用户操作维护手册

Operation Manual of IR Series Curing Oven

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1. 2 About this Manual

本手册主要对 IR 系列烘干炉的性能特点进行概述，以及提供有关烘干炉的操作、安全预防常识、故障排除及维护保养等方面的信息。在您使用 IR 系列烘干炉之前请务必详细阅读本用户手册。
This manual mainly covers the features and characteristics of IR series curing machines and provides information on its operation, safety issue and preventive measures, trouble shooting and maintenance. Please read this manual carefully before operating our IR series curing machines.

如您在使用 IR 系列烘干炉时遇到的故障自己无法排除而本使用手册中又没有描述时，请及时与本公司售后服务部联系，我们将及时为您提供技术服务。
If you are facing any trouble with our IR series curing machines that you can not shoot or is not described by this manual, please contact our after-sales service center and we will help you in a timely way.

1.3 设备描述
1.3 equipment describe

1.3.1 功能
1.3.1 Function

IR 系列烘干炉是本公司针对客户高产量烘干要求定制，广泛使用于三防漆涂可选覆后的烘干
The in-line Curing Machine (IR series) from 1Clicksmt is ideal for high-volume curing production .They are easy to integrate with different coating machines.

炉子加热长度可以根据客户产能及温度要求要制定
Available in different lengths they provide the flexibility to match your production requirements and feature robust construction and a streamlined appearance.

特制的下抽风系统，保持热量整体向下循环，同时过滤抽出的空气中的挥发物。保护环境
The oven is equipped with a unique downdraft exhaust design. Plenums below the conveyor rails, it will remove volatile organic compounds (VOC), which are typically found in coating applications. This provides a safe operating environment when coupled to your external exhaust system.
上盖可以轻松开启，方便维护发热体

The upper cover can be lifted manually. So to maintain the heater easily.

1.3.2 规格参数：
1.3.2 Key Parameters:

Dimension and Weight	
Dimension L*W*H	L2000mm*W1135mm*H1145mm
Weight	Approx.500kg
Transport System	
Transport Height	900±20mm
Transport Speed	0.1-1.4m/min
Transport Direction	L-R
Transport Motor	AC220V 90W
Transport Mode	Pin Chin (35B 5mm Stainless Steel)
Width Adjustment	MAX 450mm
Heating System	
Heating Mode	IR Panel (optional with IR Tube)
Heating Zones	3 Sets (Top3 , Bottom 3 is an option)

Temperature Scope	Room temp to 150C (IR Tube), Room temp to 250C (IR Panel)
Temperature Rising Time	8 mins(To 150C） (for IR Tube), 25-30 mins(To 250C） (for IR Panel)
PCB Size	MAX W450*L450
PCB Clearance	Top Side 60MM Bottom Side 60MM
Control System	
Control Mode	Touchscreen
Power Supply	AC380V
Total Power	13KW for only top, 25KW for top & bottom
Running Power	Top only (6-8kw for IR tube, 2--4KW for IR panel) / Top & bottom (8--14kw for IR tube, 4--8KW for IR panel)
Cover Lifting Mode	Electric Screws

IR-2030P Series Curing Oven (P means IR panel, without P means IR tube) Dimension	
IR-2030P(Upper 3)	L2000mm*W1135mm*H1145mm
IR-2033P (Upper 3/Bottom 3)	L2000mm*W1135mm*H1145mm
IR-2660P(Upper 4)	L2600mm*W1135mm*H1145mm
IR-2644P(Upper 4/Bottom 4)	L2600mm*W1135mm*H1145mm
IR-3350P(Upper 5)	L3300mm*W1135mm*H1145mm
IR-3355P(Upper 5/Bottom 5)	L3300mm*W1135mm*H1145mm
IR-4060P(Upper 6)	L4000mm*W1135mm*H1145mm
IR-4066P(Upper 6/Bottom 6)	L4000mm*W1135mm*H1145mm

1.3.3 实现功能如下：
1.3.3 Functions available:

1. 开启关闭运风
1. Open / close air circulation

2. 开启关闭加热系统
2. Open / close heater system

3. 开启关闭冷却
3. Open / close cooler system

4. 运输速度设定
4. travelling speed setting

5. 各温区温度设定
5. Set zone temperature

6. 温度报警上下限设定

6. Set upper and lower limits for over-heat warning

7. 机器参数设定
7. Set machine parameters

8. 数据调用
8. Data retrieva

9. 温度曲线测试
9. Temperature test and curve mapping

第二章 安全与预防
Chapter Two – Safety Issues and Preventive Measures

2.1 基本安全知识
2.1 Basic safety knowledge

机器必须按照有关安全操作规则操作才能避免故障和事故的发生。在本用户手册中对有关机器安全使用方面的知识作了详细的说明，确保用户对机器依照有关的安全条例进行安装和操作，预防意外安全事故的发生。
Machine should be operated strictly in accordance with relevant safety and operation rules to avoid any failure and accident. This manual described in a very detailed way the knowledge about its safe operation to ensure that users know how to install and operate our machine according to relevant safety and operation rules and accordingly avoid any unexpected accident.

2.1.1 用户职责
2.1.1 User's duties

用户应确保本机仅被下列人员操作：
User should make sure that only the following workers are allowed to operate this machine:

- 熟知基本职业安全和预防知识，且接受过本机操作培训的人员。
- The one who knows well the basic occupational safety issues and preventive measures and is trained on how to operate this machine.

- 对用户手册中有关安全的章节及有关警告内容熟知的人员。
- The one who knows well the contents and warnings under relevant chapters and sections of this manual.

- 在定期安全检查中能依照相关安全条例工作的合格工作人员。
- The one who is qualified and can perform regular check by strictly adhering to related rules.

2.1.2 机器只能在符合下列条件下使用
2.1.2 Machine can be operated only the following conditions are met:

- 机器应保持平稳，不得有倾斜或不稳定的现象，严禁剧烈震动。
- Machine should be kept level and stable without any inclination, instability and violent vibration.

- 机器应在洁净和温湿度适宜的环境中工作。
- Machine should work in a clean environment with proper temperature and humidity.

- 电源配线只能由专业电工进行操作。
- Power supply wiring can only be performed by qualified electricians.

- 机器的安装与调试须由经过专门培训的人员进行。
- Installation and commissioning of the machine can only be performed by specifically trained dedicated workers.

- 电源应处于常闭状态，仅允许有操作资格的人员开启。
- Power source should be kept at “Always Off” mode and only qualified workers are allowed to turn the power.

- 电器结构应避免暴露在空气中。
- Electrical systems should be prevented from exposure to open air.

- 熟知本机的操作规程。
- The operation rules of the machine should be familiarized.
- 影响安全的有害故障能够即时排除。
- Any failure or troubles that may cause safety issues and accidents can be removed immediately.

2.1.3 正确使用
2.1.3 Proper application

IR 系列烘干炉是本公司针对客户高产量烘干要求定制，广泛使用于三防漆涂可选覆后的烘干，任何其他偏离机器原设计意图的使用均被视为不正确的。

The in-line Curing Machine (IR series) from 1Clicksmt is ideal for high-volume curing production .They are easy to integrate with different coating machines, Any application other than what is intended is seen as improper application.

2.1.4 正确使用方法
2.1.4 Correct operation

- 遵守用户手册中所有信息。
- Follow all the requirements described in this manual.

- 遵守定期检查维护机器的制度。
- Check and maintain the machine regularly.

以下原因引起的伤害或损坏，本公司拒绝承担责任
It is not held liable for any damage or loss caused by the following reasons:

- 不正确地使用机器。
- Improper use or application of the machine.

- 不正确地授权、安装、操作及维护机器；安全装置有缺陷或不起作用。
- Improper authorization, installation, operation and maintenance of the machine. Defective or failed safety devices.

- 没有遵循用户手册中有关机器运输、安装、授权、操作、维护及设置的信息说明。
- Requirements described in this manual on transportation, installation, authorization, operation, maintenance and setting of the machine are not followed.

- 随意更改机器的结构；随意更改机器的控制程序。
- Machine structure is modified or programs are changed without any authorization.

2 .2 系统安全与预防

2.2 Safety issues and preventive measures

在开始操作或维护设备之前，应确保操作或维护人员已阅读并理解手册中的所有说明和有关安全预防条例。

Please make sure that related operators or maintenance workers read and understood all the information about safety issues and preventive measures described in this manual before starting their operation or maintenance.

! 本手册使用此符号，表示用户须特别注意的事项。

! Special attention should be paid to the items with this sign in this manual.

烘干炉有 4 个主要的危险来源：高压、高温、隔热材料以及运动着的机械零件如驱动系统的链轮、带轮等。在设备正常操作和维护情况下，这些危险都通过机器的设计以及正确的操作维护被有效地防止。

curing machines has four major risk sources: High pressure, high temperature, thermal insulation materials and moving mechanical parts such as driving system's sprockets and pulleys. If machine is operated and maintained properly, such risks can be avoided by proper design, operation and maintenance.

2．2．1 正常安全操作规则

2.2.1 Normal and safe operating rules

- 设备停机维护保养要求有 2 人或 2 人以上进行；一人负责计算机控制，一人负责观察系统操作。
- Two or more workers are needed to stop the machine and perform maintenance: one is to control the computer and the other one is to observe machine operation.

- 当进行设备操作和维护工作时，应穿戴安全防护工作服。
- Personal prevention equipment should be worn when operating and maintaining the machine.

- 在对设备进行维护保养工作之前，应关掉电源和气源。
- Power source and air source should be cut off before performing maintenance and repair.

- 设备在运输过程中应避免摇晃和震动。突然的摇晃和震动会对设备造成损坏。
- Shaking and vibration should avoided during transportation of the machine. Sudden shaking and vibration may cause damage to the machine.

- 不要随意取消机器的安全开关或机器本身具有的安全性能。
- Safety switches or canceled safety devices are not allowed to be removed without authorization.

