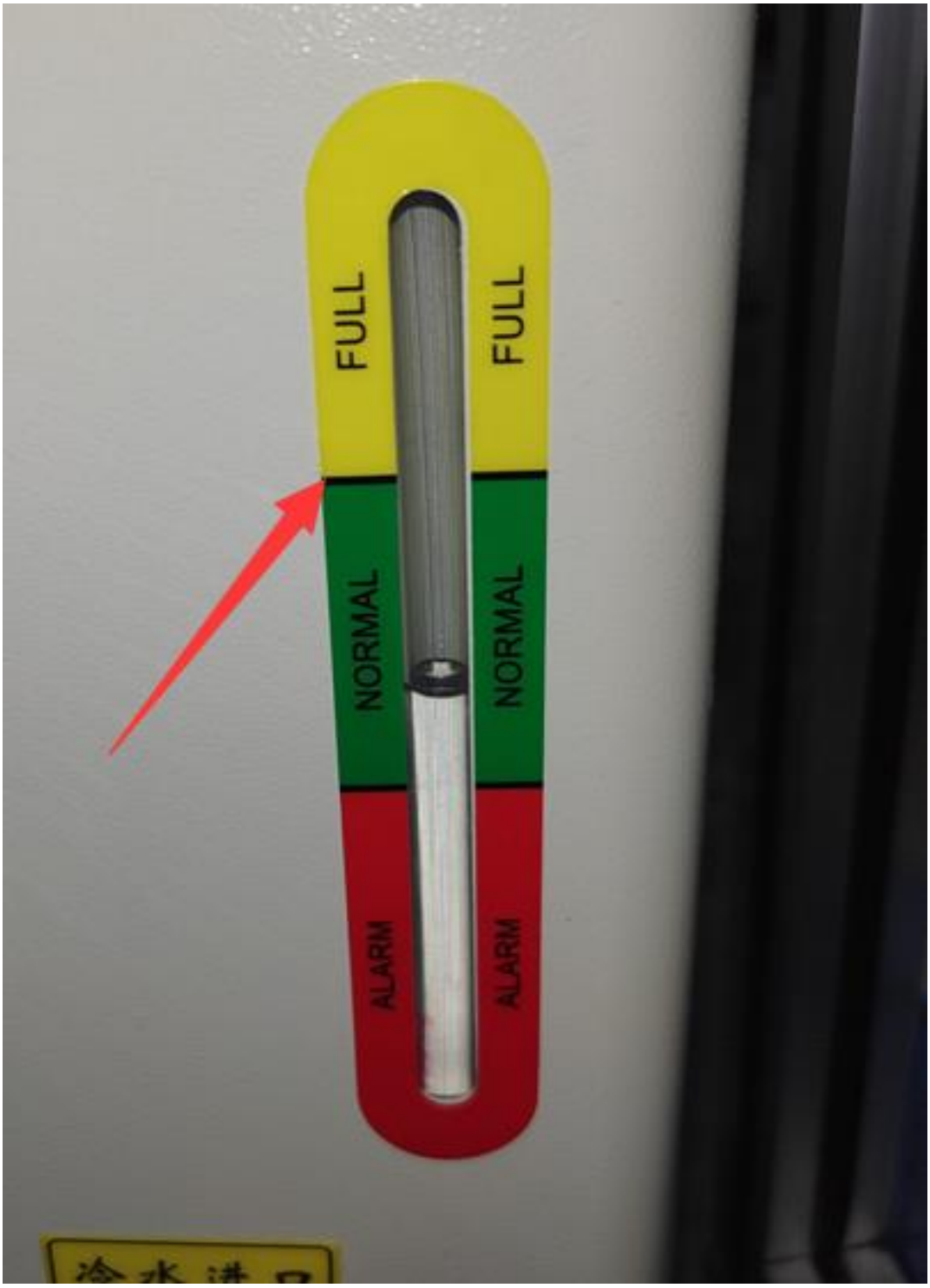


图 1-14

Figure 1-14

流量下限保护：检查流量开关&更换流量开关，联系公司售后处理。如图 1-15 所

示。 

Flow lower limit protection: Check the flow switch & replace the flow switch, and contact the company for after-sales treatment. As shown in Figure 1-15.

图 1-15

Figure 1-15

冷水机温度不会下降，检查面板冷水机是否没开机。（显示屏显示运行中处于开机状态）如图 1-16 所示。

The temperature of the chiller will not drop. Check whether the panel chiller is not turned on. (The display screen shows that it is in the boot state during operation) as shown in Figure 1-16.

图 1-16

Figure 1-16

冷水机温度不会上升（下雪地区）放掉些冷水，加些温水让水机运转会。

The temperature of the water chiller will not rise (in snowy areas). Put out some cold water and add some warm water to make the water chiller run.

流量上限保护，联系公司售后处理。

Flow ceiling protection, contact the company for after-sales treatment.

媒体上限告警，检查水流，风扇，压缩机是否正常运行，检查过滤芯是否过脏，优先清除冷水机的灰尘，如图 1-17 所示。

Media upper limit alarm, check whether the water flow, fan and compressor are running normally, check whether the filter element is too dirty, and give priority to removing dust from the chiller, as shown in Figure 1-17.

如图 1-17

As shown in Figure 1-17

四．感应器报警及对应气缸 Sensor Alarm and Corresponding Cylinder

1． 接料气缸原点&动点故障，调整感应器感应灯亮起居中即可，如图 2-1 到 2-3 所示。

1. If the origin-moving point of the receiving cylinder fails, adjust the inductor to light up the living room, as shown in Figures 2-1 to 2-3.

