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|                                                                                   | Version:2019                  | 0086-13382828213   |

# FZG/YZG 盘式真空干燥机

## FZG/YZG Series Tray Type Vacuum Dryer



### 使用说明书

### Operation Manual

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| Benny Ding        | Sherry Luo          | Jeff Zhou           |

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## 前 言

感谢您使用我公司生产的 FZG/YZG 盘式真空干燥机，本产品是严格按照行业标准《双锥回转式真空干燥机》组织生产的。

Thank you for using the FZG/YZG Tray Type Vacuum Dryer produced by Hywell Machinery company. This product is produced in accordance with Enterprise standard " FZG/YZG Tray Type Vacuum Dryer ".

在安装和使用之前，请仔细阅读本手册。若您不遵守本手册的说明而造成的人身伤害、机器损坏及其他财物损失我们将不承担责任。如有疑问，请与我们联系，我们将及时、热情地为您提供服务。

Please read this manual carefully before installing and using the machine. If user do not comply with the instructions of this manual, Hywell machinery company will not be responsible for personal injury, machine damage and other loss of property. If you have any questions, please contact us and we will serve you in a timely and warm manner.

本手册主要对 FZG/YZG 盘式真空干燥机的结构特征、工作原理、安装与调试、使用与维护、故障分析与排除以及运输、贮存等方面做出说明。有关于物料接触部分的材质报告、主要器件的资料（如有 PLC 控制器、触摸屏等）等，我们将根据您的要求以其他随机附文件方式向您提供。

This manual mainly explains the structure features, working principles, installation and commissioning, operation and maintenance, troubleshooting, transportation and storage of FZG/YZG Tray Type Vacuum Dryer . There is a material report and the information of the main components (such as PLC and touch screen). We will provide you with other random documents according to your request.

本手册适用于 FZG/YZG 盘式真空干燥机。本系列其他规格产品以及用户特殊定制的其

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他规格的同类产品可参照使用。

This manual book is suitable for FZG/YZG Tray Type Vacuum Dryer . This series of other specifications and other products of special-ordered and other specifications of the same product can be used as reference.

本手册中出现的 product 外观或其他图例或菜单屏幕等与实际产品有所不同，使用时以实际产品为准。

If there is inconsistency between the manual book and the actual product, the actual product shall govern.

在用户遵守保养和使用规则的前提下，在调试验收之日 12 个月内，如确实因产品制造原因而影响使用时，本企业无偿给予修理或更换。

On the premise of user's compliance with the rules of maintenance and use, within 12 months of commissioning and acceptance, if the product is actually affected by the manufacturing cause, the enterprise shall pay the repair or replacement without compensation.

由于产品的不断改进,本手册中的技术参数如有修改,恕不另行通知.

如果您对本产品有其他疑问或者看法而本说明书内容未尽其详,请及时提出咨询,我们将很乐意回答您提出的问题、建议和批评.感谢贵公司的选择和您的信任!

Due to the continuous improvement of products, such as the technical parameters in this manual are modified without prior notice.

If you have any questions or view the contents of this manual and the details of all time, please put the consultation, we will be very glad to answer your questions, advice and criticism.

Thank you for your choice and your trust!

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## 1.关键提示 Keynotes

本手册中，将在不同的地方出现表 1 中列出安全和警告提示，请务必注意。

In this manual, a list of safety and warning signs will be displayed on the machine as the listed in Table 1 at different places. Be sure to pay attention to it.

表 1 安全和警告提示

Table 1 Safety and warning signs

|                                                                                     |                                                                                                 |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
|    | 触电危险，可能导致死亡或重伤<br>A risk of a electric shock that may cause death or serious injury.            |
|    | 机械伤害危险，可能导致死亡或重伤<br>A risk of a mechanical injury that may cause death or serious injury.       |
|    | 跌落危险，可能导致死亡或重伤<br>A risk of a fell injury that may cause death or serious injury.               |
|  | 危险警告，可能导致伤害<br>Danger warning, which may cause injury                                           |
|  | 可能导致设备故障或非预期停机<br>It may cause equipment failure or unexpected shutdown                         |
|  | 操作提示和 有用的信息<br>Operational hints and useful information                                         |
|  | 非维护状态时，禁止触摸，否则可能导致伤害<br>Non - maintenance state, forbid to touch, otherwise it may cause damage |

1.2 遵守本手册的规定是保障您人身和财产安全、设备质量保障和正常运行的前提。

Compliance with the provisions of this manual is a prerequisite for the safety of your personal and property, the quality of the equipment and the normal operation of the equipment.

1.3 本手册提供了 FZG/YZG 盘式真空干燥机 正确安装、使用和维护的重要资料，请在设备安装位置附近妥善保管

This manual provides important information for the correct installation, use and maintenance of the FZG/YZG Tray Type Vacuum Dryer . Please safekeeping.

## 2 安全说明 Safety instructions

下列安全说明涉及 FZG/YZG 盘式真空干燥机 的运输储存、安装于调试、使用与维护保养，忽略说明，可能造成人身伤害或财产（设备/原料/产品）损失。

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The following safety instructions relate to transportation storage, installation, commissioning, operation and maintenance of FZG/YZG Tray Type Vacuum Dryer. Ignoring instructions may cause personal injury or property (equipment / raw material / product) losses.

## 2.0 概述 Summary

设备运行时有：带电部件、运动部件、发热部件；设备停机有带电部件。

When the equipment is running, there are charged parts, moving parts, heating components, and the equipment is stopped with charged parts.

非受过培训的专业人员不可以进行以下操作：

Non trained professionals can not carry out the following operations:

—— 运输

- Transport

—— 储存

- storage

—— 安装/装配

Installation / assembly

—— 使用

- use

—— 维护保养

Maintenance

进行这些操作之前，请仔细阅读以下文件资料：

Before doing these operations, please read the following documents carefully:

—— 本手册的附图

The accompanying drawings of this handbook

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— 其他随机文件

- other random files

— 设备标志牌

Equipment sign

— 有关设备的特别规定要求

Special requirements for equipment

— 有关安全和事故防范的国家/地方性规定

National / local regulations on safety and accident prevention

**以下情形会导致严重人身伤害和物资损失:**

The following can lead to serious personal injury and material loss:

— 不正确的搬运

- incorrect transport

— 不正确的安装

- incorrect installation

— 使用或操作不正确

- incorrect operation

— 擅自拆除必要的安全防护装置

Dismantling the necessary safety protection devices without authorization

## 2.1 运输与储存 Transport and storage

— 确认运输过程中的产品防护，在收货之后请立即检查包装箱是否完好，若有损坏请立即 通知运输单位和本公司，此为产品运输过程索赔的前提。

Confirm the product protection during transportation. Please check the packing box immediately after receiving the goods. If there is any damage, please inform the transport company and our company

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immediately. This is the premise of claim for product transportation process.

— 请严格遵守有关产品搬运的说明，否则可能导致人身伤害或设备损坏。

Please strictly observe the description of the transportation of the product, otherwise it may cause personal injury or damage to the equipment.

— 设备长期存放请按照本手册中设备“长期存放”的规定。

For long-term storage of equipment, please follow the provisions of "long-term storage" of the equipment in this manual.

## 2.2 安装与调试 Install and debug

— 请仔细阅读本手册中有关设备安装的说明。

Please read the instructions on the installation of the equipment carefully in this manual.

— 本设备的安装于调试应由本公司或本公司代理的专业人员进行，在上述人员未到达现场之前，请不要拆解包装箱，此为您有关产品索赔的前提之一。

The installation and commissioning of this equipment shall be carried out by our company or our professional agent. Please do not disassemble the packing box before the above persons have arrived.

This is one of the prerequisites for your claim for products.

— 调试过程中出现任何不正常的现象（如振动、尖锐噪音、超范围的温升），应立即停机检查，直至找出原因并排除。

Any abnormal phenomena during the commissioning process, such as vibration, sharp noise, and over range Wen Sheng, should be checked immediately, until the cause is found out and eliminated.