- 注意所有警示标签且不要随意移动设备上的警示标签。
- Pay attention to all the warning labels or tags on the machine. Such labels and tags are not allowed to be moved without authorization.

- 设备不能带病或带有危险隐患工作。
- Machine should not be operated before its trouble or hidden risk is removed.

- 在进行接线或断线操作之前应将设备电源关闭。
- Power source should be cut off before performing and wire connection or disconnection.

- 在移动设备之前应关掉电源并将电源插头拔下。
- Power source should be cut off and power plug be pulled out before moving the machine.

- IR 系列烘干炉使用高压电源。当机器工作时不要用手去触摸机器上带有高压电源的部位，否则会造成严重的危害甚至死亡。
- Our IR series curing machines equipment uses high-voltage power. Do not touch any part of the machine with high-voltage power during its operation. Otherwise, serious harm or even death may be caused.

- 烘干炉隔热材料在正常操作条件下不暴露在外，只有打开炉膛对炉子进行维护保养时才会暴露在外。此时应小心避免吸入纤维，要按要求穿戴防护口罩、手套及工作服。
- Normally, curing machines equipment's thermal materials are not accessible and they will be exposed only when oven chamber is opened for maintenance. At this time, workers should prevent inhalation of any fibers and wear protective masks, gloves and uniforms.

- 运动部件穿过整个炉膛，进行操作时不要将手触摸运动部件，如链条、链轮、带轮等；当进行维护保养时应小心运动部件，并尽可能地关掉电源。
- Moving parts are laid out and arranged along the whole chamber. Do not touch such moving parts as chains, sprockets, pulleys, etc. during operation. During maintenance, pay attention to such moving parts and power source should be cut off as possible as you can.

- 小心避免触摸到发热元件，以免烫伤或造成燃烧的后果。
- Do not touch any heating elements to prevent your from being burnt or combustion.

2．2．2 警示标签

2.2.2 warning labels

 安全警示标签贴在涂覆烘干烘炉不同位置以示有关人员在安装、操作或维护机器时注意。

炉上可能会有下列警示标签。

 Safety warning labels or tags may be arranged in different places of the machine for related workers' attention when performing installation, operation or maintenance. The following warning labels may be found on our coating curing oven

2.2.3 安全操作

2.2.3 safe operation

机器仅在安全装置起作用的情况下，进行操作。
Operation can only be started after making sure that safety devices work.

在打开机器开关之前，应确定机器启动不会伤害到任何人。
Make sure that the starting of your machine will not hurt anybody before staring the machine.

检查安全装置是否损坏，以确保一旦机器失常工作至少安全装置起作用。
Check if the safety devices fail or not to ensure that even the machine malfunctions but the safety devices can work.
本机安全装置有：紧急制动开关、主电源开关、三色灯、机器罩盖、电控箱等。
This machine's safety devices include: Emergency stop switch, main power switch, three-color lights, machine covers, electrical cabinets, etc.

! **紧急制动开关的使用：**按下紧急制动开关按钮，则中断电机供应电源，PC 电源开关仍然接通，此时机器顶部三色灯中的红色灯亮，蜂鸣器鸣叫报警。

! How to use Emergency stop switch: To press the Emergency stop switch will cut off the power source to the machine but PC's power source is still kept on, accordingly, the Red light of the three-color lights over the machine will turn on and buzzer is activated.

注意：只有在紧急情况下才能按下此开关按钮，此键按下即自锁；在机器重新开始工作之前须将此按钮顺时针旋转使之弹起复位。
Notes: This button may be pressed only if emergency appears. After it is pressed, it will be self-locked and can only be reset by turning it clockwise before re-starting your machine.

2.2.4 维护维修、故障排除：
2.2.4 Maintenance and trouble-shooting

定期的维护保养应形成制度化。
Systems should be created so that machine be maintained regularly.

在检查维护之前，一定要关闭电源开关，以确保设备处于停机状态。
Make sure power source is turned off and machine stopped completely before performing any check and maintenance.

检查齿轮、带轮等运动部件连接螺丝以确保其连接可靠。
Check the screws of such moving parts as gears and pulleys for their reliable connection.

应竖立警告标记表示机器的状态以防机器正在维修时被第三者启动。
Warning sign should be erected beside the machine to prevent that machine is started by any third party when it is being maintained.

一旦维修工作完成，应进行检查确保装置已全部安装，且功能正常。
As soon as maintenance is finished, please check and make sure that all the devices are installed completely and can work normally.

第三章 安装与调试
Chapter Three - Installation and Commissioning

3.1 运输及交付注意
3.1 transportation and delivery

1．机器外包装要求里层用防雨塑料布或抽真空塑料薄膜包裹，外层用木板装订成箱。
1. Machine should be packed by rainproof plastic cloth or wrapped by vacuum film first and then be crated.

2．木箱外应标有防碰撞、防倾斜、防潮等标记。
2. No collision, No tilting or No damping signs should be arranged over the wooden packages.

4．机器运动件应和支承件紧固，机器底座应和包装箱底板紧固。
4. The moving parts of the machine should be secured with supports and the machine base should be secured with the crates.

5. 当机器交付时，打开包装木箱并查验有无零部件缺少。
5. When handing over the machine, wooden cases should be opened to check if any part or assembly is missing.

3.2 开箱
3.2 Unpacking

包装箱内除涂覆烘干烘主机外，另有：
In addition to the main coating curing oven unit, the packing case also contains:

1．《用户手册》一本；
1. One User Guide

2．《产品随机备件及工具清单》一页(见附录)。
2. One “Accompanying spare parts and tools kit” (Please see appendix)

3．产品备件及工具。
3. Accompanying spare parts and tools

开箱后，请您首先做好以下工作：
Please follow the below instruction immediately unpacking the case:

1．对照《产品备件及工具清单》查点随机备件及工具。
1. Check the accompanying spare parts and tools based on your “Accompanying spare parts and tools kit”

2. 检查传送链条、调宽链条是否脱落，链条有无锈迹、。
3. Check if conveyor chains and width-adjusting chains came off and chains are rusty

4. 检查所有电气元件是否固定，接触是否良好，并连接好计算机控制系统各电线电缆。
4. Check if all electrical parts are fixed securely and engaged well and then get all the cables and cords connected to computer and controllers.

4. 开机前请务必详细阅读本机的《用户手册》。
4. Please make sure to read this User Manual carefully before operating this unit.

3.3 操作环境

3.3 Operating environment

环境温度：不论烘干炉机内有无工件，该机的工作环境温度应该在５～４０℃之间。

Room temperature: The room temperature for this machine should be kept at 5~40℃ no matter the machine works or not.

相对湿度：该系列机的工作环境相对湿度范围应在２０～９５％。
Relative humidity: The relative humidity of the room for this series of machines should be kept at 20~95%.

运输保管：该系列机可在－２５～５５℃的范围内被运输及保管。在２４小时以内，它可以承受不超过６５℃的高温。在运输过程中，请尽量避免过高的湿度、振动、压力及机械冲击。

Transportation and storage: This machine can be transported and stored at -25~55℃. It also can accept a temperature of 65℃ within 24 hours. During transportation, high humidity, vibration, pressure and mechanical shock should be avoided as possible as you can.

安装场地：
Site preparation for installation:

a：机器占地面积参见3.3节外形尺寸。
a: Please see Section 3.3 for machine dimensions.

b：请在洁净、通风的环境条件下运行机器，避免因灰尘等影响焊接质量；
b: Please place and use the machine in a clean and ventilated environment to prevent soldering quality from being impacted by dust.

c：请不要把机器安装在电、磁干扰源附近；
c: Do not install the machine near any electric or magnetic interference source.

d：安装时，不要将机的进、出口正对着风扇或有风吹进的窗口；
d: During installation, please make sure that the feeding end and the discharging end do not face straight any fans or windows.

e：机器后部留有可对设备进行维护、保养的空间，上方留有可供打开炉子,上盖及装通风管道的空间(机器两端两个排风口直径均为Φ125mm)。
e: Enough space should be reserved at the rear side of the machine for its repair and maintenance and over the oven for opening top cover and installing ventilation pipes (The diameters of the two exhausting outlets at the two ends of this machine are Φ125mm).

3.4 设备安置及高度调整

3.4 Installation and height adjustment

1. 将烘干烘机移动安置到选定位置。调节机器下部四个可调机脚(可调整范围：±20mm)，根据工厂生产线需要确定本机工作高度。

1. Move the series curing machines equipment to the selected place. Adjust the four adjustable legs of the machine (adjustable range: ±20mm) to the proper height decided by your production line

2. 调涂覆烘干烘机水平。*IR*在出厂前炉体水平已调整好。在IR机运输到位后水平调整方法是：

2. Adjust series curing machines equipment's levelness IR series curing machines equipment's levelness was adjusted properly before delivery. After arriving at the installation site, please follow the below steps for its levelness adjustment:

3. 使用框式水平仪。

3. Use a level tester

4. 通过四个可调机脚，对涂覆烘干烘机导轨等反复进行水平调整，直到其完全水平为止。

4. Adjusting the four adjustable legs of the machine repeatedly to adjust its guide rails' levelness until the machine is completely level.

5. 将可调机脚螺母收紧。

5. Turn the leg locking screws tight.

! 在连接电源电缆之前，请一定要用电表检查电源电压，并打开电控箱确认无明显异常。

务必请确认本机的电源跳制为断开状态(即ＯＦＦ状态)。

! Before connecting the machine to a power source, please make sure to check power source's voltage and open the electrical cabinet to check if any abnormality exists. Please make sure that the power source's thermostat stays at open (i.e. OFF state).

! 连接三相电源时，要注意三相相序，保证当本机空气开关闭合时缺相保护器的指示灯亮，否则机器不能正常运行。

! When connecting the machine to a three-phase power source, please pay attention its phase sequence. Please make sure that open-phase protector's indicator can light up when air-break switch is closed. Otherwise, the machine can not work normally.