图 2-1

Figure 2-1

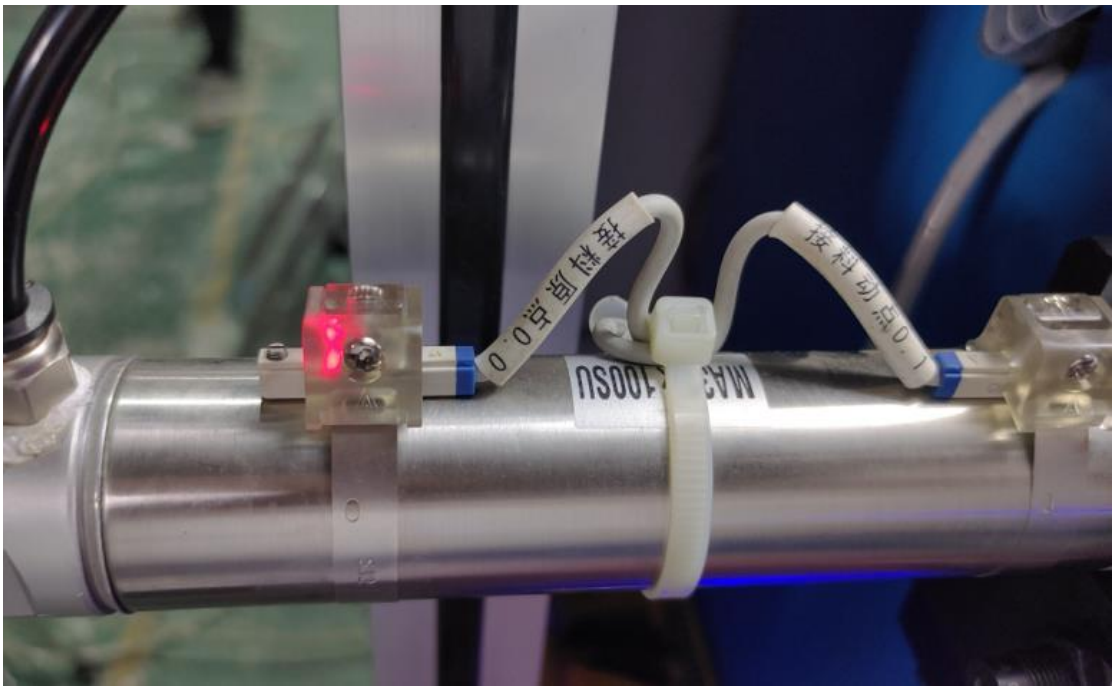


图 2-2

Figure 2-2

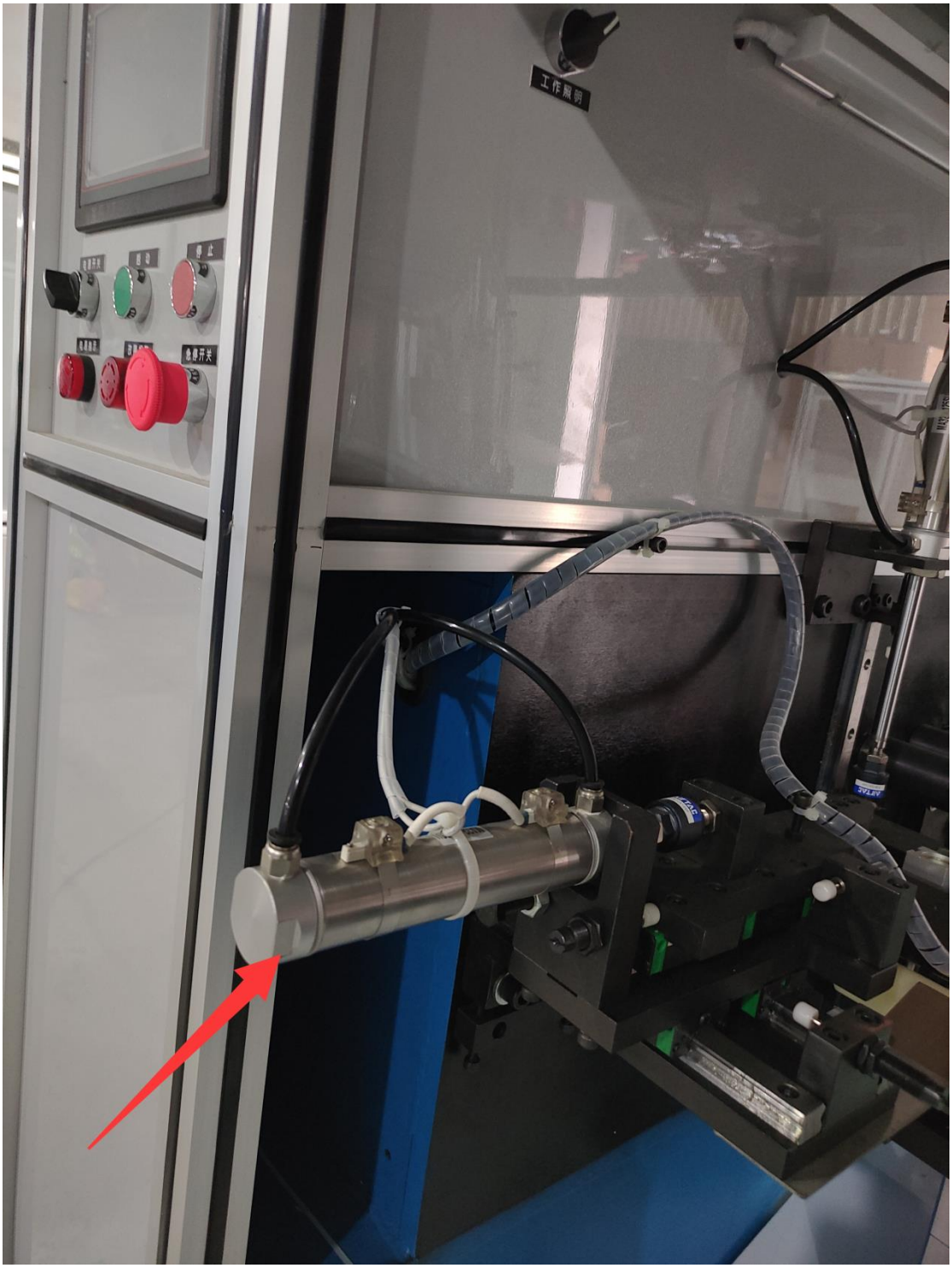


图 2-3

Figure 2-3

2．侧移气缸原点＆动点故障，调整感应器感应灯亮起居中即可，如图 2-4 到 2-6 所示。

2. Side-shift cylinder origin & moving point failure, adjust the sensor induction light to light up in the daily life, as shown in Figures 2-4 to 2-6.

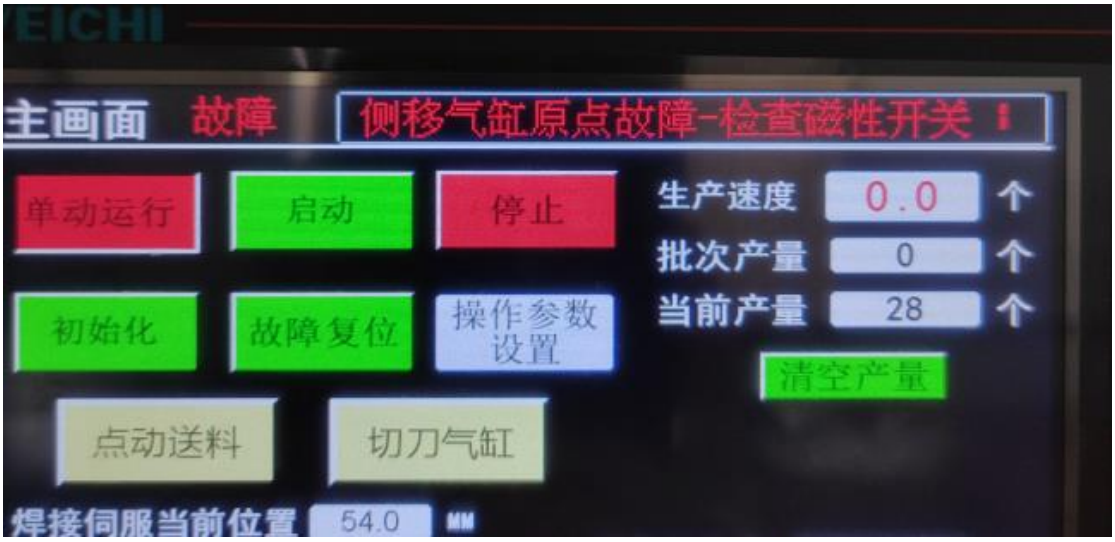


图 2-4

Figure 2-4

图 2-5

Figure 2-5

图 2-6

Figure 2-6

3．压平气缸原点&动点故障，调整感应器感应灯亮起居中即可，如图 2-7 到 2-9 所示。

3. Flatten the cylinder origin & moving point fault, and adjust the sensor induction light to light up in the daily life, as shown in Figures 2-7 to 2-9.