## 2.3 使用与维护保养

Operation and maintenance

— 设备使用过程中存在带电部件、旋转部件、直线往复运动部件、承压部件，请谨遵本手册的规定，以防使用过程中造成触电伤害或机械伤害。

There are live parts, rotating parts, straight reciprocating parts and negative pressure parts during the

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operation of the equipment. Please obey the manual's regulations, and avoid to cause the electrical injury or mechanical damage during use.

— 设备运行过程中出现任何不正常的现象（如振动、尖锐噪音、超范围的温升），应立即 停机检查，直至找出原因并排除，必要时请与本公司联系。

Any abnormal phenomena during the operation of the equipment (such as vibration, sharp noise, and over range Wen Sheng) should be checked immediately, until the cause is found out and eliminated.

— 设备清洗过程可能涉及带电部件、化学液体或高温液体，请谨遵本手册的规定，以免造成触电、碰（砸）伤或跌落受伤。

If necessary, please contact with our company. The process of equipment cleaning may involve live parts, chemical liquids or high temperature liquids. Please comply with the requirements of this manual to avoid electric shock, collision or injury.

### 3 设备概述 Equipment Overview

#### 3.0 概述 Overview

现生产的 FZG 系列产品，其基本原理是利用蒸汽，热水或导热油为热能源，常压下，约 100℃时纯水开始沸腾。而在真空条件下，水的沸点低于 100℃。例如：表面压降至-0.07Mpa 时，水在 70℃即开始沸腾。所以尽管在较低的操作温度下，本系列干燥器仍有较大的干燥能力。该系列广泛适用于制药、化工、食品、轻工和重工业的热敏性物料的加热干燥。

The basic principle of the FZG series products is to use steam, hot water or heat transfer oil as the heat source. Under normal pressure, the pure water starts to boil at about 100 °C. Under vacuum conditions, the boiling point of water is below 100 °C. For example, when the surface pressure drops to -0.07Mpa, the water starts to boil at 70 °C. Therefore, despite the lower operating temperatures, this series of dryers still have a large drying capacity. This series is widely used for heat drying of heat sensitive materials in pharmaceutical, chemical, food, light industry and heavy industry.

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### 3.1 产品特点

#### Product features

##### 3.1.1 结构特点 Structural characteristics

1. 能在较低温度下得到较高的干燥速率，热量充分利用；

It can get a higher drying rate at lower temperatures and make full use of heat.

2. 适合低温干燥，热敏性物料的干燥，怕氧化物料的干燥；

it is Suitable for drying of the heat sensitive materials that use lower temperature.

3. 能干燥含有溶剂及需回收溶剂的物料；

It can dry materials containing solvents and then the solvents to be recovered;

4. 在干燥前可进行消毒处理，干燥过程中无任何不纯物混入；

It can be disinfected before working, no impurities in the drying process;

5. 本干燥器属于静态真空干燥，故干燥物料的形体不会损坏；

The dryer is static vacuum dryer, so the shape of the material will not be damaged;

6. 本干燥器为间歇式生产设备，能随时调整工艺；

This dryer is a batch production equipment, which can adjust the process at any time;

7. 内部为拱形结构，能有效避免凝结水反滴现象；

The inside is an arched structure, which can effectively avoid the condensation of condensed water;

8. 采用四点合一抽真空结构，确保了未了干燥的均匀性；

Adopting a four-in-one vacuum structure to ensure uniformity without drying;

##### 3.1.2 控制方式: Control way

— 普通控制（按钮控制）或 PLC 人机界面控制（按客户要求）；

— General control (button control) or PLC man-machine interface control (According to customer requirements);

— 温度控制（按客户要求）；

— Temperature control (According to customer requirements);

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— 工作程式与工艺参数储存记忆及带打印功能（按客户要求）；

— Work program and process parameters storage memory and printing function (According to customer requirements);

### 3.1.3 加料方式: Feeding way

— 人工上料; Manual feeding

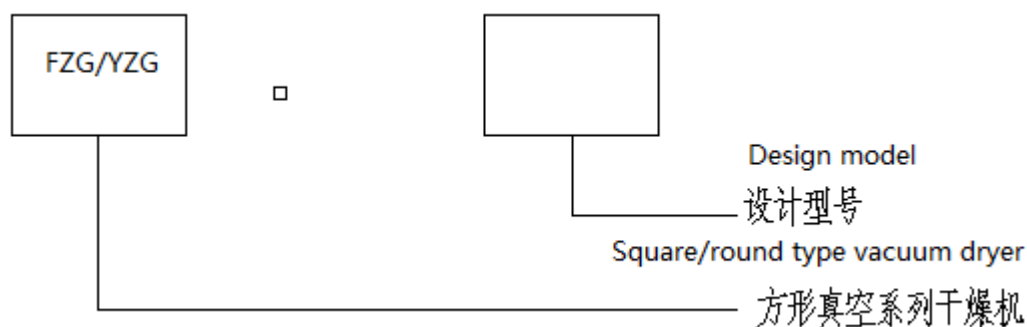
### 3.1.4 清洗方式: Cleaning way

— 人工清洗; Manual cleaning

## 3.2 产品规格型号及其意义 Product specification model and significance

本公司 FZG/YZG 盘式真空干燥机 是系列产品的总称，根据生产力不同具有多种规格。产品型号是按生产能力不同而编制，其意义如下：

FZG/YZG Tray Type Vacuum Dryer of Hywell company is the general name of a series of products, with various specifications according to the different productivity. The product model is prepared according to the different production capacity, and its significance is as follows



## 3.3 适用的环境和工作条件 Applicable environment and working conditions

### 3.3.1 工作环境 Work environment

a) 环境温度：正常工作的环境空气温度在 5℃～40℃；

a) ambient temperature: the ambient air temperature of normal work is from 5 to 40.

b) 湿度：当环境温度为 40℃时，工作环境的相对湿度不超过 50%，较低温下可允许较大湿度（如环境

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温度为 20℃时，工作环境的相对湿度不超过 90%)。

B) humidity: when the ambient temperature is 40 degrees, the relative humidity of the working environment is not more than 50%, allowing for larger humidity at lower temperature (for example, when the ambient temperature is 20 degrees, the relative humidity of the working environment is no more than 90%).

c) 大气压强：86kpa~106kpa。

c) Atmospheric pressure: 86kpa to 106kpa.

### 3.3.2 工作条件 Working conditions

a) 电源条件：AC 380V/50Hz，特殊电源条件经系统配置变更后方可适用；

a) Power supply condition: AC 380V/50Hz, special power supply condition can be applied after system configuration change

b) 蒸汽：压力 0.2Mpa~0.8Mpa；烘箱内温度可达 140℃，视企业可提供热源可使用蒸汽，热水或导热油。如果使用单位不能提供相关热源，请告知我司，我司根据客户现场情况设计电加热水箱或者电加热导热油箱。

b) Steam: pressure 0.2Mpa ~ 0.8Mpa; oven temperature can reach 140 °C, heat source can use steam, hot water or heat transfer oil. if end user have not any heat source as the upper listed, Hywell machinery company can design the electrical heating water tank or electrical heating conduct oil tank as end user requirement base the workshop situation.

c) 真空：在-0.1Mpa 下运行

c) Vacuum: run under of -0.1Mpa

### 3.4 环境影响 Environmental impact

3.4.1 整机运行噪声小于 80dB(A)(5 米),符合 GMP 的设备的要求；

The operation noise of the machine is less than 80dB (A)(5m), which meets the requirements of the equipment of the GMP.

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3.4.2 清洗污液的排放请遵守国家和当地政府的相关规定；

3.4.3 The discharge of cleaning dirty liquid, please comply with the relevant regulations of the state and the local government;

### 3.5 设备报废 Equipment scrap

设备经多年使用后会将会报废，报废物资的处理请遵守当地法律的规定。设备中有些部分可以回收其残值，如：

The equipment will be discarded after years of use, and the disposal of waste materials will comply with the provisions of the local law. Some parts of the device can reclaim their residual values, such as:

—— 机架、电机外壳、减速机外壳、齿轮、轴及轴承等碳素钢可作为废铁；

Carbon steel, such as rack, motor shell, reducer shell, gear, shaft and bearing, can be used as scrap iron.

—— 设备不锈钢件可作为废旧不锈钢；

The equipment stainless steel parts can be used as the waste stainless steel.