第四章　系统描述

Chapter Four – Overview of the Machine

4.1 主要性能特点：
4.1 Main features

4.1.1 加热系统
4.1.1 Heating system

加热内胆全部采用加厚不锈钢制作，耐高温，无变形。
Stainless steel inner walls to resist high temperature and deformation.

专门设计加厚保温层，确保热量损失最小，从而达到省电节能的目的。
Specially designed super-thick insulation layers to guarantee the least heat loss and save power energy accordingly.

4.1.2 控制系统
4.1.2 Electrical system

PLC 与触摸屏控制，可保存 200 组温度设置于触摸屏中。
PLC and touch-screen to save 200 groups of temperature data.

温度均采用 PID 方式控制，确保温度控制精度在 +/-1 度.
PID controlled temperature to guarantee temperature control precision within +/-1 degree.

知名品牌电器采用，比如德国施耐德接触器，日本欧姆龙中继等.
Famous-brand electrical parts and components such as Schneider contactors from Germany and Omron relays from Japan.

4.1.3 运输系统
4.1.3 Conveyor system

进出口均带高度可调挡板，在满足产品高度的前提下保证热量损失最小
At entrance and exit there are plate we can adjust the height, so prevent heat lose from both end.

导轨链条运输，可选网带运输或根据客户产品定制运输方式运输
Standard with pin chain conveyor, can be optional with mesh belt conveyor

4.2 系统介绍
4.2 Introduction of individual system

4.2.1 运输系统
4.2.1 Conveyor system

需烘干产品是通过运输系统的传送而通过烘干炉的。运输系统主要由传送链轮、链条和运输马达，大减速比牙箱等组成。传送链条为大节距非标链条，宽度根据客户冶具尺寸而定，不可调整。

PCBS are moving through the curing machine by means of conveyor system. Conveyor system consists of sprockets, chains, motors, high-reduction-ratio gear box and so on. Chains are non-standard wide-pitch chains and its width should be decided by customers' jigs and fixture but is not adjustable.

4.2.2 驱动系统
4.2.2 Driving system

采用链条传输，驱动系统安装在炉子的出口处。驱动系统包括驱动马达、驱动轴、驱动链条及链轮等。
Since chains are used, the driving system is arranged at the exit of the oven. Such driving system includes motor, driving shafts, driving chains, sprockets and so on.

4.2.3 炉内温区构成
4.2.3 Temperature zone structure

炉体上方由悬挂远经外发热板，发热板高度可以调整。发热板均匀分布在炉体上空，产品在下方经过时吸收红外线的热量从而达到烘干的目的。上盖可以手动取下来，方便更换发热板或是热电偶。每个热电偶控制横向排布的两块发热板，采用PID控制方式，温度恒定。
Far infrared heating boards are hung over the upper part of the cabinet and the heating board height is adjustable. Such heating boards are laid out with the same space between each other in the upper part of the cabinet and the objects to be dried will move under the heating boards, absorb the heat from the far infrared heating boards and then dry. The top cover can be removed by hand to replace heating boards or thermcouples easily. Every one thermcouple controls two heating boards which are arranged horizontally. PID controller is adopted to realize constant temperature.

4.2.5 速度控制
4.2.5 Speed control

烘干炉运输系统的速度可根据用户的需要自行在触摸屏上进行设定，由软件进行控制。旋转编码器反馈脉冲信号到触摸屏进行显示。
The speed of curing machines' conveyor system can be set and adjusted by user and controlled by software. The rotary encoder will feedback its pulse signals to the touch-screen to display.

4.2.6 温度控制
4.2.6 Temperature control

各温区设定温度通过软件操作程序进行设置，各温区的实际温度通过安装在每个温区的热电偶传递并显示在PC控制屏上，同时也将控制信号反馈给电控箱中的固态继电器以提供足够的动力将温度维持在设定的数值。
The temperature of each zone can be set and controlled by software and the actual temperature of each zone is detected by the thermo-couple installed in each zone and sent to the PC monitor and also feedback to the solid-state relays in the electrical cabinet to provide enough power for maintaining the temperature at its preset value.

4.6 电脑显示温度与 PCB 板面温度差别：
4.6 Difference between computer-displayed chamber temperature and PCB surface temperature:

电脑显示的实际温度是 IR 炉腔内的实际环境温度，它是一个静态测量数值；而 PCB 板面温

度是 PCB 板在炉腔内上述环境温度下运动过程中所测量出来的温度，它是一个动态测量数据值，与 PCB 板的吸热率、传送速度等因素有关，所以，测量出来的 PCB 板面实际温度与涂覆烘干烘炉电脑显示的实际温度有一定的差别

Computer-displayed temperature is the actual temperature within curing machines equipment's chamber and it is a statically measured value. PCB surface temperature is the PCB's surface temperature when PCB moves through the chamber with the before said environment and it is a dynamically measured value which depends on PCB's heat absorption rate, moving speed, etc. So PCB surface temperature measured is something different from the computer-displayed chamber temperature.

第五章 操作系统说明
Chapter Five – Machine Operation

5.1 开机前准备
5.1 Preparation before starting the machine

1. 检查电源供给是否为指定额定电压、额定电流的三相4线制电源；
1. Check if the rated voltage and current of the power source can meet requirements and if it is a three-phase 4-line power supply.

2. 检查主要电源是否接到机器上；
2. Check if main power is already connected to the machine.

3. 检查设备是否良好接地
3. Check if machine is earthed properly.

4. 检查是否有无关的碎物留在电控箱内，电控箱内各接线插座是否插接良好；
4. Check if any foreign objects are left within the electrical cabinet and all the sockets can work properly within the electrical cabinet.

5. 检查位于出、入口端部的紧急制动开关是否弹起；
5. Check if all the emergency stop switches at both feeding and discharging ends are ejected to their normal positions.

6. 保证IR机的入口、出口处的排气通道与工厂的主通风道进行活动式连接；
6. Make sure that the exhausting pipes at both feeding and discharging ends of the curing machines equipment are connected flexibly with the main ventilation pipes.

7. 检查各滚筒轴承座的润滑情况；
7. Check if all the roller bearing seats are lubricated properly.

8. 检查传输链条有无从炉膛内的运输导轨槽中脱落；
8. Check if conveyor chains come off the guide rails within the chamber.

9. 检查位于传送装置进出口两端的链轮和齿轮紧固螺钉是否已全部拧紧；
9. Check if all the fastening screws for the sprockets and gears at both feeding and discharging ends of the conveyor system are turned tight.

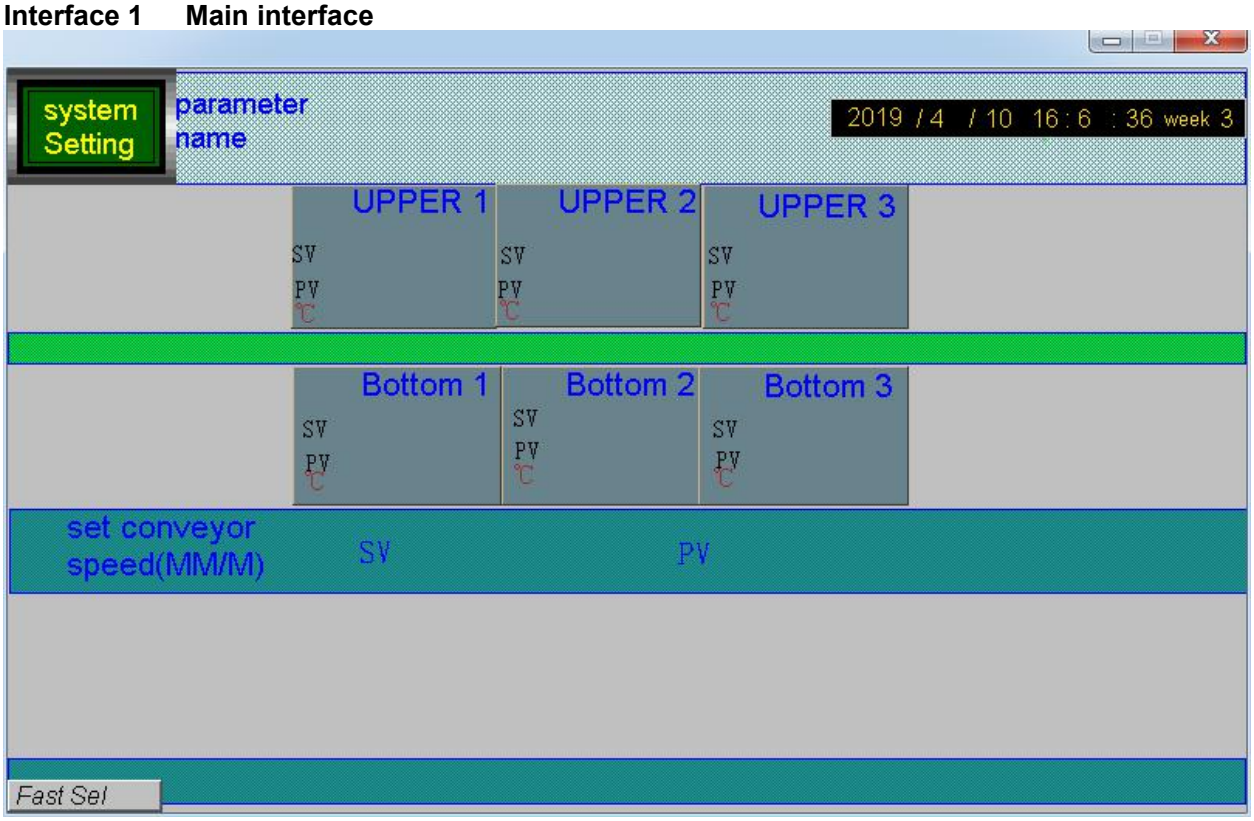
10. 检查传输链条传动是否正常，保证其无挤压、受卡现象，保证链条与各链轮啮合良好，无脱落现象；

10. Check if chains can run normally and make sure that they are not pressed or stuck, are engaged with all the sprockets properly and do not come off.