图 2-7

Figure 2-7

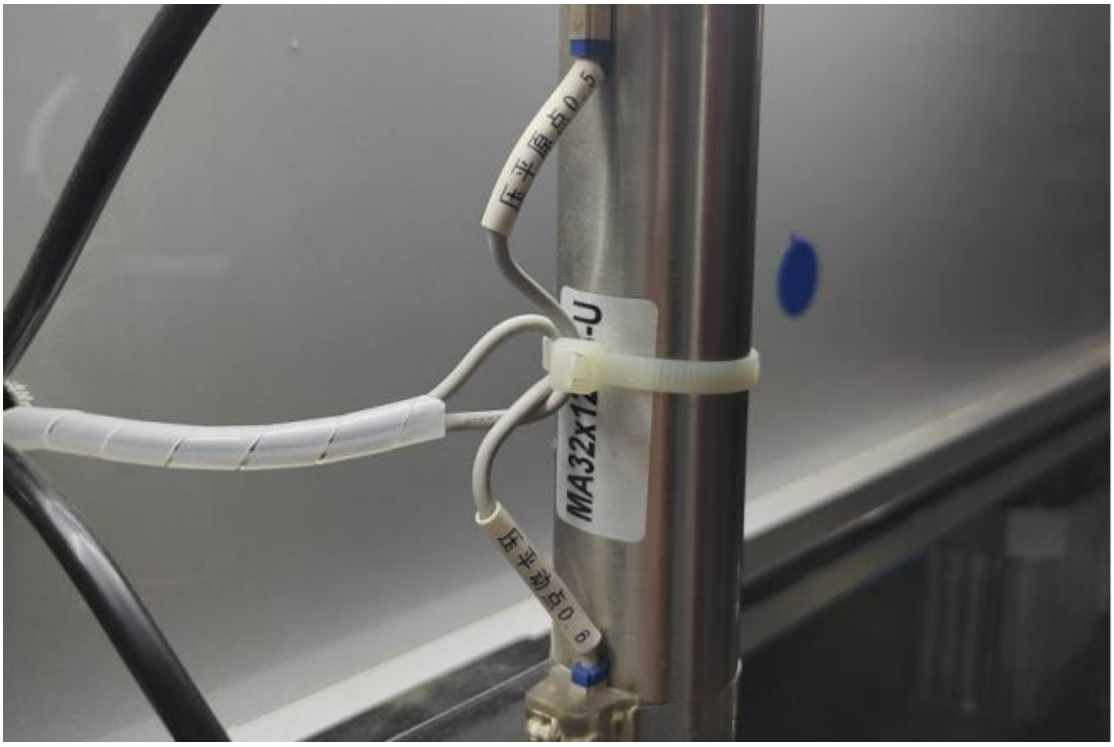


图 2-8

Figure 2-8

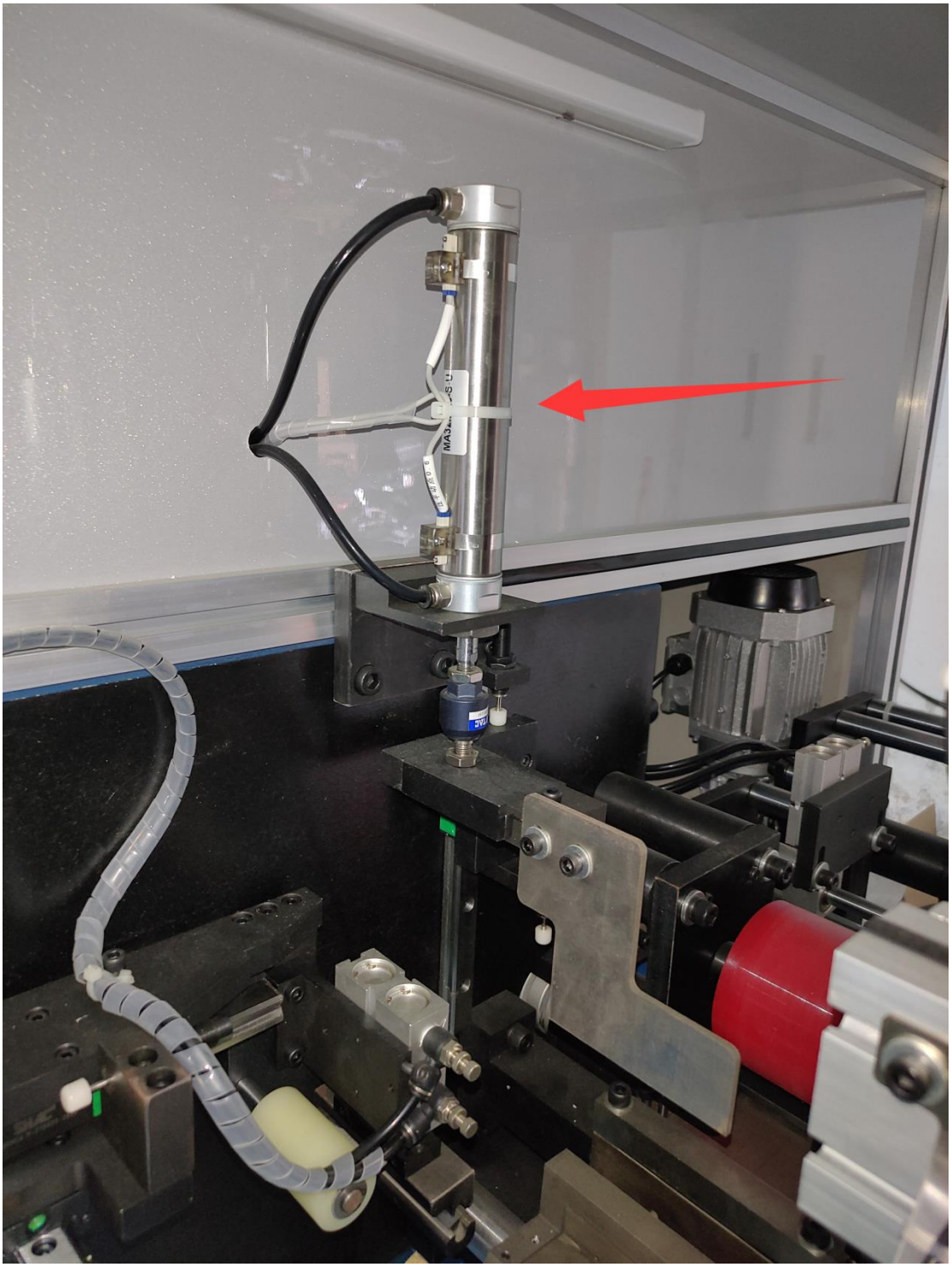


图 2-9

Figure 2-9

4 切刀气缸原点故障，调整感应器感应灯亮起居中即可，如图 2-10 到 2-12 所示。

4. Cutter cylinder origin failure, adjust the sensor induction light on the living, as shown in Figure 2-10 to 2-12.

图 2-10

Figure 2-10

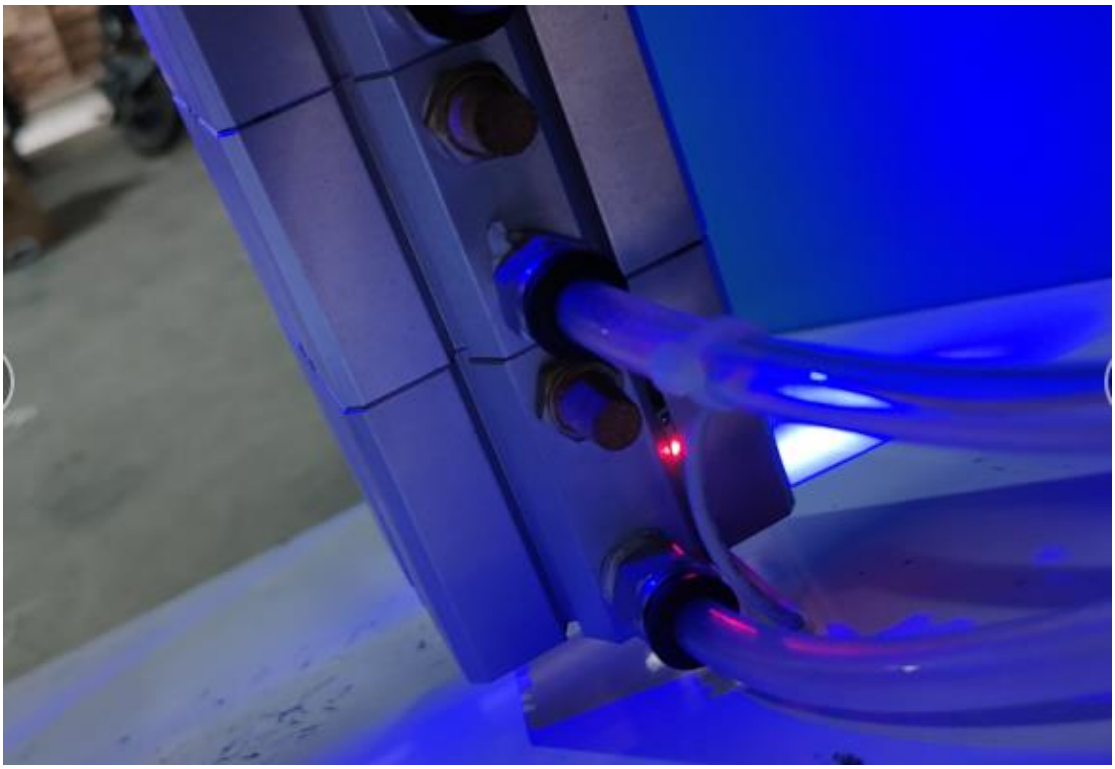