—— 电机线圈可作为废铜；

The motor can be used as a copper coil;

—— 其他塑料壳作为废旧塑料。

Other plastic shells are used as waste plastics.

## 4 结构特征与工作原理

### Structural features and working principles

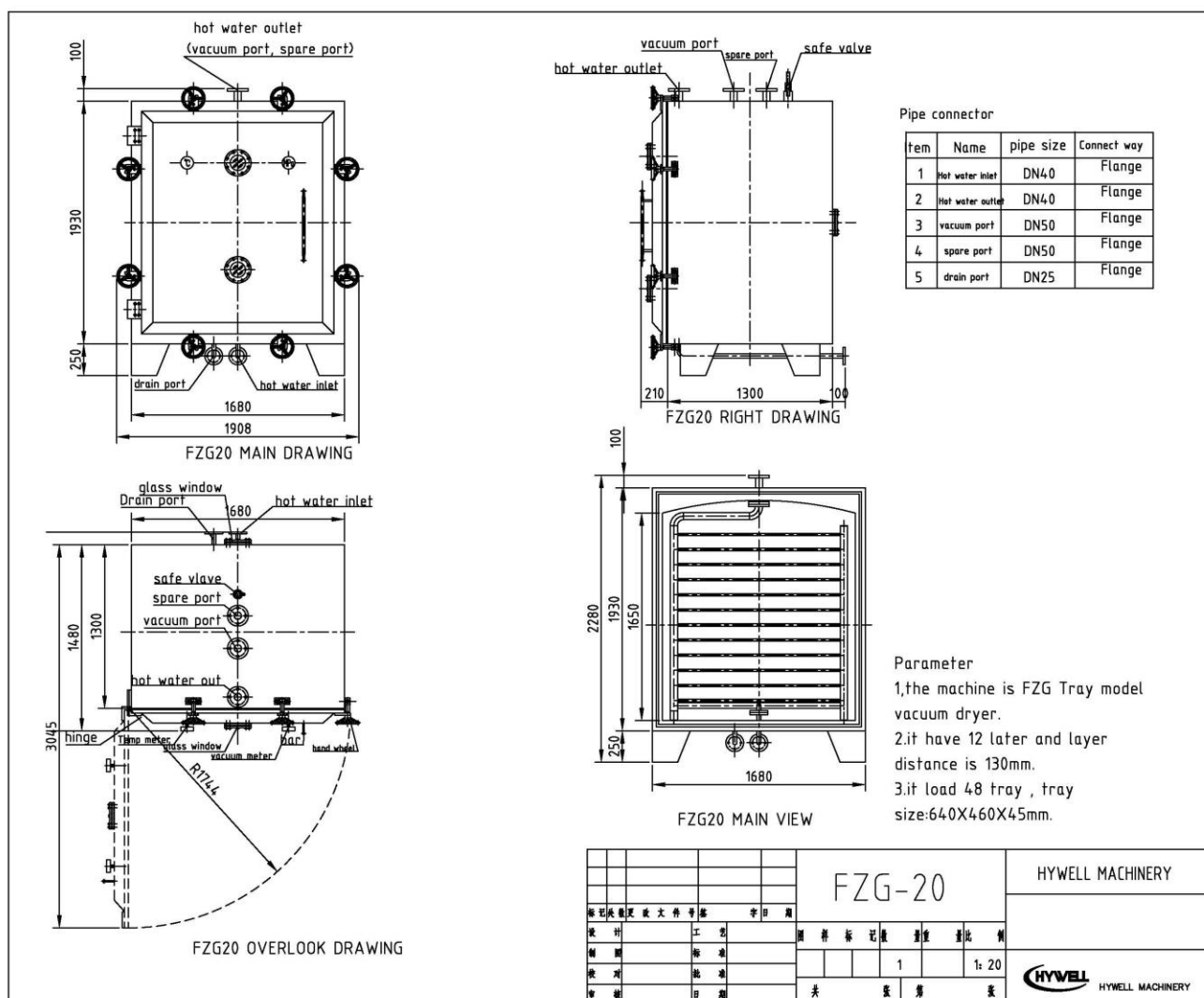
盘式真空干燥机系统：抽真空单元、加热单元、筒体、烘架、烘盘单元及电气控制主要单元组成（按客户订单要求）。

As shown in Drawing 4-1(FZG-20 square vacuum dryer is taken as an example), Tray type vacuum dryer system include the follow parts: vacuum unit, heating unit, cabinet unit, drying rack, baking tray unit

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and main unit of electrical control (According to customer requirements of order).



备注：本章中插图仅为阅读本手册的参考图例，是对器件清单的补充，使用中以实物为准。

Note: the illustrations in this chapter are only the reference illustrations for reading this manual. It is a supplement to the list of devices.

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图 4-1 FZG-20 型真空干燥机 FZG-20 Model Vacuum Dryer

## 5 外形尺寸及主要技术参数: Overall dimension size and parameter

**5.0 外形简图及主要尺寸**（在这里只介绍一种型号尺寸(FZG-20),具体请查看我公司样本或者根据客户设计的图纸）

Profile and main dimensions (here is only one type of size(FZG-20), please see our company catalogue or the designing machine drawing base the client requirement ).

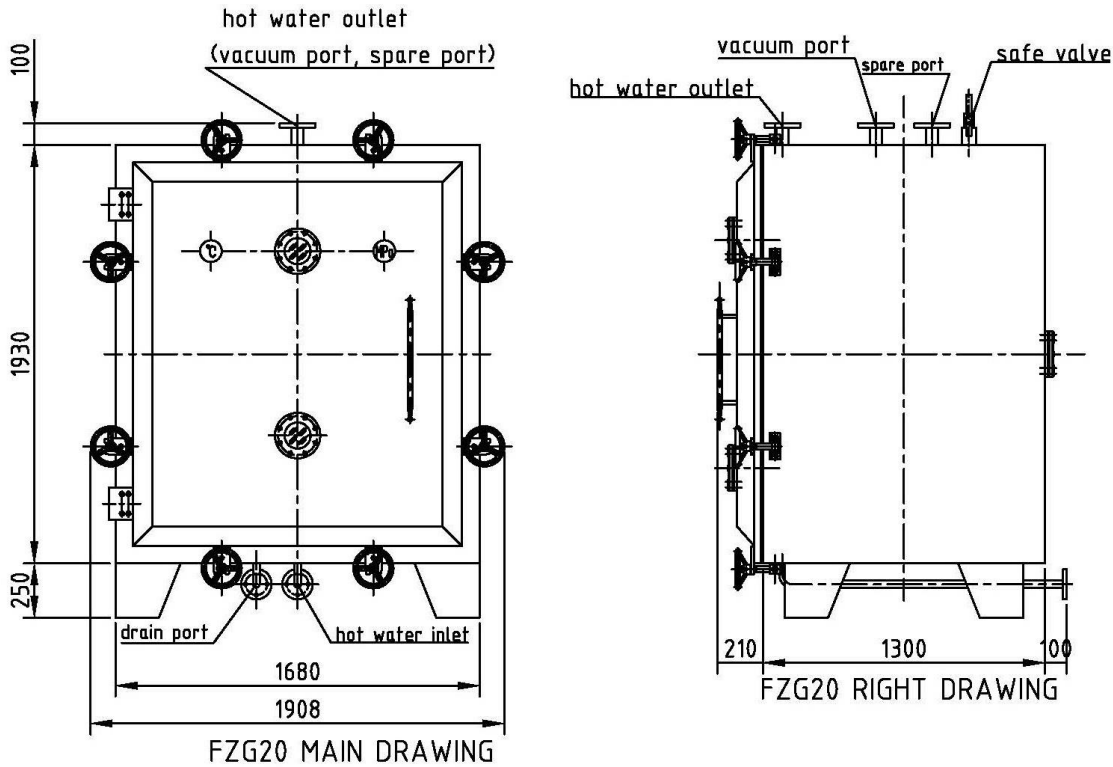


图 5-1 外形简图 Figure 5-1 Overall dimension

|                                                                                     |                                                       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------|
|  | 图 5-1 所示 FZG-20 盘式真空干燥机的设备外形与尺寸，其他规格产品                |
|                                                                                     | 见本公司产品样本。本公司可以按用户生产现场基建情况对设备的要求                       |
|                                                                                     | 进行专门设计。Figure 5-1 shows the size of the equipment for |