11. 清理干净炉腔，不要将工件以外的东西放入机内；
11. Clear and clean the chamber. Do not allow any object staying in the chamber

5．2 软件说明
5.2 Software Introduction

界面 1　主界面
Interface 1　Main interface

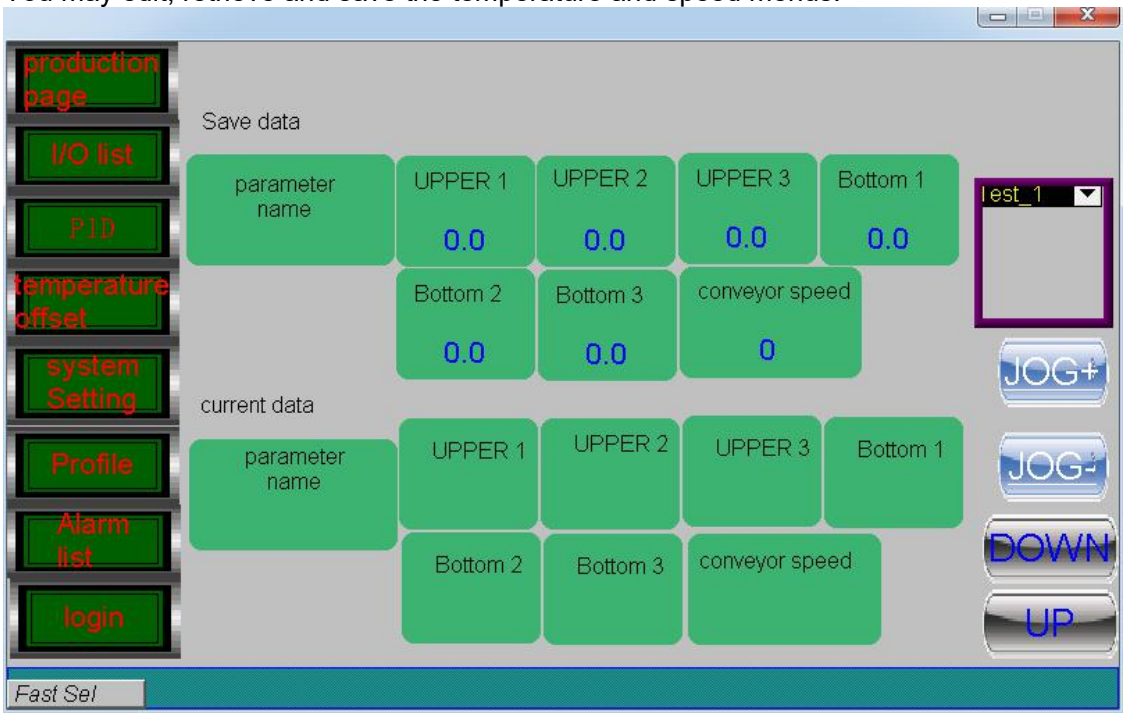


SV：　设定速度值 PV：　实际速度值
SV: Setting Transport Speed　PV: Currently actual Speed

运输：　运输开关
conveyor: conveyor switch

Heater Up: Top IR heaters switch

界面 2 “数据保存”界面
Interface 2 “Program Save” interface
You may edit, retrieve and save the temperature and speed menus.



UP/DOWN: Cover opening switch

ID and Password

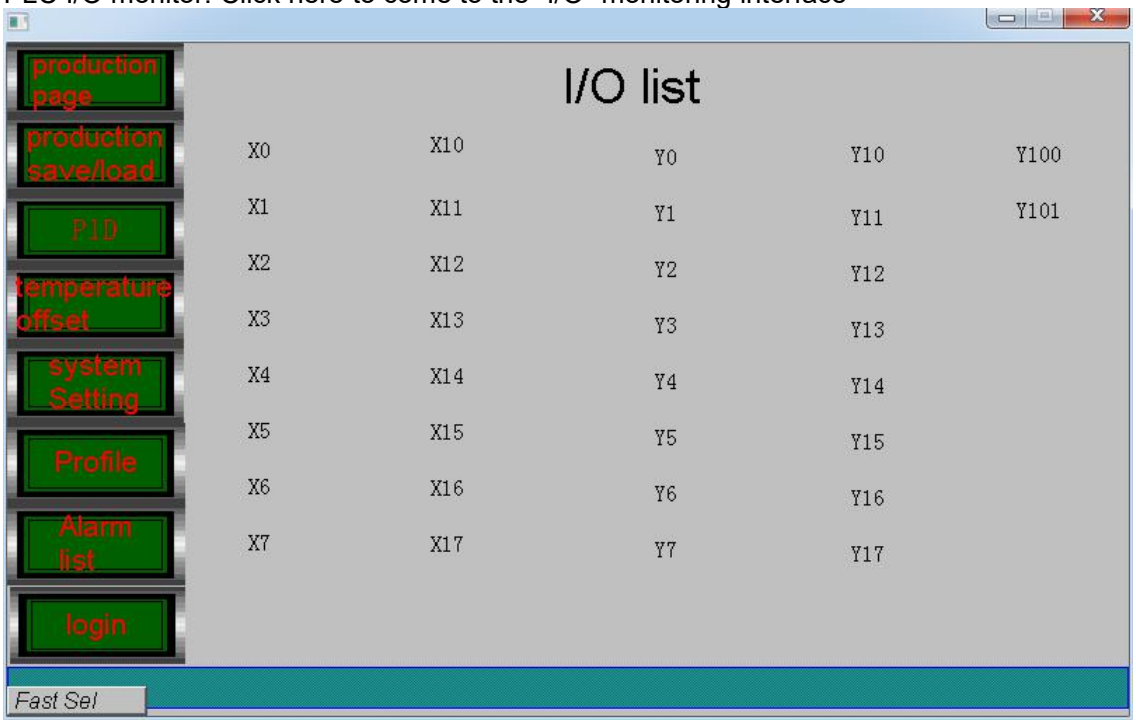
Operator
ID:1
Password:111
Only have right to start the oven

Supervisor
ID:2
Password:222
Have right to set temperature, speed and download program

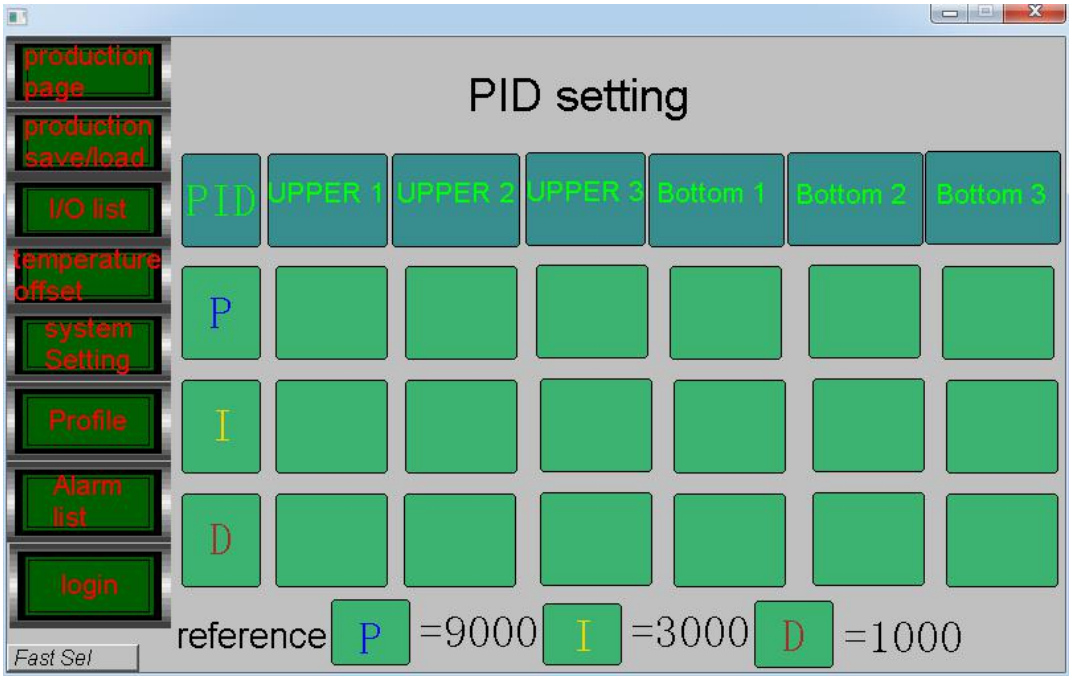
Manager
ID:3
Password:333
All Rights

界面 3　“I/O”监控界面
Interface 3　“I/O” monitoring interface

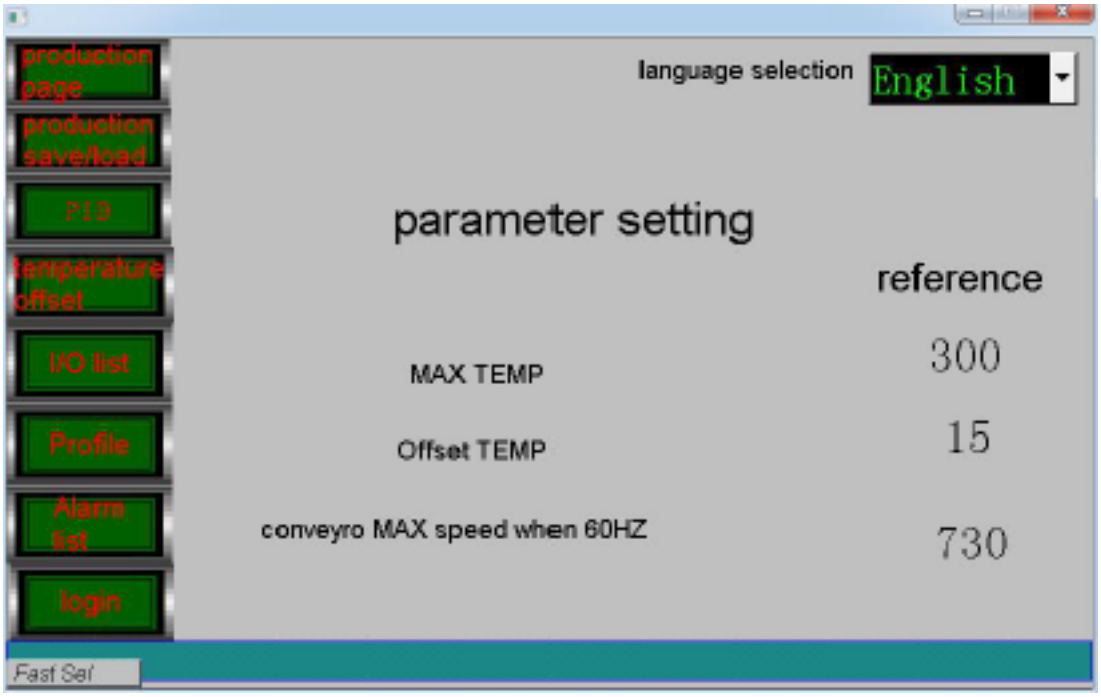
I/O 监控　　点此进入 “I/O”监控界面
PLC I/O monitor: Click here to come to the “I/O” monitoring interface