图 2-11

Figure 2-11

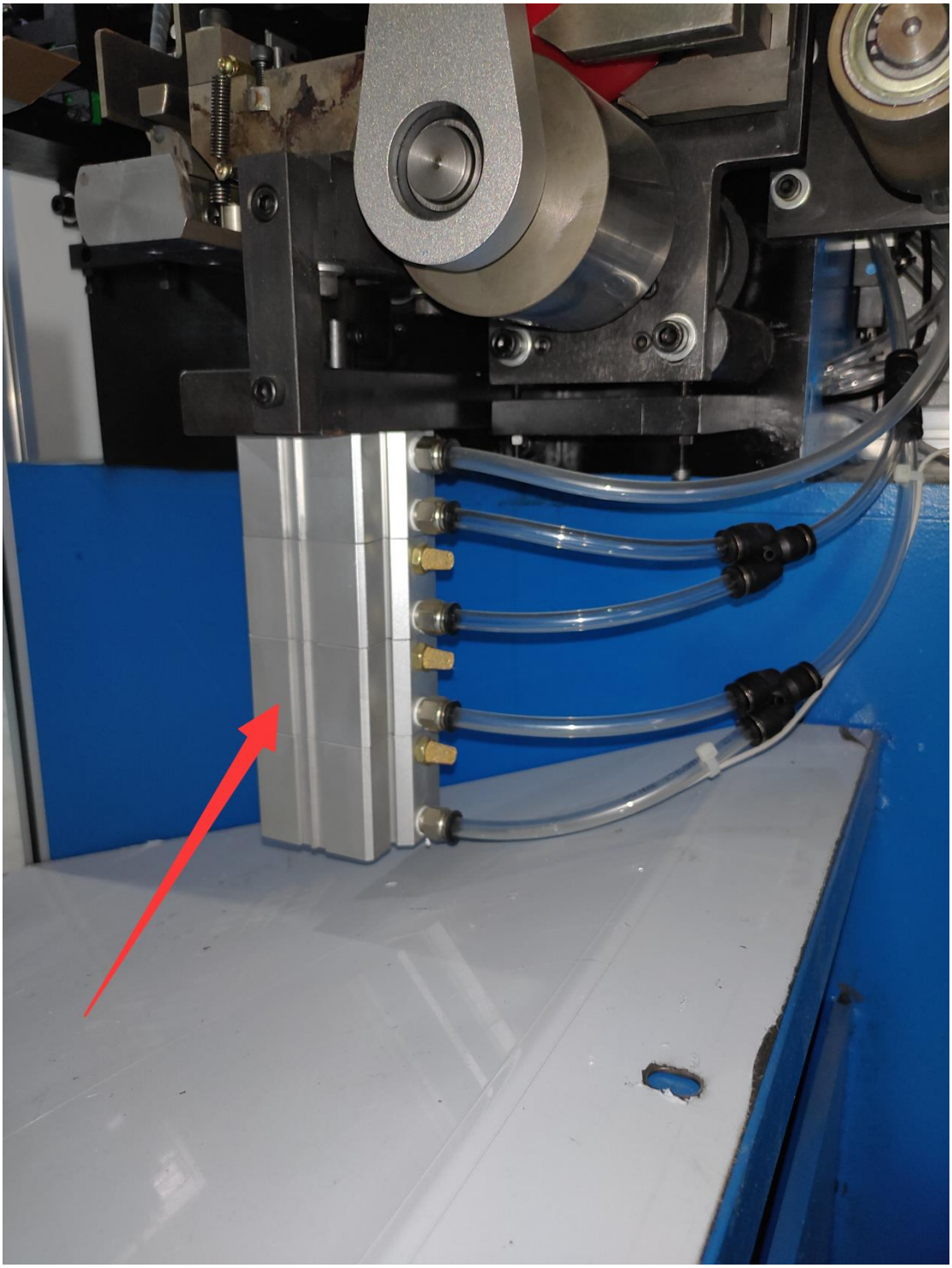


图 2-12

Figure 2-12

5．推料气缸原点故障，推料气缸在焊接夹中间，调整感应器感应灯亮起居中即可如图 2-13 到 2-15 所示。

5. The origin of the push cylinder is faulty, the push cylinder is in the middle of the welding clamp, and the inductor can be adjusted to light up in the daily life as shown in Figure 2-13 to 2-15.