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|  |                                                                                                                                                                                                                                                |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | FZG-20 Tray Type Vacuum Dryer . The products of the other specifications are found in the catalogue of the company. The company can make a special design on the requirements of the equipment according to the site construction of the user. |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 5.1 主要技术参数（表 5.1） Main technical parameters (table 5.1)

表 5.1 主要技术参数 Table 5.1 Main technical parameters

The main technical parameter of this machine are available for reference, we are produce and design product as peer customers' requirement.

| Model    | Layer | Qty of tray | Working temp(C) | Working pressure | Vacuum degree | vacuum pump (condersator used) | vacuum pump (no condersator used) | Weight (Kg) |
|----------|-------|-------------|-----------------|------------------|---------------|--------------------------------|-----------------------------------|-------------|
| YZG-600  | 4     | 4           | 35~150          | <0.784           | -0.1          | 2.2 kw                         | 2 kw                              | 350         |
| YZG-1000 | 6     | 12          | 35~150          | <0.784           | -0.1          | 7.5 kw                         | 5.5 kw                            | 800         |
| YZG-1400 | 8     | 32          | 35~150          | <0.784           | -0.1          | 7.5 kw                         | 5.5 kw                            | 1400        |
| FZG-10   | 5     | 20          | 35~150          | <0.784           | -0.1          | 5.5kw                          | 4kw                               | 1400        |
| FZG-15   | 8     | 32          | 35~150          | <0.784           | -0.1          | 7.5 kw                         | 5.5 kw                            | 2100        |
| FZG-20   | 12    | 48          | 35~150          | <0.784           | -0.1          | 7.5 kw                         | 5.5 kw                            | 3200        |

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Nonstandard design machine model!

## 6 安装与调试 Installation and debugging

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>在主机的安装与调试时应小心谨慎，避免：</p> <p>⚠从高处跌落！⚠触电！⚠禁止使用不完好和不匹配的工具！</p> <p>⚠非专业人员或未经培训合格 人员不得从事设备的安装与调试作业！</p> <p>In the installation and debugging of the host, should be careful, avoid:</p> <p>(1) fall from the high! (2) electric shock! (3) prohibit the use of unfinished and mismatched tools!</p> <p>(4) Non professional personnel or untrained personnel shall not be engaged in installation and commissioning of equipment.</p> |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 6.0 设备安装 Equipment installation

#### 6.0.1 设备吊装 Equipment lifting

搬运吊装干燥机时，应用钢丝绳从机架底部穿入，并使钢丝绳均匀受力，以免发生倾倒。

When lifting the dryer, apply the wire rope from the bottom of the rack and evenly force the wire rope to avoid tipping vent overhaul. A warning line or a protective fence should be drawn at a distance of 1 m from the barrel.

#### 6.0.2 主机部分安装（就地安装） Main machine installation

6.0.2.1 真空干燥主机安装基础必须是结实、平整的混凝土地面或楼面，或钢制平台/钢架上。基础水平度要求不大于 2/1000。

The vacuum dryer installation foundation must be a solid, level concrete floor, or a steel platform/steel

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frame. The basic level requirement is not more than 2/1000.

#### 6.0. 2.2 机身的校平 Leveling the fuselage

##### 6.0. 2.2.1 用水平仪在两边立柱和机器正面进行检查，偏差应不超过±2mm,最后使用经纬仪校平

Check with the level on both sides of the column and the front of the machine, the deviation should not exceed  $\pm 2\text{mm}$ , and finally use the theodolite to level

##### 6.0. 2.2.2 使用经纬仪对机身进行水平对齐操作

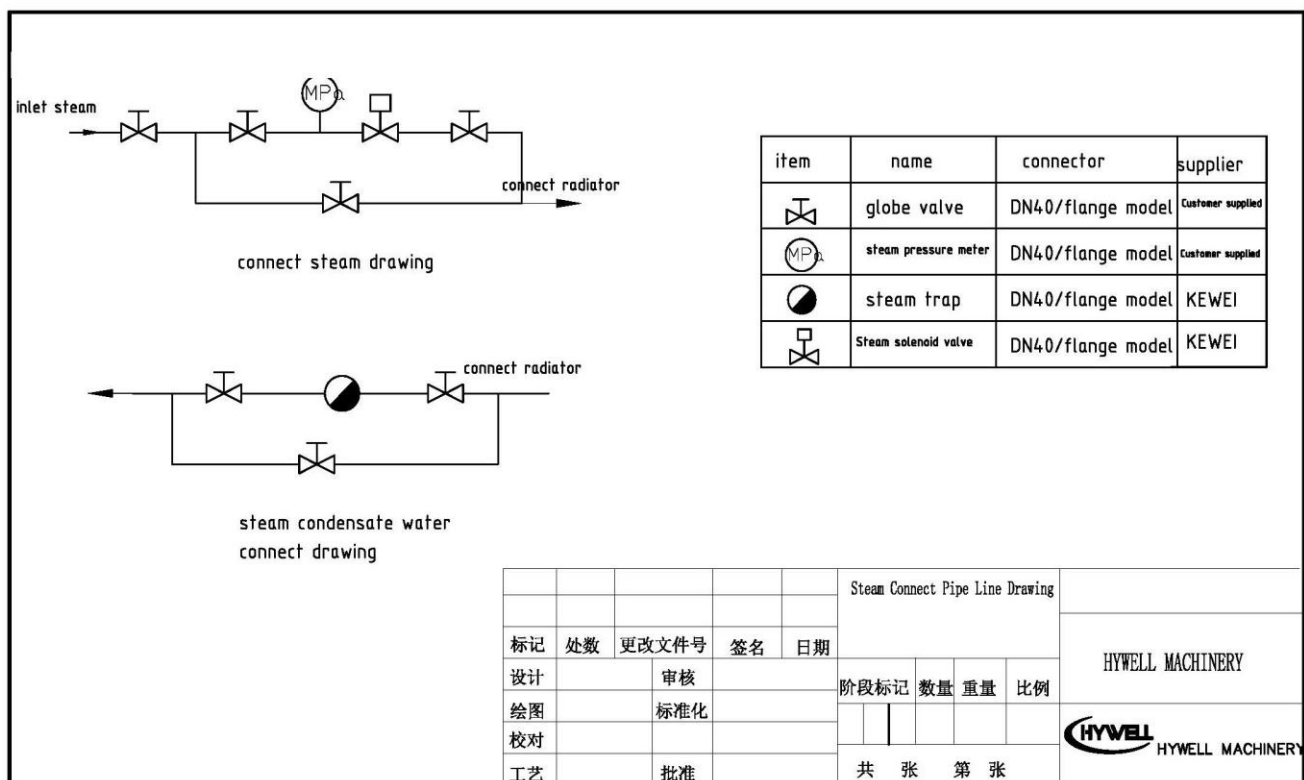
Horizontal alignment of the fuselage using the theodolite

##### 6.0. 2.2.3 机身找平后应拧紧好膨胀螺栓的螺母(一般工况下无须按照膨胀螺栓)。

After the fuselage is leveled, the nut of the expansion bolt should be tightened (Under normal circumstances, there is no need expansion bolt).