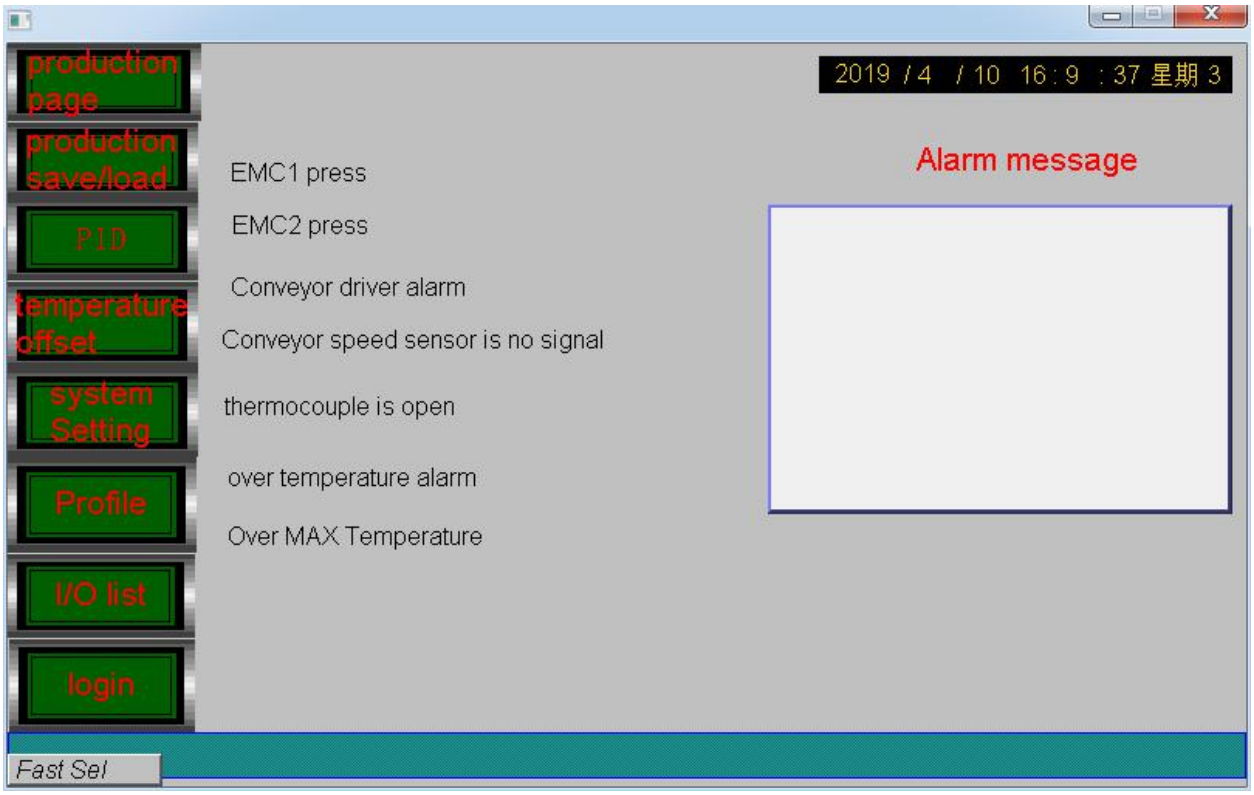
PID　　点此进入　“PID”设置界面
Interface 4 PID Setting: Click here to come to the “PID” setting interface
This is to show PID parameters and the values on its below side are defaults. Generally, it is not recommended to change them.