图 2-13

Figure 2-13

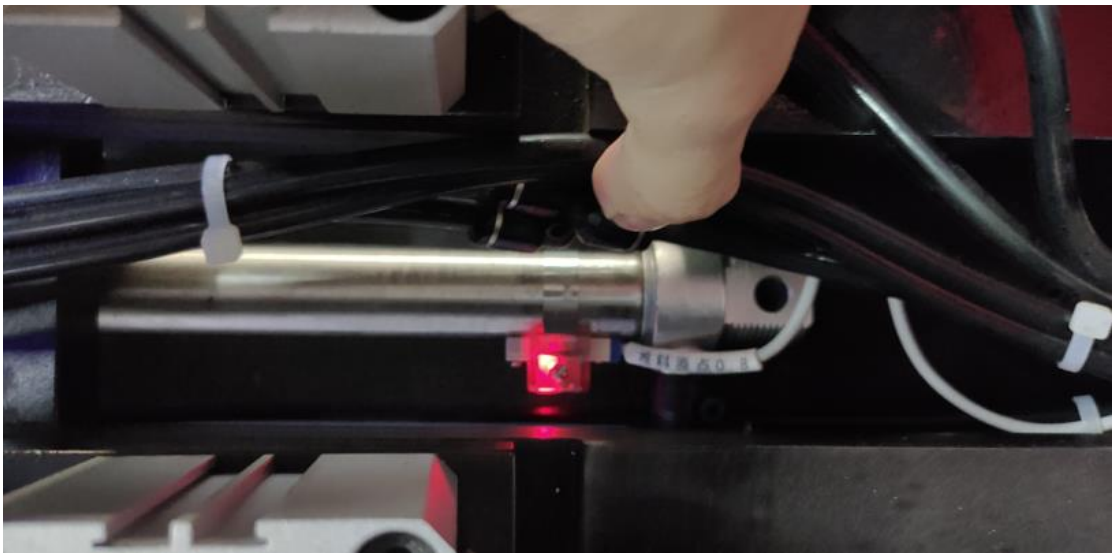
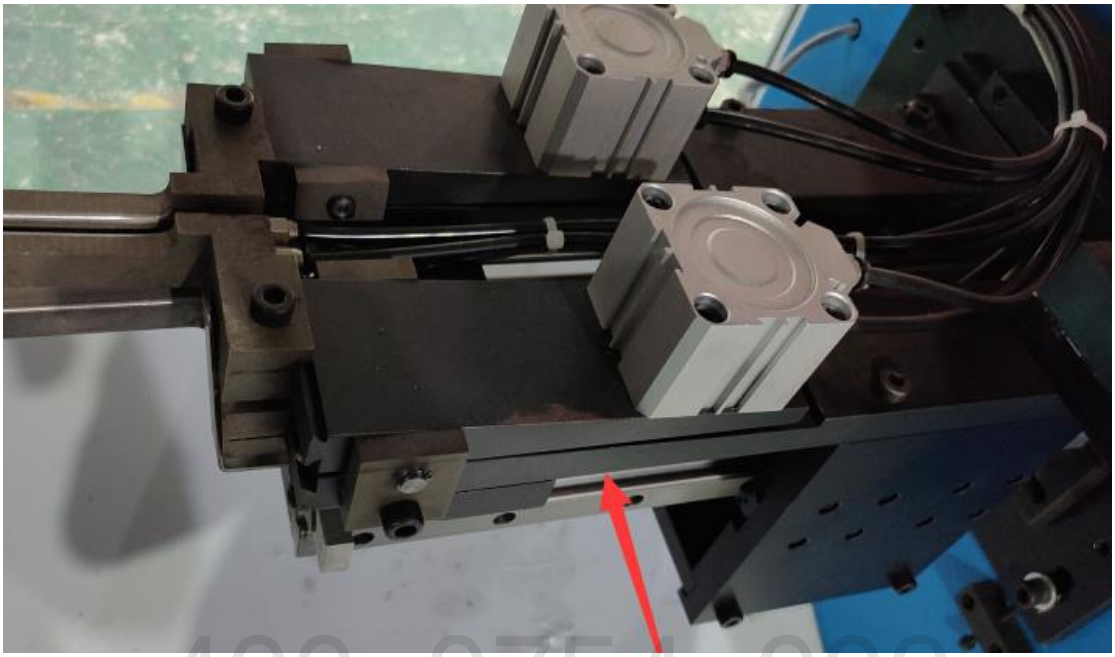


图 2-14

Figure 2-14



如图 2-15

Figure 2-15

6．焊接缺料故障，调整光电眼红光照到钢圈即可，如图 2-16,2-17 所示。

6. In case of welding material shortage, adjust the photoelectric red light to the steel ring, as shown in Figure 2-16 and Figure 2-17.