#### 6.1 蒸汽管道及冷凝水管安装 Steam pipe and Condensate pipe installation

According to steam heating, the piping layout is as shown in drawing 6.1-1



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蒸汽加热，管道安装图（图 6.1-1）（按客户要求是否配备）

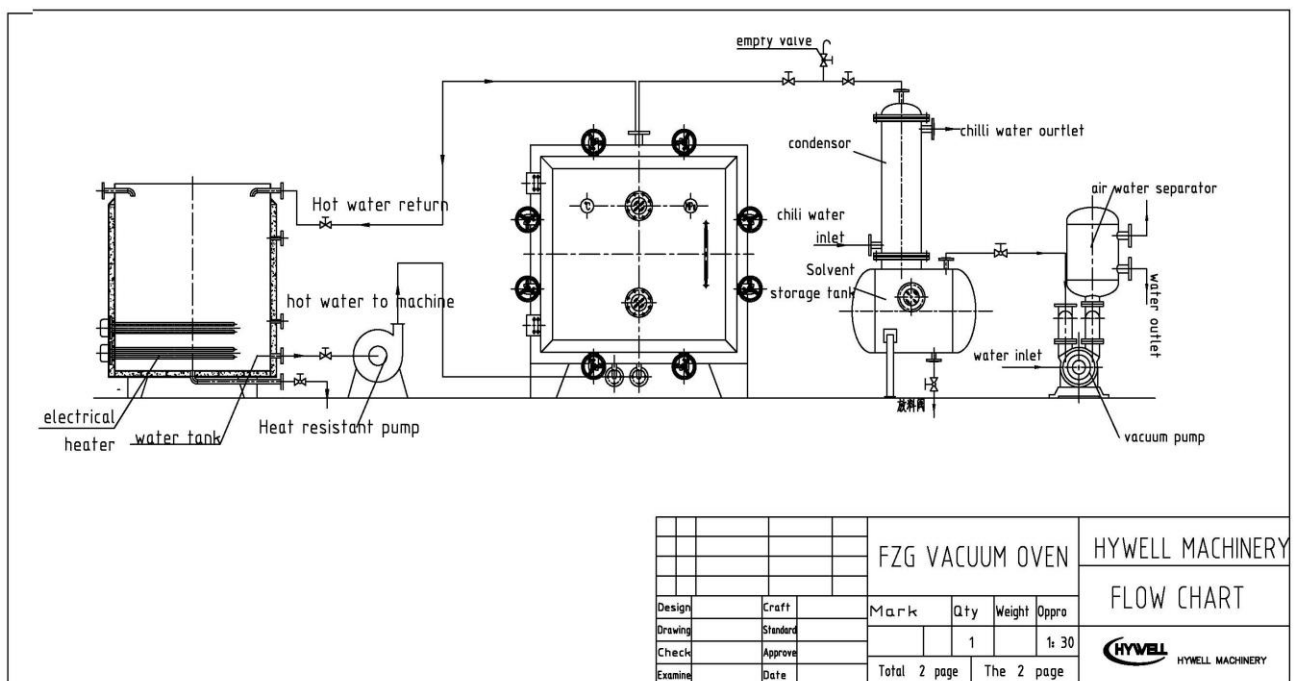
Steam heating, pipe installation diagram (Figure 6.1-1)

(According to customer requirements-Optional)

## 6.2 管道安装 Pipe installation

根据加热介质不同，及溶剂回收，管道布置示意图如 6.2-1 至 6.2-4 (根据客户要求)

According to different heating media and solvent recovery, the piping layout is as shown in drawing 6.2-1 to 6.2-4(According to customer requirements).

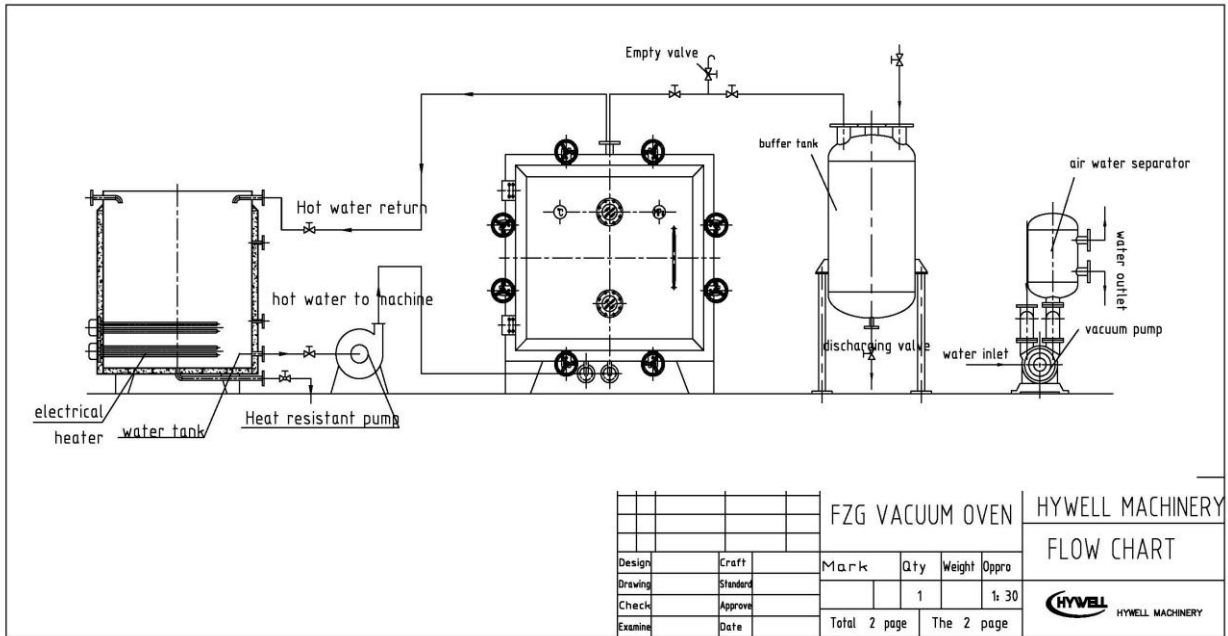


热水（导热油）加热，溶剂回收管道安装图（图 6.2-1）

Hot water (heat transfer oil) heating, solvent recovery pipe installation diagram (Figure 6.2-1)

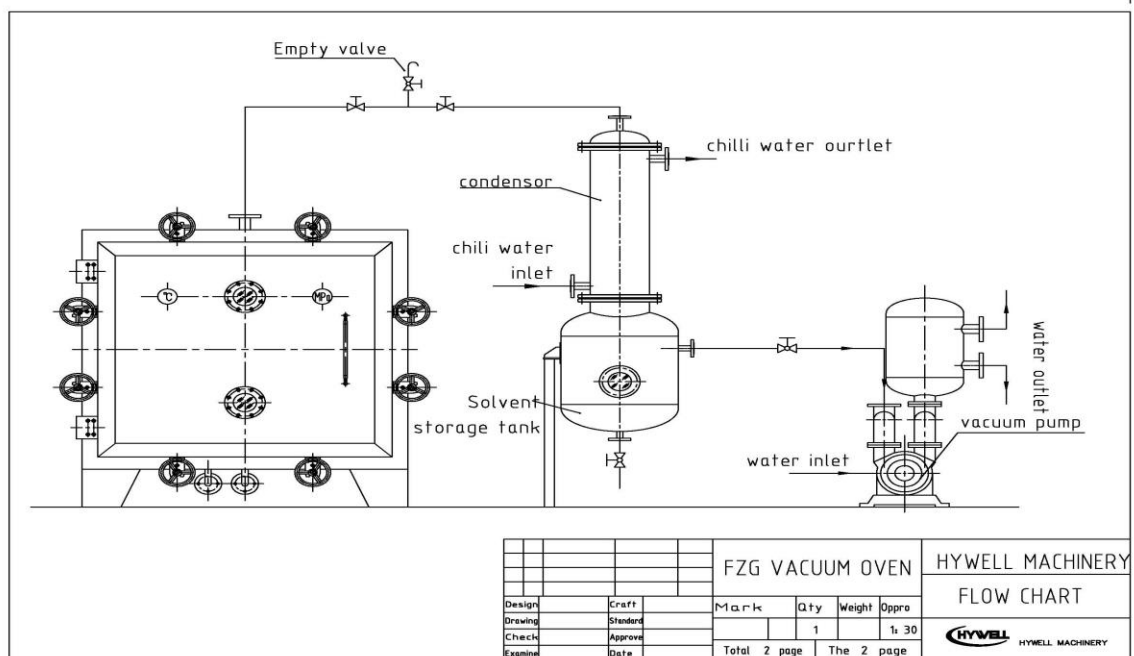
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热水（导热油）加热，溶剂不回收管道安装图（图 6.2-2）

Hot water (heat transfer oil) heating, exclude solvent recovery pipe installation diagram (Figure 6.2-2)