Interface 5 System setting: temperature limit/temperature alarm/actual speed

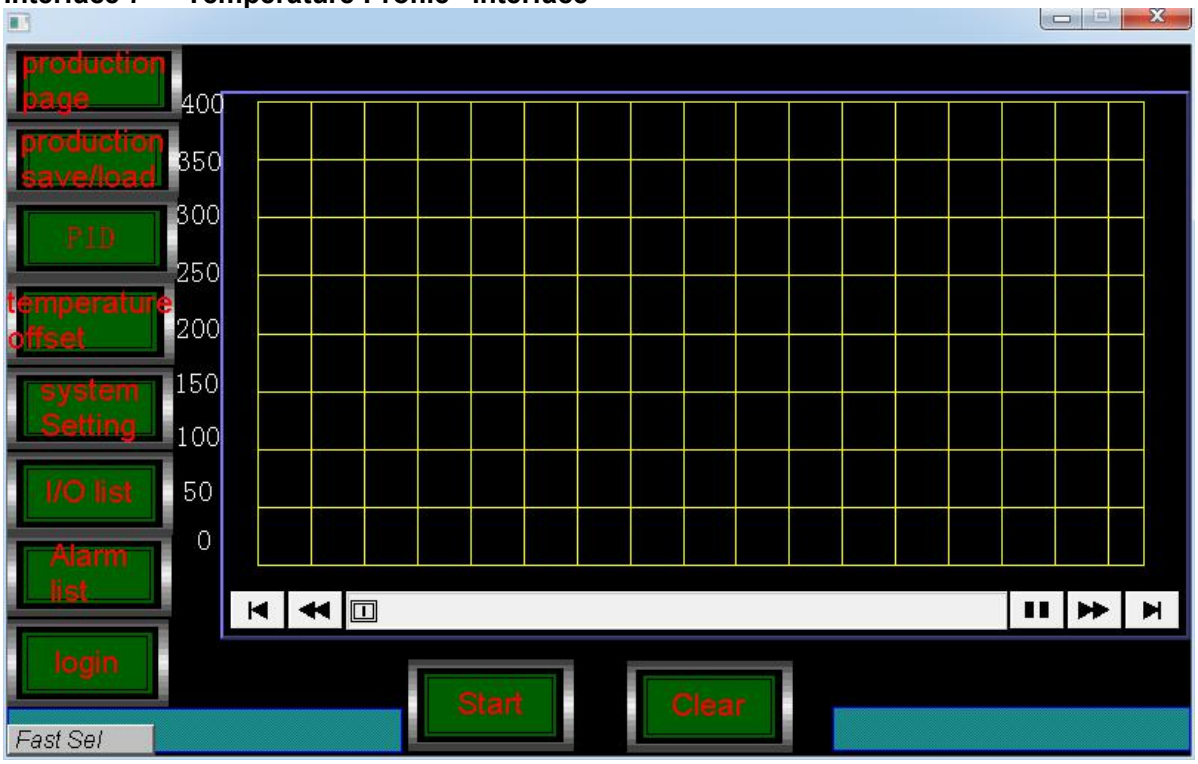


Interface 6 "Alarm Message List" interface



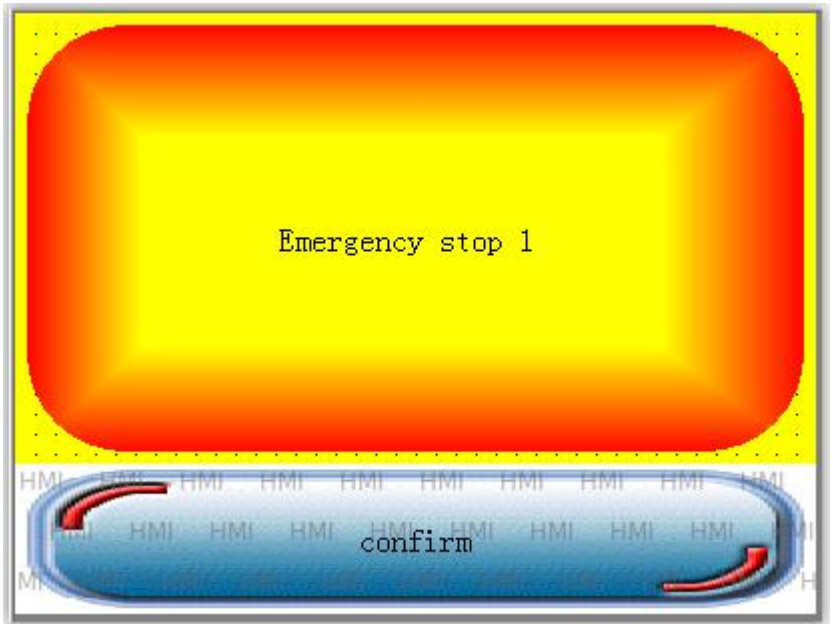
界面 7 “曲线”界面

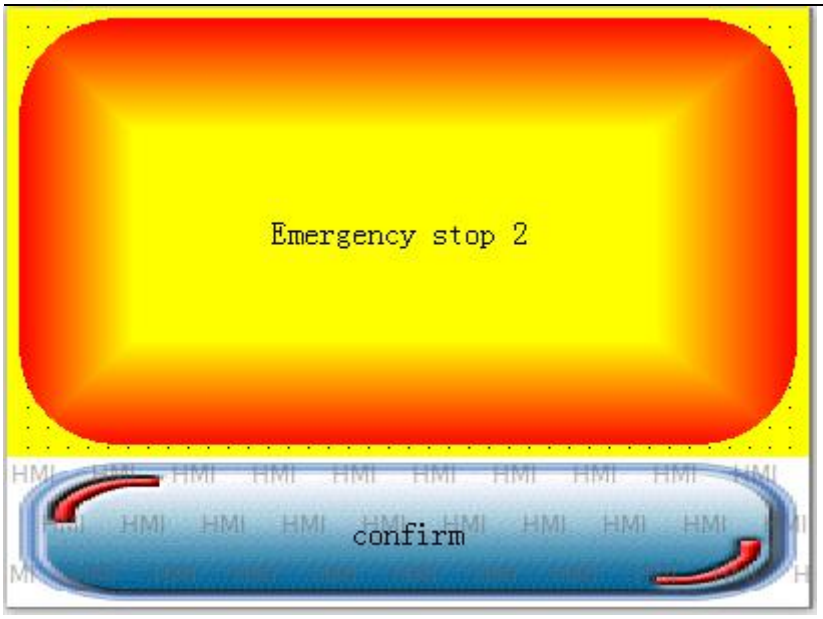
Interface 7 “Temperature Profile” interface



界面 报警提示

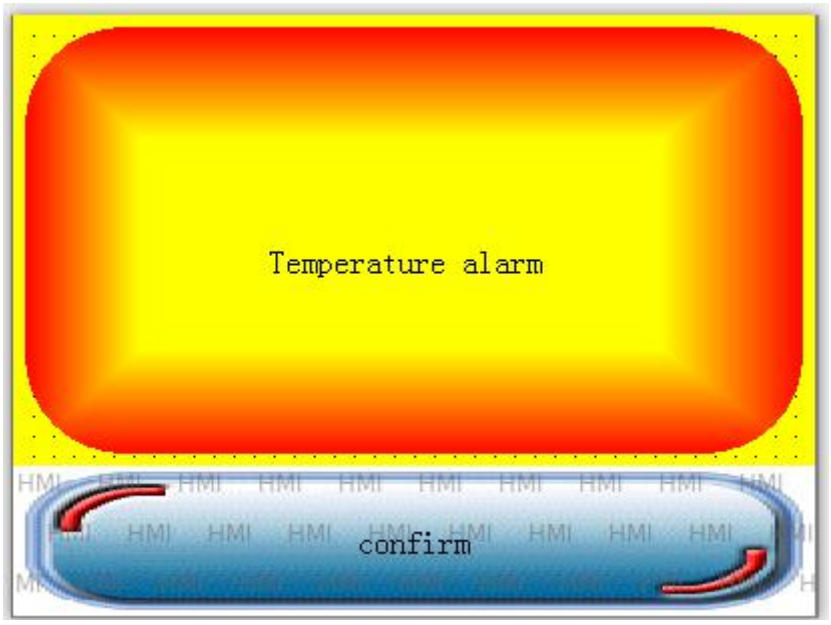
Interface 9 “Alarm” interface

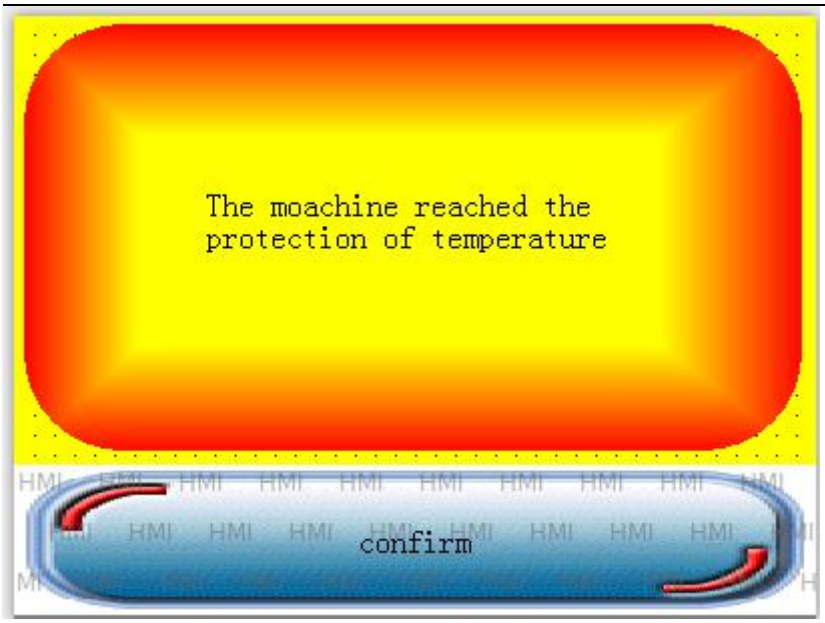




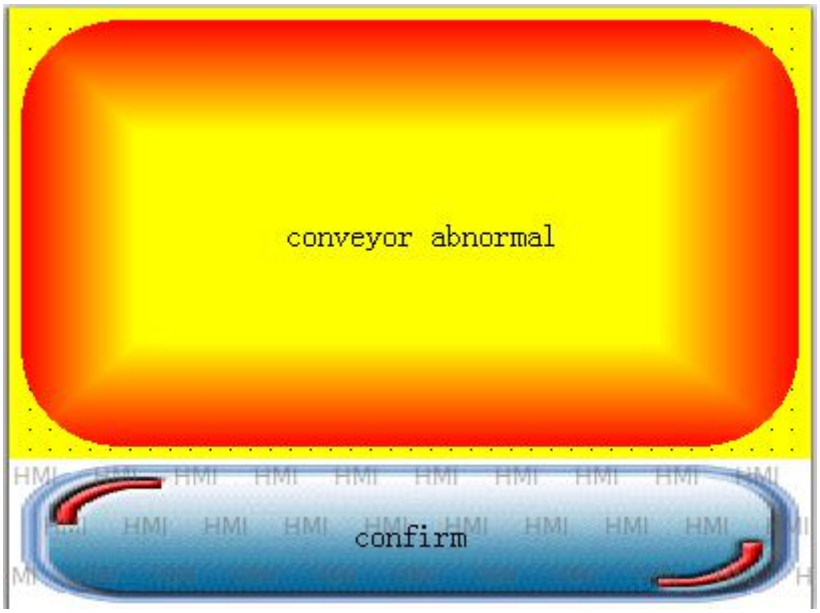
急停按钮 被按下， 按下面“CONFIRM”确认以消除报警

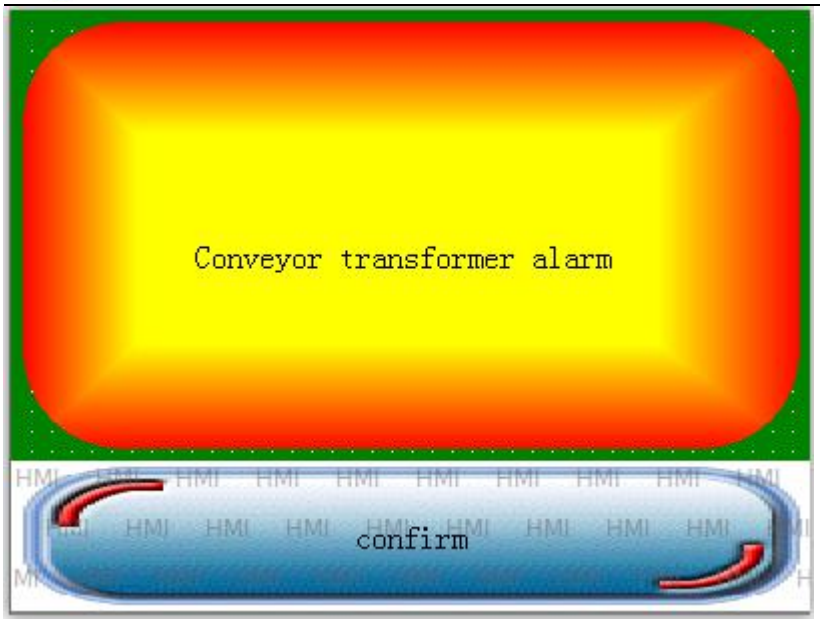
After emergency stop button is pressed, you may press “Confirm” button to clear the alarm.



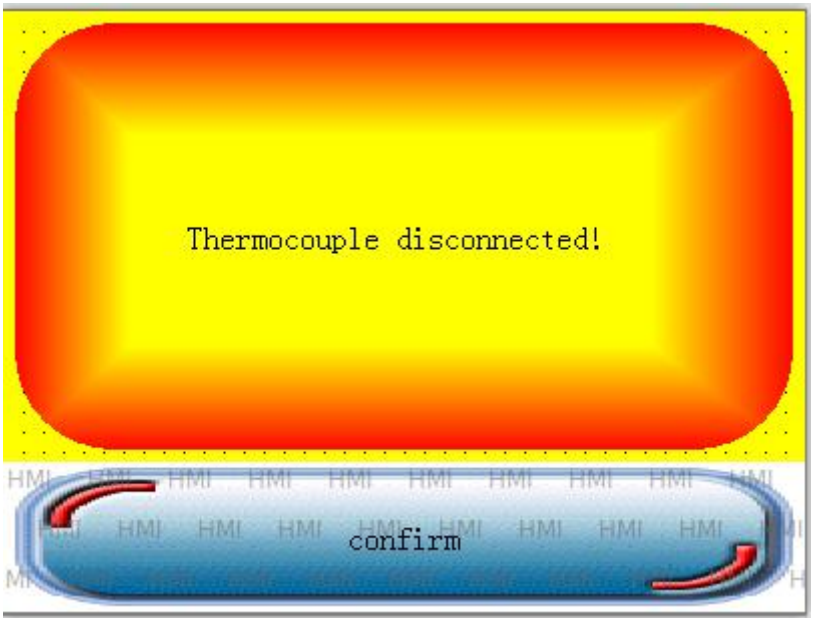


温度超过报警值， 按下面“CONFIRM”确认以消除报警
If temperature exceeds the alarm limit, you may press “Confirm” button to clear the alarm.