图 2-16

Figure 2-16

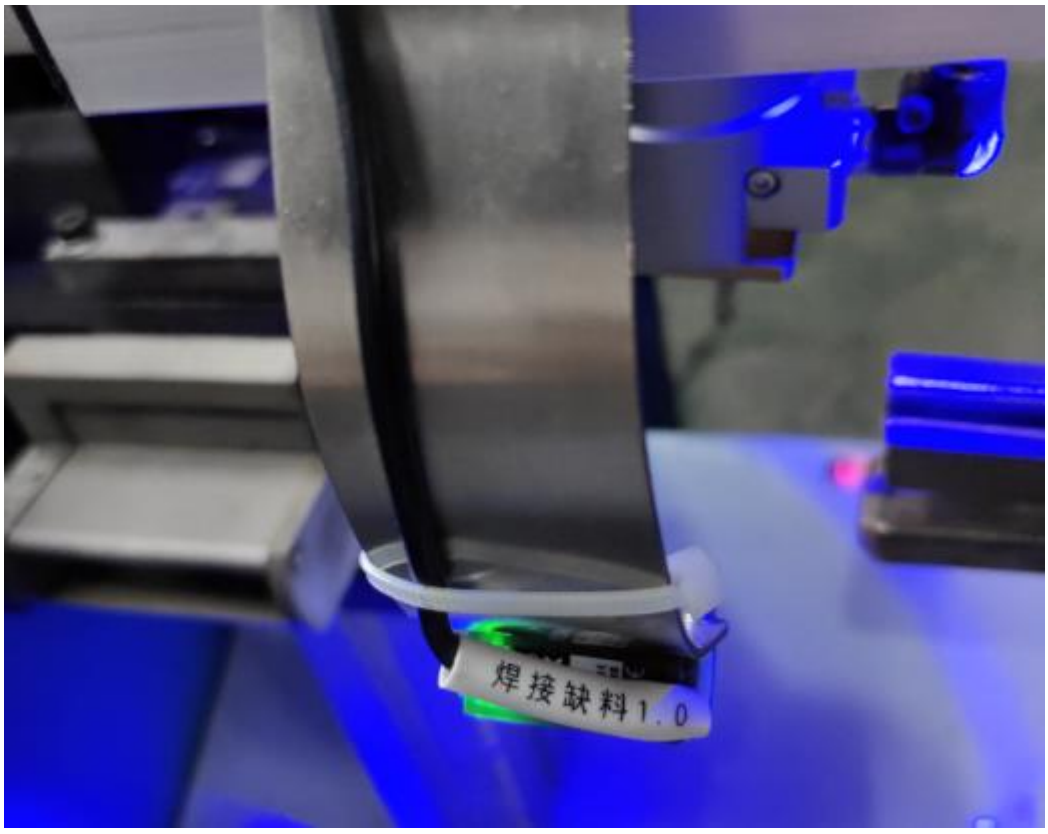


图 2-17

Figure 2-17

7．料架缺料故障,光电眼调整位置照到钢带或调整感应距离，如图 2-18 所示。

7. When the material rack is short of materials, adjust the position of the photoelectric

eye to shine on the steel strip or adjust the induction distance, as shown in Figure 2-18.

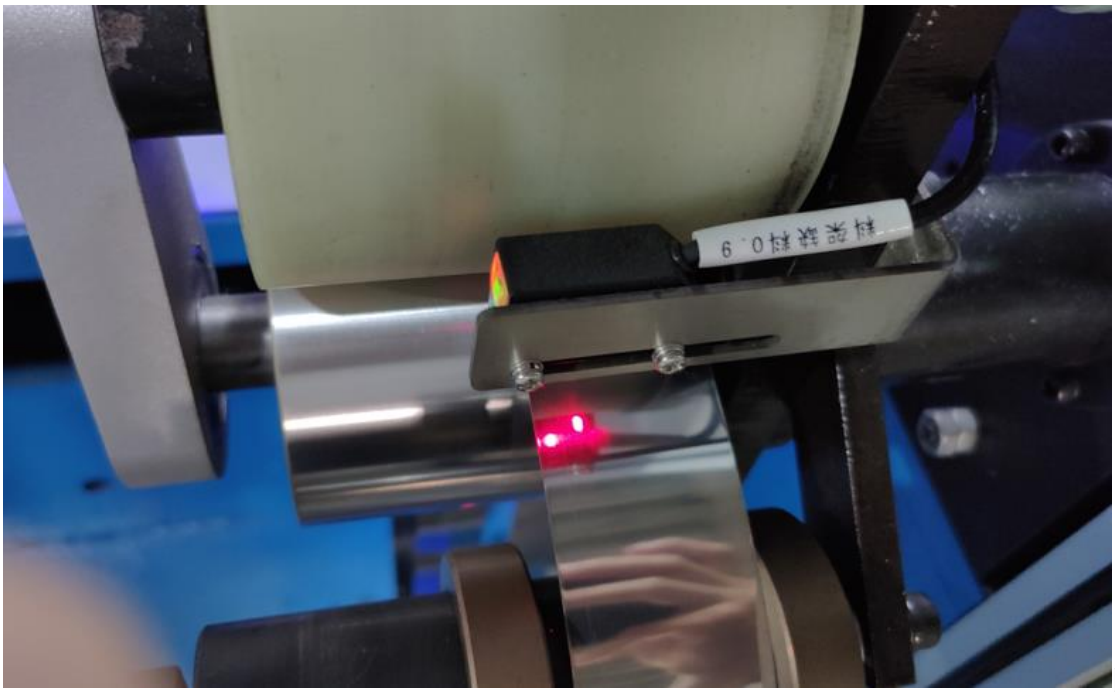


图 2-18

Figure 2-18

8 .料架上限故障，检查变频是否报警，调整接近开关感应位置或更换接近开关，如图 2-19 所示。

8. If the upper limit of the material rack fails, check whether the frequency conversion gives an alarm, adjust the sensing position of the proximity switch or replace the proximity switch, as shown in Figure 2-19.