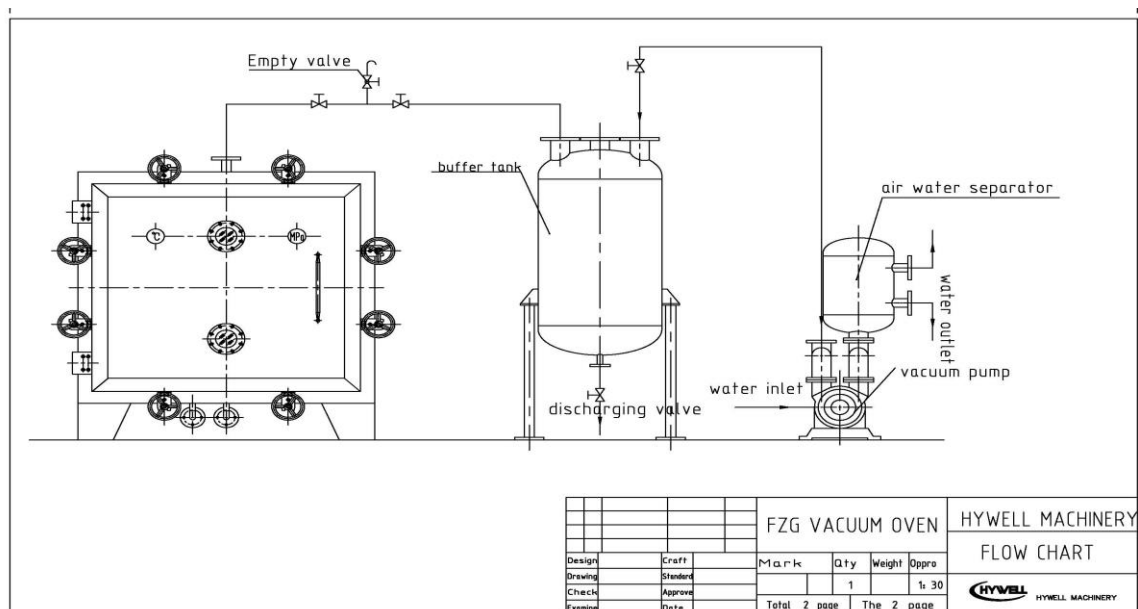


蒸汽加热，溶剂回收管道安装图（图 6.1-3）

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Steam heating, solvent recovery pipe installation diagram (Figure 6.1-3)



蒸汽加热，溶剂不回收管道安装图（图 6.2-4）

Steam heating, exclude solvent recovery pipe installation diagram (Figure 6.2-4)

## 6.2 设备调试 Debugging

|                                                                                     |                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>调试状态所有安全保护措施完全被屏蔽，非业人员不得进行调试作业！</p> <p>All the safety measures in the debugging state are completely shielded, and the non professional workers are not allowed to carry out the debugging operation.</p> |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 6.2.1 调试前检查 Pre check for debugging

表 6.1 调试（整）前检查项目 Pre check for debugging

| 检查项目 checking item       | 要求 requirement                                                                            | 方法 checking way                 |
|--------------------------|-------------------------------------------------------------------------------------------|---------------------------------|
| 系统接地 grounding of system | 接地和保护接地电阻不大于 4Ω<br>Grounding and protection grounding resistance is not more than 4 Omega | 以欧姆表检测<br>Detection by Ohmmeter |

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|                                  |                                                     |                                        |
|----------------------------------|-----------------------------------------------------|----------------------------------------|
| 各安装联接<br>Installation joins      | 牢固可靠<br>Firm and reliable                           | 以工具测试<br>Tool test                     |
| 接通电源 Connect to power            | 380±10V/50Hz (follow the electrical drawing)        | 由专业人员进行<br>Do it by professional staff |
| 设备工作区域<br>Equipment working area | 无影响工作的杂物或无关人员<br>An unaffected or unrelated person. |                                        |

#### (1) 开停机设定 On/Off setting

##### 1、开机前检查 Check before working

各连接管道及阀门是否安装正确、密封。

Whether the connecting pipes and valves are properly installed and sealed.

电器线路连接是否正确、可靠。

Whether the electrical circuit connection is correct and reliable.

真空干燥机的抽真空调试：将箱门关上并将门拉手旋紧到位，关闭放气阀(使橡皮塞上的孔与放气阀上的孔扭偏 90°),开启真空阀(由逆时针旋转 90°)，第一次使用可能真空阀开关较紧，可用力旋转。

Debugging of vacuum pumping for vacuum dryer: Close the door and screw the door handle into place. Close the empty valve (turn the hole on the rubber plug 90° away from the hole on the vent valve) and open the vacuum valve (rotate 90° counterclockwise). The vacuum valve can be tightened once and can be rotated by force.

接通真空泵电源，开始抽气，当真空表指示值达到-0.09Mpa 时，先关闭真空阀后关闭真空泵电源，以防止真空泵机油倒流到工作室内，此时真空干燥机机内处于真空状态。

Turn on the vacuum pump power supply and start pumping. When the vacuum gauge indication value reaches -0.09Mpa, turn off the vacuum valve and then turn off the vacuum pump power to prevent the vacuum pump oil from flowing back into the working chamber. At this time, the vacuum dryer is in the machine of vacuum state.

##### 2、正式工作启动程序 Work start procedure

关闭并锁紧门盖。

Close and lock the door.

打开加热循环阀门，启动加热系统（如果电加热水箱，需要打开电加热加热器）。

Open the heating cycle valve and start the heating system (if the water tank is electrically heated,

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the electric heating heater needs to be turned on).

打开抽真空管路阀门，启动真空泵。

Turn on the vacuum line valve and start the vacuum pump.

### 3、停机步骤 Shutdown steps

关闭加热系统。

Turn off the heating system.

先关闭真空管路上的截止阀，再停真空泵，而后打开放空阀。

First close the shut-off valve on the vacuum line, then stop the vacuum pump, then open the vent valve.

打开门盖出料。

Open the door cover and discharge.

### (2) 操作规程 Operating procedures

#### 1、开机前检查: Check before starting:

过滤器是否符合工艺要求。

Whether the filter meets the process requirements.

#### 2、上料。

Loading materials

#### 3、锁紧门盖；并保证气密封性。

Lock the door cover; and ensure air tightness.

#### 4、开启真空管路阀门，使罐内达到一定的真空度。

Open the vacuum line valve to achieve a certain degree of vacuum inside the tank.

#### 5、开启加热系统（蒸汽或热水进口阀门打开），对器内物料进行加热干燥。

Turn on the heating system (the steam or hot water inlet valve is opened), and heat and dry the materials in the device.

6、根据操作经验、溶煤的回收量以及器内温度情况；确认罐内物料干燥过程是否已经结束。结束后，切断蒸汽（或热水）及真空管路上的阀门。

According to the operation experience, the recovery amount of dissolved coal and the temperature

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inside the vessel; confirm whether the drying process of the material in the tank has ended. After the end, cut off the steam (or hot water) and the valve on the vacuum line.

7、关闭真空泵，开启真空管路阀门打开真空系统上的放空阀，使罐内恢复常压。

Turn off the vacuum pump and open the vacuum line valve to open the vent valve on the vacuum system to restore normal pressure inside the tank.

8、打开门盖取料。

Open the door cover and take out the material.

9、清扫罐内残留物料，关闭门盖，以防灰尘进入主机内。

Clean the residual material in the tank and close the door to prevent dust from entering the main unit.

#### 6.2.2 电气系统调试（按客户要求）Electrical system debugging (According to customer requirements)

急停开关可靠性与传感器有效性调试 Emergency stop switch reliability and sensor effectiveness debugging

急停开关（用于紧急情况停机。）放开急停开关，将电源开关（钥匙开关）设置 ON 的位置。按下急停开关，看急停开关及其线路是否有效，否则应予纠正。

Emergency stop switch (for emergency shutdown.) Release the emergency switch and set the power switch (key switch) to the position of the ON. Press the stop switch to see the stop switch and wire line are valid, otherwise it should be corrected.

#### 6.2.3 空载运行 No-load operation

电气系统调试完成后，应进行空载运行，空载运行时间不少于 30 分钟。

After the electrical system is completed, the no-load running should be carried out, and the running time is not less than 30 minutes. In the unloaded operation.