Transport abnormal ,please check conveyor and motor



Thermocouple disconnected: please check all temperature thermocouple

第六章 注意事项

Chapter Six - Precautions

1. IR焊机有两个排风口，直径均为１２５mm³／ｍｉｎ以上。在实际生产中，必须将两个抽风口与工厂的主通风道进行连接，一般排风量为10m³-20m³/min。为了便于定期维护，排气口必须与工厂主通风道进行镶嵌式活动连接。

1. curing machines equipment has two exhausting outlets with the same diameter of 125 mm³/min. These two exhausting outlets must be connected with factory's main

ventilation pipes and their exhaust capacity is usually $10m^3$-$20m^3$/min. For easy regular maintenance, such exhausting outlets should be connected with factory's main ventilation pipes in flexible insert-type connection.

2. 若遇紧急情况，可以按下机器两端的"紧急制动开关"。
2. If any emergency appear, just press the emergency stop switches at the two end of the machine.

3. 凡出现超温报警、电机过载报警、电源缺相报警，链条打滑报警、掉板报警等情况，在按下[紧急制动开关]按钮后一定要单击主窗口的[复位]按钮。(在主窗口的左下角提示进行[复位]操作)
3. If over-heat warning, over-loading warning, open-phase warning, chain slip warning, PCB fall warning and so on appear and emergency stop switches are activated, please remember to click the Reset button on your computer (An alert will appear at the lower left corner of your main interface for you to operate the Reset button).

4. 测温插座、插头均不耐高温，所以每次测完温度后，务必迅速将测温线从炉中抽出以避免高温变形。
4. Both plugs and sockets for temperature detection can not bear high heat. So every time when you finished your temperature detection, make sure to pull out the temperature detection cables from the chamber to prevent their deformation due to high heat.

5. 温度设置不要低于室温，以避免机器信号灯塔红灯常亮。
5. Temperature set should not be lower than room temperature lest that the red indicator light is always on.

6. 机器经过移动后，须对各部件进行检查，特别是传输网带的位置，不能使其卡住或检查传输链条传动是否正常，保证链条与各链轮啮合良好，无脱落、挤压、受卡现象。
6. Check if chains can run normally and make sure that chains and sprockets are engaged well, are not pressed or stuck or come off.

7. 保证链条导轨自动润滑装置正常工作，并定期向其中加注高温润滑油。(推荐使用牌号见第七章维护与保养)
7. Make sure that the automatic lubrication devices for both chains and guide rails can work normally and heat-resistant lubricant is filled to them regularly. (Please refer to Chapter Seven – Maintenance for recommended brands)

8. 检修机器时，请一定关机切断电源，以防触电或造成短路。
8. If you are to check and repair the machine, please make sure to cut off the power source to prevent any electric shock or short-circuit.

9. 检修机器时应尽量在炉体是常温下进行。
9. If you are to check and repair the machine, please do so as possible as you can when the chamber is in room temperature.

10. 操作时，请注意高温，避免烫伤。
10. During operation, be careful of over-heat and avoid being burnt.

第七章 维护与保养
Chapter Seven – Maintenance

一台好的SMT设备，如果不注意平时预防性地维护保养工作，防止因残留污垢、缺乏润滑剂、螺丝松动等问题而造成设备过早损坏或频繁发生故障，会使设备寿命大打折扣，甚至于使整个系统瘫痪。为保证设备在完好状态下工作，焊出高质量的产品，最大限度地减少停机损失，请遵循以下方面的维护保养准则：

If preventive maintenance is not performed properly on a good SMT equipment to prevent its early damage or frequent trouble due to dirty residues, insufficient lubrications, screw loosening and so on, its life may be shortened greatly and even the worse, the whole system is paralyzed. To ensure that the equipment can work in good condition, make high-quality products, and minimize downtime loss, please follow the below maintenance rules strictly:

制定设备日常和定期维护保养制度及维护周期，并由经过培训的专门人员进行维护保养。

Create daily and regular preventive maintenance systems, set the maintenance frequencies, and arrange specifically trained personnel to perform the maintenance.

常规维护保养周期见下表(如在恶劣的及高温环境下，应增加预防维护频次)：

Please see below table for regular maintenance frequencies (in the case of bad and hot environment, preventive maintenance frequencies should be increased):

维 护 保 养 内 容 **Maintenances**		**保养周期时间** **Frequency**
清洁： Cleaning:	机器两端调宽丝杆和导向轴 Width-adjusting screw rods and steering shafts at the two ends of the machine	每周或根据要求 Weekly or as requested
	运输链条和导向轨道 conveyor chains and their guide rails	3个月 Quarterly
	机器表面 Machine surface	根据要求 As requested
	冷却部分风扇 Cooler fans	3个月 Quarterly
润滑： Lubrication:	运输导轨和链条 conveyor guide rails and chains	工作时自动润滑 Automatic lubrication during operation
	驱动链轮和链条 Driving sprockets and chains	每月 Monthly
	转动轴轴承座 Moving shafts' bearing seats	每月 Monthly
	温度曲线(在传送速度检查后) Temperature curve (after conveyor speed is checked)	每月或按要求 Monthly or as requested
机械检查/调整 Check / adjustment on mechanical parts	传输系统 conveyor system	2个月 Bi-monthly
	驱动电机电刷(检查磨损情况) Driving motors' carbon brushes (Check their wear	6个月 Every six months

	and tear)	

7.1 **机器各部分的清洁和润滑：**
7.1 Cleaning and lubrication

- 清洁炉子罩盖步骤：
- Steps to clean top cover

a. 关掉机器电源并让炉子冷却至手可触摸。
a. Turn off the machine's power source and the oven will cool gradually until a temperature when we can touch it is reached.

b. 打开炉子上盖。
b. Open the top cover.

c. 用擦布蘸酒精清洁炉子罩盖及周边密封条。
d. Use wipers dipped with alcohol to clean the cover, its surrounding area and the sealing strips.

- 清洁运输链条步骤：
- Steps to clean conveyor chains

a. 移动运输链条；
a. Move the conveyor chains.

b. 使用硬塑料刷洗擦运输链条，确保不让碎片掉入炉内；
b. Use hard plastic brushes to clean the conveyor chains while making sure that no residues or chips drop to the chamber.

! 注意：不要使用溶剂清洁运输链条，因为清洁溶剂对链条上的污垢清洁比较困难而且会妨碍链条正确润滑。也不能使用气枪清洁链条，如这样，会将碎片吹进炉内，造成污染或电源短路；

! Note: Do not use solvent to clean the conveyor chains since it is difficult for solvent to clean the dirty residues on the chains and even the worse, it may prevent the chains from being lubricated properly. Also, air gun is not allowed to clean the chains since it may blow any residues or chips into the chamber, causing contamination or short circuit.

c. 用高温润滑油(杜邦公司牌号为 Krylox GPL106 或德国产耐温 300℃润滑油)润滑链条，保证链传输良好。
c. Use heat-resistant lubricants (Dupont's Krylox GPL106 or Germany-made 300 ℃ -resistant lubricant) to lubricate the chains for their proper operation.

7. 2 机械系统维护
7.2 Maintenance of mechanical systems

机械系统需要维护的地方主要有：
Maintenance of mechanical systems mainly includes:

1. 调整炉子水平
1. Adjustment of oven levelness

2. 更换密封条
2. Replacement of sealing strips

3. 运输导轨水平调整。
3. Levelness adjustment of conveyor's guide rails.

4.要求准备的工具：
4.Tools needed for levelness adjustment

2 根硬的细尼龙线(每根都要长于炉子的总长)
Two hard nylon ropes (each rope should be longer than oven's overall length)

4 个 1/8″厚的调整垫块
Four 1/8″ thick adjustment blocks

7 个 1/16″厚的调整垫块，1~2 个水平仪，塞尺
Seven 1/16″ thick adjustment blocks，One to two levels，Feeler gages

5 根长 560mm 的水平直尺(任何固体材料做成一样的厚度)
Five 560mm long rulers (which can be made of any solid material with the dame thickness)

运输导轨水平的调整
Steps to adjust the levelness of conveyor's guide rails

1) 在炉子的进出口处分别在前、后运输导轨上放置 1/8″的调整垫块。
1) Place the 1/8″ block on the front and rear guide rails at the feeding and discharging ends of the oven.
2) 沿炉膛长度方向三处在前后运输导轨上放置 1/16″的调整垫块。
2) Place three 1/16″ adjustment blocks on the front and rear guide rails along the chamber's longitudinal direction

3) 将 5 个水平直尺沿炉膛宽度方向分别放到前、后 1/8″、1/16″的调整垫块的顶部。
3) Place five rulers on the top of the front and rear 1/8″ and 1/16″ blocks along the chamber's transversal direction.

4) 将两根硬的细尼龙线穿过炉膛分别放在所有水平直尺的前、后两端上，拉紧绳子两端或在绳子两端系上 1.25Kg 的重物，使两根细尼龙线绷直。绷直的细线作为测量传输系统水平的参考线。
4) Pull the two hard nylon ropes through the chamber and place them on the front and rear ends of all the rulers. Pull the rope tightly or attach their two ends with a weight of 1.25Kg so that the two ropes are straightened. The straightened ropes will be used as the reference lines to measure conveyor system's levelness.

5)确定在炉子进出口两端没有其它零、部件妨碍水平的调整。
5) Make sure that no part or component stay at the feeding and discharging ends of the oven which may affect the levelness adjustment.