图 2-19

Figure 2-19

9．焊接原点&限位故障，调整接近开关感应距离，如图 2-20 所示。

9. For welding origin-limit fault, adjust the induction distance of proximity switch, as shown in Figure 2-20.

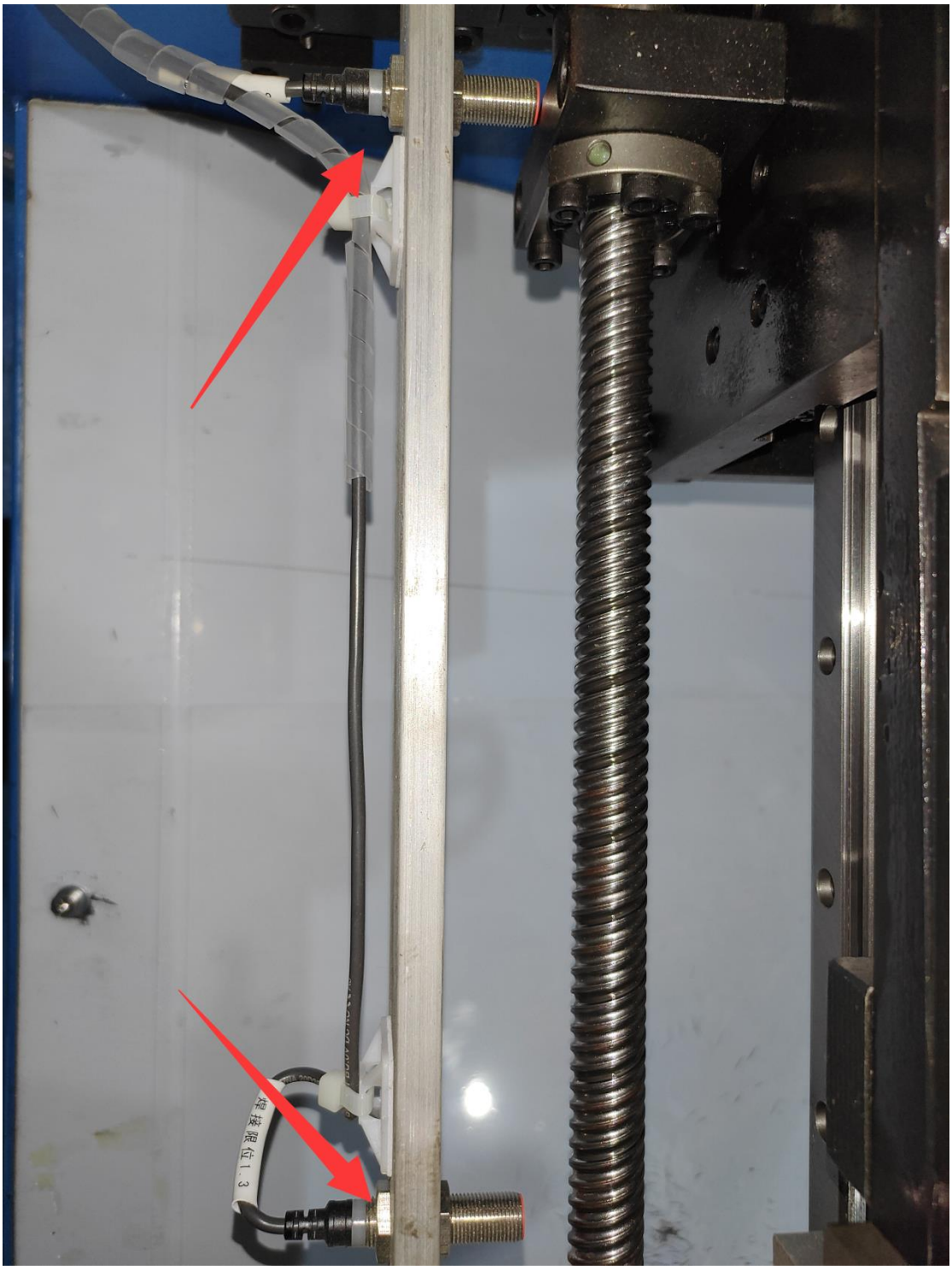


图 2-20

Figure 2-20

10．焊接触摸屏通讯超时，检查触摸屏背面通讯线是否松动＆PLC 主机通讯口是否松动损坏，或检查通讯线整线会不会受损，如图 2-21,2-22 所示。

10. When welding touch screen communication timeout, check whether the communication line on the back of touch screen is loose & whether the communication port of PLC host is loose and damaged, or check whether the whole communication line will be damaged, as shown in Figures 2-21 and 2-22.

图 2-21

Figure 2-21

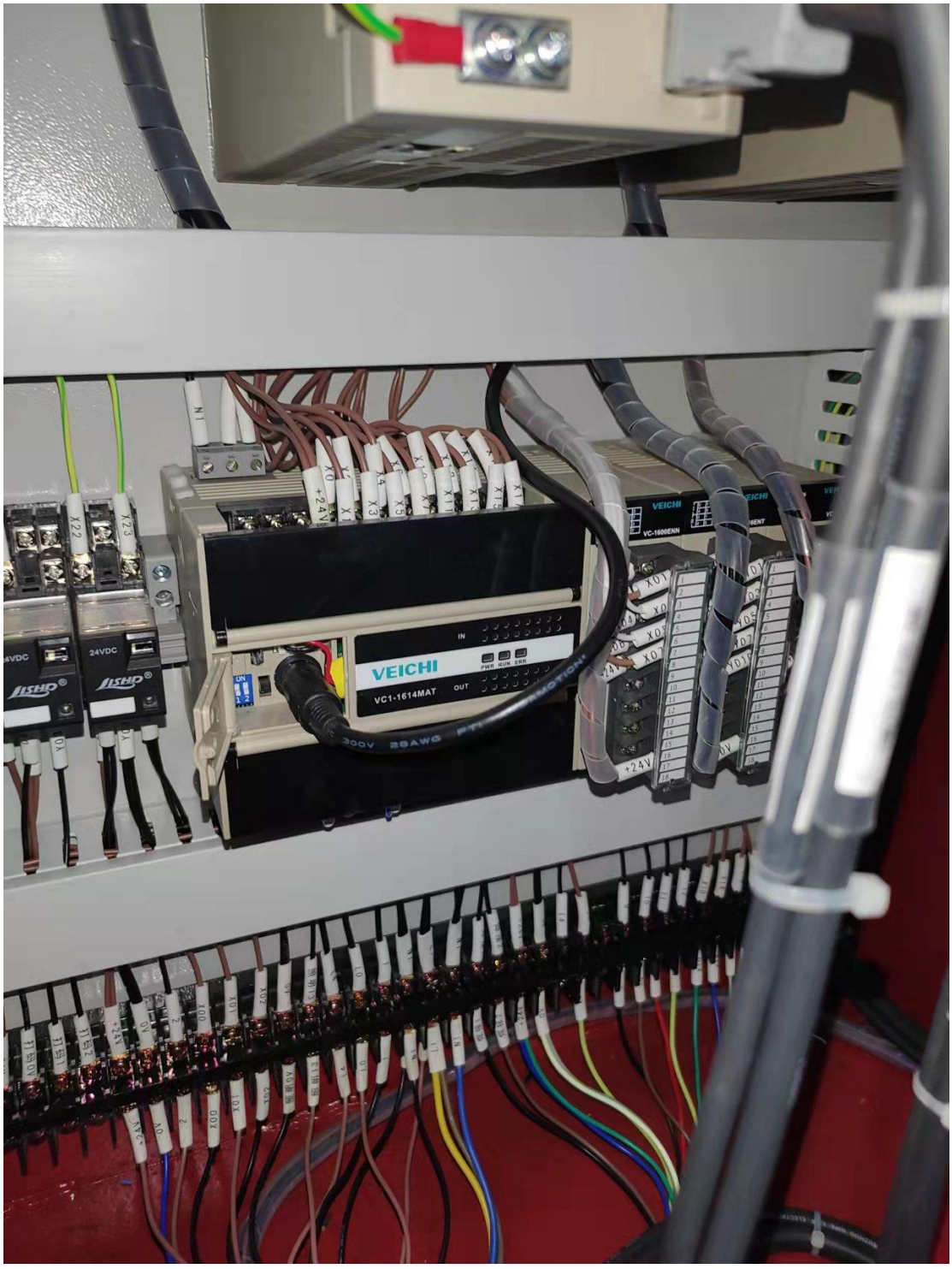


图 2-22

Figure 2-22

五．钢带生产处理故障方案 Troubleshooting for Steel Strip Production

1．首次送料长短，查看操作参数首次送料参数是否过低，检查胶轮是否压紧，检查胶轮&铁辊表面是否有油渍，检查接料夹手胶条&旋转夹胶条是否磨损，检查胶轮是否磨损.

1. The length of the first feeding, check whether the operating parameters are too low, check whether the rubber wheel is pressed, check whether there are oil stains on the surface of the rubber wheel-iron roller, check whether the rubber strip of the receiving clamp hand-rotating clamp is worn, and check whether the rubber wheel is worn.

2．钢带高低头，检查后挡圈跟后限位是否平行，或调整前限位，检查钢带毛刺是否过大，旋转夹胶条是否磨损.

2. Bow the steel strip high, check whether the rear retaining ring is parallel to the rear limit, or adjust the front limit, check whether the burr of the steel strip is too large, and whether the rotating clamp strip is worn.

3．钢带∨口，检查后挡圈跟后限位是否平行，或调整前限位，检查钢带切面毛刺是否过大，旋转夹胶条&焊接夹手胶条是否磨损，检查压平是否对齐焊缝是否压好，激光手动打点，看焊缝是否齐不齐，焊接夹手夹料是否蹭到钢带，检查上下夹手燕尾槽&上下夹板燕尾槽是否有裂缝导致钢带压不紧，点动送料检查刀口是否平行.