检查整机运行状况，如有不平稳或异常响声等不正常情况，应立即向车间汇报，排除故障后方可投入生产。

Check the operation condition of the whole machine, if there are abnormal conditions such as unstable

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or abnormal sound, it should report to the workshop immediately, and it can be put into production after the troubleshooting.

### 6.3 安装调试后的验收试验项目，方法和判据 Acceptance test items after installation and commissioning

表 6.2 验收试验项目，方法和判据 Test way

| 项目 Item                   | 要求 Requirement                                                           | 试验方法 Testing way                          | 备注 Mark |
|---------------------------|--------------------------------------------------------------------------|-------------------------------------------|---------|
| 概况 Survey                 | 符合工程设计要求 Meet the requirements of design                                 | 对照工程设计图 Compare the design drawing        |         |
| 平度 Flatness               | $\leq 1.5/1000$                                                          | 仪框水平仪<br>Frame level instrument           |         |
| 电源 Power                  | 接入相序正确 Access phase sequence correct                                     | 目测电机转向 check the motor rotation direction |         |
| 电气系统 electrical system    | 接地电阻不大于 $4\Omega$<br>The grounding resistance is not more than $4\Omega$ | 用万能表检测 Use the universal meter to detect  |         |
|                           | 急停开关有效，可靠<br>emergency stop switch is effective                          | 目测 check by eye                           |         |
| 空载试验 No load running      | 运行是否流畅,有无异响<br>running smoothly                                          | 感官 listen                                 |         |
| 现场整理<br>Field arrangement | 现场杂物清理干净<br>Clean up the sundries on the spot                            | 目测 check by eye                           |         |

## 7 设备使用操作 Equipment operation

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|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>本章罗列了 FZG/YZG 盘式真空干燥机 全部功能的操作, 具体设备可能只适用其中的部分。本章列举的屏幕菜单可能与具体设备实际存在不一致, 适用时请以实际为准。为了维持设备正常的工作效率和适用寿命, 建议按 8 小时/班的工作频度使用设备。This chapter lists all the functions of the FZG/YZG Tray Type Vacuum Dryer , and the specific of equipment may only apply to the parts. The screen menu listed in this chapter may not be in accordance with the actual equipment.</p> <p>In order to maintain the normal working efficiency and life span of the equipment, it is suggested that the equipment should be used in the frequency of 8 hours per shift.</p> |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

本手册中的操作说明可作为编制设备操作规程的参考性文件。The operation instructions in this manual may be used as a reference document for the preparation of the operating procedures of the equipment.

## 7.0 操作规程 Operating Procedures

### 1. 开机前检查: Check before starting

| 项目 Item            | 要求 Requirement                                           | 备注 Mark                                                                                                  |
|--------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| 接通电源 connect power | 按电源条件 as power condition                                 | 复位急停开关, 将上钥匙开关旋至 ON 位置 Reset the emergency stop switch and turn the upper key switch to the ON position. |
| 疏水器 Steam trap     | 使用之前打开排放污水 discharged sewage before use                  | 检查是否损坏 (对于蒸汽加热) Damage checking (for steam heating)                                                      |
| 物料 Materials       | 放入烘架 Put on the baking tray                              |                                                                                                          |
| 工作现场 Work site     | 整洁有序, 符合生产管理要求 Neat and orderly, in line with production |                                                                                                          |

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|--|-------------------------|--|
|  | management requirements |  |
|--|-------------------------|--|

2. 将物料先放入烘盘中，放入烘架，关闭门。

Place the material in the baking tray, place it in the drying rack, and close the door.

- 3.开启真空管路阀门，使罐内达到一定的真空度。

Open the vacuum line valve to achieve a certain degree of vacuum inside the tank.

- 4.开启加热蒸汽（或热水）进口阀门，对器内物料进行加热干燥

Turn on the control valve of jacket heating steam (or hot water) to heat and dry the material in the cabinet.

- 5.根据操作经验，溶煤的回收量，器内温度情况，在确认罐内物料干燥过程已经结束时，切断蒸汽（或热水）及真空管路上的阀门，然后缓慢地向夹套通以冷却水(视物料而定)，待物料冷却到适当温度后，然后关闭冷却。

According to the operating experience to know the recovery of slovent and the temperature inside the vessel, when it is confirmed that the drying process of the material in the tank has ended, and then turn off the steam (or hot water) control valve on the pipeline, and then the send cooling water to jacket so that use short time to reach room temperature(Depending on the material), after the material has cooled to the appropriate temperature and the turn off the cooling .

- 6.关闭真空泵，开启真空管路阀门打开真空系统上的放空阀，使缸内接通大气。

Turn off the vacuum pump and turn on the empty vacuum valve on the vacuum pipe line to allow the barrel to be connected to the atmosphere.

7. 打开机器门，手工拿出物料盘。

Open the machine door and manually take out the material tray

- 8.清扫罐内残留物料。

Clean the residual material in the cabinet.

#### 9.清洁设备 Cleaning equipment

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用水或其它清洗剂进行清洗，后晾干待用。

Wash the machine by water or other detergent and dry it.

## 7.1 盘式真空干燥机使用时的注意事项：Attention of Tray Type Vacuum Dryer

1. 外壳必须有效接地，以保证使用安全。

The enclosure must be effectively grounded to ensure safe use.

2. 盘式真空干燥机应在相对湿度 $\leq 85\%RH$ ，周围无腐蚀真空干燥机性气体、无强烈震动源及强电磁场存在的环境中使用。

The Tray Type Vacuum Dryer should be used in an environment where the relative humidity is  $\leq 85\%RH$ , there is no corrosive gas for vacuum drying machine and no strong vibration source and strong electromagnetic field.

3. 真空泵不能长时期工作，因此当真空度达到盘式真空干燥机物品要求时，应先关闭真空阀，再关闭真空泵电源，待真空度小于盘式真空干燥机物品要求时，再打开真空阀及真空泵电源，继续抽真空，这样可延长真空泵使用寿命。

The vacuum pump can't work for a long time. Therefore, when the vacuum degree reaches the requirements of materials drying, the vacuum valve should be closed first, then the vacuum pump power should be turned off. When the vacuum is less than the requirements of drying for materials, turn on it again, which can extend the life of the vacuum pump.

4. 盘式真空干燥机经多次使用后，会产生不能抽真空的现象，此时应更换封条。

After the Tray Type Vacuum Dryer is used for many times, and the seal should be replaced at this time so that the keep vacuum seal.

5. 放气阀橡皮塞若旋转困难，可在内涂上适量油脂润滑。(如凡士林)

If the rubber plug of the bleed valve is difficult to rotate, apply a proper amount of grease to the inside. (such as Vaseline)

6. 若盘式真空干燥机长期不用，将露在外面的电镀件擦净后涂上中性油脂，以防腐蝕，并套上塑料薄

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膜防尘罩，放置于盘式真空干燥机的室内，以免电器元件受潮损坏，影响使用。

If the dryer is not used for a long time, the exposed plating parts and apply neutral grease to prevent corrosion. Put on the plastic film dust cover and place dryer inside the room to avoid electrical components

## 8 故障的分析与排除 Analysis and elimination of faults

设备的大多数故障会在屏幕上端及时消息栏中显示出来，以便于操作和维护人员采取相应措施。出现故障时，系统所有运行会被立即中止，工作人员应及时进行故障分析排除。

Most of the failures of the device will be displayed in on the control panel to facilitate the operation and maintenance personnel to take appropriate measures. When the fault occurs, all the system runs will be stopped immediately, and the staff should do the fault analysis and troubleshooting in time.