6) 在水平直尺与水平线间有 1/16″的间隙(除进出口两端水平直尺外)，再用 1/16″调整垫块作为塞尺检查水平直尺顶部到已绷紧水平线间的距离。
6) If there is a clearance of 1/16″ between ruler and the ropes (excepting the rules at the feeding and discharging ends of the oven), then use 1/16″ adjustment blocks as feeler gages to check the distance between the top side of the ruler and the straightened rope.

7)如果检查出水平不正确，应旋动图中的螺母调整网带支承杆下面横梁的高度(调整时从炉膛中间分别向进出口两端调整)，直至间隙消除。
7) If levelness is found incorrect, please turn the screws as shown in Figure 7-4 to adjust the height of the cantilever under the mesh conveyor's support poles (when adjusting the height, start from the middle part of the chamber and then move towards the feeding and discharging ends separately) until all the clearances are eliminated.

8) 如必需的话，可调整运输导轨两端支承板的高度。
8) The height of guide rails' support plates at its two ends may be adjusted as necessary.

9) 水平仪校验水平直尺的水平。
9) Use your level to check the ruler's levelness.

10) 将所有连接处的螺钉紧固。
10) Fasten all related screws.

11)在炉膛水平调整好后，将炉膛上盖合闭。
11) After chamber levelness is adjusted correct, close its top cover.
12) 打开电源并启动运输开关，在传输系统上放置一块 PCB 板检查运输情况是否良好。
12) Turn on the power source and press the conveyor switch, place a PCB on the conveyor to check if the conveyor can work properly.

更换硅胶和硅铜密封条
Replacement of silicone sealing strips

在炉膛的上下盖、冷却区罩盖、增压模块周边等地方使用了硅铜和硅胶密封条，使用一段时间后因损坏或者是老化，需要进行更换。更换方法如下：
Silicone sealing strips are used in top covers, bottom covers, cooling zone covers and the surrounding areas of the booster modules. After some time, such sealing strips may be damaged or become aged and need replacement. Steps to replace them are as follows:

1) 除掉损坏的或老化的密封条，并用油灰刀和溶剂将粘合剂清除掉。
1) Remove damaged or aged sealing strips, then use putty knife and solvent to clean it.

2) 用 RTV 硅铜密封胶粘合剂将新的密封条粘合到原来的位置，不要留有间隙并用钳子夹紧一段时间。
2) Use RTV silicone glue to stick the new sealing strips to the original position. Do note leave any clearance between the strips and the covers and use a pincher to clamp them tightly for a while.

3) 须待密封胶凝固后方可合上罩盖等。
3) Covers can be closed only after glue has been cured.

7.3 电气系统维护
7.3 Electrical system

电气系统维护包括下面一些内容：
Maintenance of electrical systems mainly includes:

1. 更换固态继电器
   1. Replace solid-state relays

2. 更换自动断路器
   2. Replace automatic breakers

3. 更换熔断保险丝
   3. Replace fuses

- 更换固态继电器
- Replace solid-state relays

定期检查电控箱内固态继电器等易损元器件的完好情况，如有损坏应及时更换，保证电路
控制可靠。
Check easily damaged parts and components such as solid-state relays and so on in the electrical cabinet. If any of them is damaged, please replace it immediately to ensure electrical system's reliable control function.

- 固态继电器更换方法如下：
- Steps to replace solid-state relays:

1）关掉电源，取下机器后面中间门板，根据用户手册附页中电控箱元件布置图，找到固态继电器SSR1~SSR5(对应一至五温区)、SSR1~SSR7(对应一至七温区)、SSR1~SSR10(对应一至十温区)所在位置；
1) Turn off the power, remove the middle door behind the machine, and find the solid-state relays SSR1~SSR5 (corresponding to the temperature zone 1~5), SSR1~SSR7 (corresponding to the temperature zone 1~7) and SSR1~SSR10 (corresponding to the temperature zone 1~10) based on the electrical cabinet's part and component layout in this manual.
2）检查固态继电器，找出其中的损坏件，拧下上、下两端固定螺丝，将损坏件从散热铝板上拆下；
2) Check such solid-state relays for their damaged parts, unscrew the upper and lower fastening screws and remove the damaged parts from aluminum sinks.

3) 将散热铝板上原先的散热剂清除干净，重新涂上一层散热剂；
3) Clean the coolant from the sinks and apply a layer of new coolant.

4) 将新固态继电器反面涂上一层散热剂，固定在散热铝板上原先位置；
4) Apply a layer of new coolant on the back of the new solid-state relay and re-install it to the original position of the sink.

5) 重新检查电路，确定接线正确，接通电源试机并确认。
5) Re-check the circuit and make sure that wirings are performed correctly. Turn on the power to try the machine.

- 自动断路器复位
- Reset automatic breakers

IR炉正常配有自动断路器。偶而会因电流短路或电路超载而跳闸。复位方法如下：
curing machines equipment is usually equipped with automatic breakers. Such breakers may break off due occasionally due to short-circuit or overload. The steps to reset it are:
1）关掉炉子所有电源。
1) Turn off all the power supplies.

2） 检查、确定故障原因并进行必要的修理。
2) Check and identify why it breaks off and remove such cause.

3） 打开自动断路器防护面板并找到已断开的断路器。
3) Open the automatic breaker cover and find the breaker which broke off.

4)将自动断路器复位，方法是将OFF开关拨到ON上。

4) Reset the automatic breaker by moving it from OFF to ON.

5) 重新合上断路器盒盖。
5) Close the breaker cover.

6)打开炉子电源开关检查并确认。
6) Turn on the power source for verification.

第八章 故障分析与排除
Chapter Eight Trouble Analysis and Shooting

常见故障分析与排除表：
Common trouble analysis and shooting

故障 Trouble	原因分析 Cause analysis	故障排除 Trouble shooting	机器状态 Machine Status
电源输入灯不亮 Power indicator does not light up	1. 主电源供给开路 1. Main power source is open 2. 主电源接驳处空气开关未打开 2. Air-break switch of main power source is not closed 3. 灯有故障 3. Indicator is broken	1. 检查电源线连接是否有误，与接线端子是否良好接触； 1. Check if power cords are connected wrongly and contacted well with the terminals. 2. 检查所有熔断器是否接通。 2. Check if all fuses are connected and work correctly. 3. 打开或重换电源空气开关 3. Open and replace air-break switches	停止状态 Stopped
开机后涂覆烘干烘机不能起动 coating oven equipment does not work even it is started	1. 控制箱保险管丝熔断 1. Fuses in electrical cabinet are broken. 2. 限流器(热继电器)跳开 2. Current limiter (thermal relay) breaks off. 3. 漏电开关断开 3. ALCI breaks off. 4. 紧急制动按扭未弹起 4. Emergency stop switch does not reset.	1. 更换保险丝 1. Replace the fuses. 2. 将限流器复位 2. Reset the current limiter, 3. 合上漏电开关 3. Close the ALCI. 4. 顺时针旋转紧急制动按扭 4. Turn the emergency stop switch clockwise for resetting.	停止状态 Stopped

加热区温度升不到设置温度 The temperature in warm-up zone can not rise to preset temperature	1. 发热线断、或接触不良 1. Heating wire is broken or does not contact well. 2. 热电偶连线接触不良 2. Thermo-couple cable does not contact well. 3. 固态继电器开路 3. Solid-state relay is open-circuited. 4. 排气过大或室内风影响 4. Air is over-exhausted or indoor air affects. 5. 温度设置不当 5. Temperature is set improperly.	1. 断开线路，检查发热线的静态电阻，看是否有断开或接触不良。 1. Turn off the power source, check heating wire's static resistor to verify if it is broken or does not contact well. 2. 检查或更换热电偶 2. Check and replace the thermo-couple as needed. 3. 更换固态继电器 3. Replace solid-state relay. 4. 调节排气板排除室内风影响 4. Adjust the air distributer to eliminate the impact of indoor air. 5. 重新设置温度 5. Set the temperature again.	
加热区温度超出设置温度太多 The temperature in warm-up zone rises too higher than preset temperature	1. 温度设置不当 1. Temperature is set improperly. 2. 温度上限报警值设置不当 2. Temperature limit for warning is set improperly. 3. 温度控制器失控 3. Temperature controller does not function 4. 热电偶开路 4. Thermo-couple is open-circuited. 5. 固态继电器击穿 5. Solid-state relay is broken down.	1. 重新设置温度 1. Set the temperature again. 2. 重新设定温度上限报警值 2. Set the temperature limit again. 3. 检查或更换温度控制器 3. Check or replace temperature controller. 4. 检查或更换热电偶 4. Check or replace thermo-couple. 5. 更换固态继电器 5. Replace solid-state relay.	信号红灯亮 Red indicator is on.
传送带不动作 conveyor does not work	1. 调速器接触不良或损坏 1. Speed regulator does not contact well or is broken. 3. 传送电机损坏或电源接驳处接触不良 3. conveyor motor is broken or its power source wiring does not contact well. 4. 应急开关处于按下状态 4. Emergency stop switch is not reset.	1. 检查调速器接线或更换之 1. Check speed regulator wiring or replace it as needed. 3. 更换电机或检查电源接驳检查测速传感器是否工作 3. Replace motor, check power source wiring or check if speed sensor works normally. 4. 顺时针旋转应急开关 4. Turn the emergency stop switch clockwise for resetting.	
电机超载误报警 Wrong warning that motor is over-loaded	1. 传送带热继电器失控 1. Thermo-relay of the conveyor is out of control. 2. 热继电器设置不当 2. Thermo-relay is not set properly.	1. 重新开启传送带热继电器 1. Re-start conveyor's thermo-relay. 2. 检查或更换热继电器 2. Check or replay thermo-relay. 3. 重新设定热继电器电流值 3. Set the current of thermo-relay again.	1. 信号红灯亮 1. Red indicator is on. 2. 所有发热线停止加热 2. All heating wires do not work.

第九章 附录
Chapter Nine – Appendix