3. V-port of steel strip, Check whether the rear retaining ring is parallel to the rear limit, Or adjust the front limit, Check whether the burr on the steel strip section is too large, Rotary clamping strip & welding clamping hand strip is worn, check whether flattening is aligned, whether welding seam is pressed well, laser manual dotting to see

whether welding seam is uneven, whether welding clamping hand clamping material rubs against steel strip, check whether there are cracks in upper and lower clamping hand dovetail grooves & upper and lower splint dovetail grooves, which lead to tight steel strip pressing, and inching feeding to check whether knife edges are parallel.

４．钢带叠料，看焊接触摸屏显示钢带叠哪边，焊缝上边多了减少参数首次送料长度 10 个丝逐步减，焊缝下边微调接料气缸下边的外六角螺丝，先把螺母松了微调即可。检查旋转夹胶条是否磨损导致送料长短，胶轮是否磨损严重.

4. Steel strip stacking, look at the welding touch screen to show which side of steel strip stacking, reduce the parameters on the upper side of the weld seam, and gradually reduce the first feeding length by 10 wires. Fine-tune the outer hexagon screw on the lower side of the receiving cylinder under the weld seam, and loosen the nut and fine-tune it first. Check whether the rotary clamp strip is worn, which leads to the length of feeding and whether the rubber wheel is seriously worn.

５．钢带压痕变形，检查各胶条是否磨损，检查是否参数首次送料过多&接料钢带过长，接料气缸下方的螺丝放松微调即可，

5. The steel strip is indented and deformed, check whether each rubber strip is worn, check whether the parameters are too much for the first time & the receiving steel strip is too long, and relax the screws under the receiving cylinder for fine adjustment.

６．钢带拉爆，检查激光红光点是否在钢带焊缝中心，检查钢带是否有 V 口或焊不透，功率过大也会导致拉爆，聚焦点偏高偏低导致虚焊或假焊，

6. The steel strip is pulled and exploded. Check whether the laser red spot is in the center of the weld seam of the steel strip, check whether the steel strip has V-port or is impenetrable. Excessive power will also lead to pull and explosion, and high and low focusing point will lead to virtual welding or false welding.

7．钢带吹不白，检查氮气机是否正常运行，检查氮气电磁阀是否正常工作或上下夹手出气孔堵塞，氮气气压过大过小也会导致吹不白，压平块&上下夹手有油渍也会导致吹不白，上夹手距离过宽导致吹气不均匀，

7. If the steel strip is not blown white, check whether the nitrogen machine is running normally, check whether the nitrogen solenoid valve is working normally or whether the air outlets of the upper and lower clamps are blocked. If the nitrogen pressure is too large or too small, it will also lead to blown white. If the flattening block & oil stains on the upper and lower clamps, it will also lead to blown white. If the distance between the upper clamps is too wide, it will lead to uneven blowing.

8．钢带焊不透，激光触摸屏功率逐步增加，查看激光头保护镜片是否损坏或者有白点黑点导致出光不正常，

8. The steel strip is impenetrable, and the power of the laser touch screen gradually increases. Check whether the protective lens of the laser head is damaged or there are white spots and black spots that lead to abnormal light output.

9．旋转夹漏气，检查旋转夹内部小气缸橡皮圈是否磨损，更换即可，

9. The rotary clamp leaks air, check whether the rubber band of the small cylinder inside the rotary clamp is worn and replace it.

10．钢带堵料，检查前后限位是否靠钢带太紧导致翘料，点动送料看是否撞到接料夹手，牵引铁辊过高也会导致钢带送料撞到旋转夹&接料夹手，

10. If the steel strip is blocked, check whether the front and rear limits depend on the tight steel strip to cause the material to become warped, and inching the feeding to see if it hits the receiving clamp hand. If the traction iron roller is too high, it will also cause the steel strip feeding to hit the rotating clamp-receiving clamp hand.

11．气缸动作不稳定，检查气压是否过低＆不稳定，或气缸串气导致进出气异常

或气缸损坏，再者检查电磁阀是否堵塞，

11. The cylinder action is unstable, check whether the air pressure is too low & unstable, or the cylinder string air leads to abnormal air inlet and outlet or cylinder damage, and check whether the solenoid valve is blocked.

12．后送料电机不送料，检查主电箱变频是否显示故障，检查料架下方料架启动接近开关是否照到料架铁块，或接近开关损坏，更换即可，

12. If the rear feeding motor does not feed, check whether the frequency conversion of the main electric box shows fault, check whether the proximity switch started by the rack below the rack shines on the iron block of the rack, or the proximity switch is damaged and replaced.

13．焊接夹手撞到旋转夹，检查焊接原点是否损坏导致原点改变位置，

13. When the welding clamp hand hits the rotating clamp, check whether the welding origin is damaged and causes the origin to change its position.

14．自动状态下走几步停下不走，故障复位初始化改单步走模式，点动启动按钮一步一步走，检查 IO 监控各信号是否正常，再查看操作参数是否设置错误，

14. Take a few steps to stop in the automatic state, change the fault reset initialization to a single mode, press the start key step by step, check whether the IO monitoring signals are normal, and then check whether the operating parameters are set incorrectly.

15．焊接机触摸屏参数错乱，联系公司售后处理，（注：发现参数错乱严禁启动机器，或导致速度过快碰撞，）

15. The touch screen parameters of welding machine are disordered, and contact the company for after-sales treatment. (Note: It is strictly forbidden to start the machine if the parameters are disordered, or cause too fast collision.)

16．送料光电眼故障，检查光纤检测口会不会沾灰尘导致检测不稳定，或更换光纤线，

16. If the feeding photoelectric eye fails, check whether the optical fiber detection port will be stained with dust, resulting in unstable detection, or replace the optical fiber line,

17．切刀切料切不断，检查切刀是否磨损不锋利，或者气压不足&气缸串气，

17. The cutter cuts the material continuously, and check whether the cutter is worn and not sharp, or the air pressure is insufficient & the cylinder is strung with air.

六．焊接机&冷水机保养及维护 Maintenance of Welding Machine & Water Chiller

1．定期一周滑块&丝杆打油，清理机台灰尘（减少胶轮铁辊的表面损坏）

1. Slide block & screw rod oil regularly for one week to clean up the dust on the machine (reduce the surface damage of rubber-tyred iron roller)

2．定期一周检查储气罐是否有水，及时排水，减少电磁阀及气缸的损坏，

2. Check whether there is water in the air storage tank regularly for one week, drain water in time, and reduce the damage of solenoid valves and cylinders.

3．检查缓冲器缓冲效果是否正常，发现损坏及时更换，

3. Check whether the buffer effect is normal, and replace it in time if it is damaged.

4．不定期检查各气缸螺丝螺母是否松动，

4. Check whether the screws and nuts of each cylinder are loose from time to time,

5．冷水机定期一个月更换一次纯净水，滤芯三个月换一次，

5. The chiller regularly changes the purified water once a month and the filter element

once every three months.

6．冷水机定期一个月清理一次灰尘，以免冷水机散热不正常，

6. The chiller regularly cleans up dust once a month to avoid abnormal heat dissipation of the chiller.

7．定期检查各接近开关光电眼是否沾上过多油渍导致感应不正常，

7. Regularly check whether the photoelectric eyes of each proximity switch are stained with excessive oil stains, resulting in abnormal induction.

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