常见故障现象，原因分析及排除方法见表 8.1

Common failure phenomenon, reason analysis and elimination method see table 8.1

### 8.1 故障及排除 Failure and elimination

|                                                                                                                                                             |                           |                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------------------------------------------------------|
| <p>所有设备故障应由专业人员检修，故障排除后应进行确认</p> <p>All equipment failures should be overhauled by professional personnel and should be confirmed after troubleshooting</p> |                           |                                                                  |
| 故障现象<br>Failure phenomenon                                                                                                                                  | 可能原因<br>Reason            | 排除办法<br>Elimination method                                       |
| 罐体无温度<br>The barrel heating is not sucessful                                                                                                                | 水泵不工作 water pump not work | 检查水泵线路和水泵<br>check the water pump and water pump electrical line |

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|                                   | 水泵阀门未打开（如果蒸汽加热，蒸汽阀门未打开）<br>Water control closed (if steam heating, the steam valve is not work) | 打开阀门<br>Turn on the water / steam control valve        |
|                                   | 水箱没水<br>No water at water tank                                                                  | 水箱加水<br>Add water to water tank                        |
|                                   | 水箱水没加热<br>The water tank heater is not work                                                     | 加热水箱内水<br>Check the heater control and electrical line |
| 箱内温度不匀<br>Not uniform temperature | 烘门未关严<br>Door is not all closed                                                                 | 检查并关紧门<br>Checking and closed the machine door         |
| 罐内真空度不高<br>Lower vacuum degree    | 管道漏气 vacuum pipelin have leak place                                                             | 检查管路<br>Check pipeline                                 |
|                                   | 真空泵太小<br>Vacuum pump is small                                                                   | 维修或更换真空泵<br>Change bigger power vacuum pump            |

## 8.2 设备易损件明细表 vulenrable part list

| 名称 Name             | 用途 Usage                   | 备注 Mark   | 数量 Qty |
|---------------------|----------------------------|-----------|--------|
| 真空表<br>Vacuum meter | 测真空度<br>Test vacuum degree | -0.1—0MPa | 1      |

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| 温度表<br>Temperature meter        | 测温度用<br>Test temperature | 0—150℃             | 1     |
| 密封垫<br>Seal                     | 密封<br>Sealing            |                    | 1unit |
| 水环式真空泵 Water<br>ring pump       |                          | 380V               |       |
| 门铰链 door hinge                  | 10"                      | 不锈钢 Stainlss steel | 10"   |
| 测 温 热 电 阻<br>Temperature sensor | PT100                    |                    |       |

## 9 维护及保养 Maintenance



在进行设备的维护和保养之前，必须保证电源都被断开。

Before the maintenance the equipment, it is necessary to ensure that the power supply is disconnected.

### 9.0 概述 Summary



本部分所包括的内容是为确保人员和设备安全和有效操作所必须进行的预防性维护程序。

The contents of this section are preventive maintenance procedures that must be carried out to ensure the safety and effective operation of personnel and equipment.



执行维护工作的人只能是称职的工程技术人员或已经接受过此设备维护培训的人员。

The person who performs the maintenance work can only be a competent engineering technician or a person who has already received the maintenance and training of the equipment.



进行设备维护保养之前，必须保证电源与本机阻隔断开。

Before the maintenance of the equipment, it is necessary to ensure that the power supply is

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separated from the machine.

维护的目的是保证该机始终处于完好运动状态。维护分日常维护和周期维护。

The purpose of maintenance is to ensure that the machine is always in good condition.

Maintenance of daily maintenance and cycle maintenance.

### 9.1 日常维护：Daily maintenance

- 1、清洗所有烘盘及干燥用的辅助工具。

Clean all baking trays and auxiliary tools for drying.

- 2、真空干燥系统如长期不使用，应将所有容器，阀门中及夹缝中的残存物排出，并用清水冲洗干净，排尽烘架内的凝水和热水箱中的水。

If the vacuum drying system is not used for a long time, all the containers, the residuals in the valve and the cracks should be discharged, and rinsed with clean water to drain the condensate in the drying rack and the water in the hot water tank.

- 3、干燥器密封门铰链处（FZG/YZG）真空干燥器加入复合钙基润滑脂。

Add a calcium-based grease to the dryer seal door hinge (FZG/YZG) vacuum dryer.

- 4、干燥器身上的密封橡胶条请用抹布擦尽污垢，为防止密封橡胶条老化，严禁用香蕉水、汽油等擦洗，密封橡胶条应经常涂抹滑石粉加以保护，以防密封橡胶条脱落。

The sealing rubber strip on the dryer body, please wipe the dirt with a rag, in order to prevent the sealing rubber strip aging, it is strictly prohibited to scrub with banana water, gasoline, etc., the sealing rubber strip should always be coated with talc powder to protect the rubber strip from falling off.

- 5、真空表、温度计及安全阀应定期检验，每年至少一次

Vacuum meters, thermometers and safety valves should be inspected regularly, at least once a year.

6. 电器零件应保持清洁、灵敏，发现故障应及时修复。

The electrical parts should be keep clean and sensitive, and the fault should be repaired in time.

7. 本机视操作运转半年应检查修理一次，检查时应按原位置装配并调整各部位间距和公差。

This machine should be inspected and repaired once according to the operation for half a year. When

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checking, it should be assembled according to the original position and adjust the spacing and tolerance of each part.

## 9.2 周期维护：Periodic maintenance:

一年小修一次，二年大修一次。

A minor maintenance for one time for one year, two years for an overhaul.

## 10 设备的搬运与储存 Handling and storage of equipment



开始安装前应保证起重设备是适当的，这些装置应具有有效的测试证书；

Before the installation, it is necessary to ensure that the lifting equipment is appropriate and that these devices should have effective test certificates.

请勿使用带绞合缆绳，受损缆绳或打结缆绳进行起重作业；

Do not use stranded cable, damaged rope cable or knot cable for lifting operation.

禁止使用不完好和不匹配的工具

Prohibition of the use unfinished and mismatched tools

### 10.0 包装 Package

出厂前对设备进行部分拆解分箱包装。

Before leaving from the factory, the equipment is partially disassembled and packed in the sub box.

主机及其拆解部件以木箱进行包装。在不可倒置，侧放的包装箱上，已作好明确标识。

The main machine and its disassembly parts are packed in wooden cases. It is clearly marked on the side packed box.

### 10.1 搬运 Carry

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搬运时应符合起重要求的起吊装置进行搬运。搬运中不得使用带绞合缆绳，受损缆绳或打结缆绳，缆绳与设备除吊环外的其他部位接触应以橡胶，棉布等柔软物加以区隔，以免损伤设备。

The lifting device should be handled in accordance with the lifting requirement. It is not allowed to use stranded cables, damaged cables or knotting cables. Cables and equipment should be separated from other parts except rings, so that rubber and cotton fabrics can be separated from each other so as to avoid damage to the equipment.

## 10.2 运输 Transport

本设备适宜陆运和海运。

This equipment is suitable for land transportation and sea transportation.

陆运时装车应注意包装箱上的标志，除基座外，其余部件要求包装箱不得倒置，侧放和倾斜过多。装车时还应采取适当的防护措施，以避免设备在运输过程中受潮，受振和受冲击。

It should pay attention to the logo on the packing box when load the land transport truck. Except for the base seat, the other parts require that the packing box should not be inverted, the side and the tilt are too much. Appropriate protective measures should also be taken to avoid the dampness, vibration and impact of the equipment during the transportation.

## 10.3 贮存 Storage

设备应贮存于干燥，通风，无腐蚀性介质，无振动的室内。

The equipment should be stored in dry, ventilated, non corrosive medium and no vibrating room.

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## 11 开箱机检查 Opening box inspection

### 11.0 开箱注意事项 Precautions for opening the box

a) 开箱前应仔细检查包装是否完好，件数，名称规格与运单是否一致

a) before the box is open, it should be carefully examined whether the package is intact; whether the number, the name ,the model is same as the waybill.

b) 开箱时应拆除包装箱顶盖，然后打开四侧，取出设备。

B) when the box is open, the top of the box should be dismantled. Then the four side should be opened and the equipment is removed.

### 11.1 检查内容 Inspection content

a)随机文件（一般包括：装箱单，合格证书，使用说明书，检验报告，随机附件清单等）；

a) Random files (generally included: packing list, certificate of qualification, manual book, inspection report, random appendix list, etc.);

b)根据装箱上记载的内容逐件核对查验，并作好记录。

b) Check one by one according to the contents recorded on the packing, and make good records.

附录一：电气图(按客户订单要求) Appendix 1 Electrical drawing (According to customer requirements of order)

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**感谢您使用 hywell 公司生产的 FZG/YZG 盘式真空干燥机 。在安装和使用之前请仔细阅读本说明书!**

**Thank you for using the FZG/YZG Tray Type Vacuum Dryer produced by Hywell company. Please read the instructions carefully before installing and using!**

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