User Manual

DESICCANT DEHUMIDIFIER

KEEP THESE INSTRUCTIONS FOR FUTURE REFERENCE

Thank you for choosing our dehumidifier to provide the needs of dehumidification system. This operating manual will provide you with valuable information on the proper care and maintenance of the dehumidifier. Please take a few moments to read the instructions thoroughly and familiarize yourself with all the operational aspects of this dehumidifier.

Foreword

This manual provides all the information about this desiccant dehumidifier, including the structure, installation, working principle and the detailed operating instruction is provided. No modification of the unit is allowed without prior approval, to avoid void of warranty.

Warning!

All electrical connections works must be done by local professionals, to meet the relevant regulations or requirements. Please read through the manual before any installation work is carry on, this is to avoid any fault operation that may cause loss of life or property. Please contact the supplier or the manufacturer if there are any issues arises that are not stated in this manual.

Safety

This series of dehumidifier is in conformity with the essential safety requirements as following:

GB/4706.32-2004/IEC 60335-2-40:199	GB/T7725-1996
GB/T16803-----1997	GB/T18883-2002
GB/T17791-----1999	GB/T19411-2003
GB/755---2000	UL/474-1993
GB/T2518	GB/T191-2000
GB/50016-2006 /GBJ16-87	ANSI/AHAM DH-1-1992
GB/50243-2002	ANSI/UL94
GB/50019-2003	UL/484-1993
GB/50015-2002	UL/969
GB/J13-86	GB/T18713—2002
GB/T6424—1997	GB/T15513—1995

GB/T4271—2000	QB/T15816—2004

In each section of the manual, there are safety information and explicitly pointed out operation that may causes danger. And it is mark with "Warning Sign  "

This manual provides information on the appropriate ways of operating the dehumidifier. It shall serve as a guideline only and are not liable for any personal responsibility or to meet the local safety regulations.

During the installation and operation of the equipment, everyone shall bear the liability of the following:

- To ensure the equipment in good condition according to the description provided in this manual;
- Do care the safety of yourself and others;
- Dehumidifier should be operated and maintenance by qualify professionals;
- Do not install dehumidifier around the explosive protection devices;
- Turn off the power before accessing to the internal compartment of the machine;
- To carry out maintenance service, please allow the machine to stop and cool down about 15 minutes;
- All of the machine panel should be closed at all time if maintenance work is not carried out;
- Dehumidifier is limited to atmospheric pressure condition to dehumidify;
- All our dehumidifier come with filters, it must be properly install and cleaned on regular basis;
- Amend or remove any labels, safety marking or notes on the dehumidifier is prohibited;
- The manual should be kept well for reference;
- Original spare parts should be used for any faulty part replacement;
- The written permission from manufacture must be needed before repairing the dehumidifier by other party;

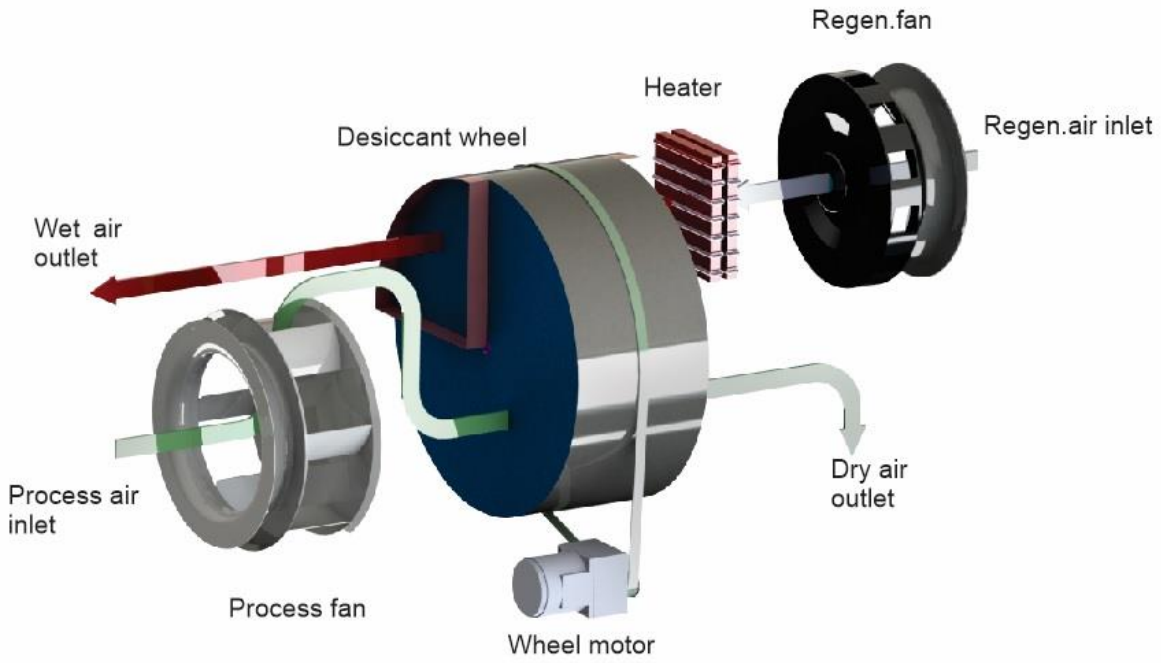
1 Introduction

1.1 Principle

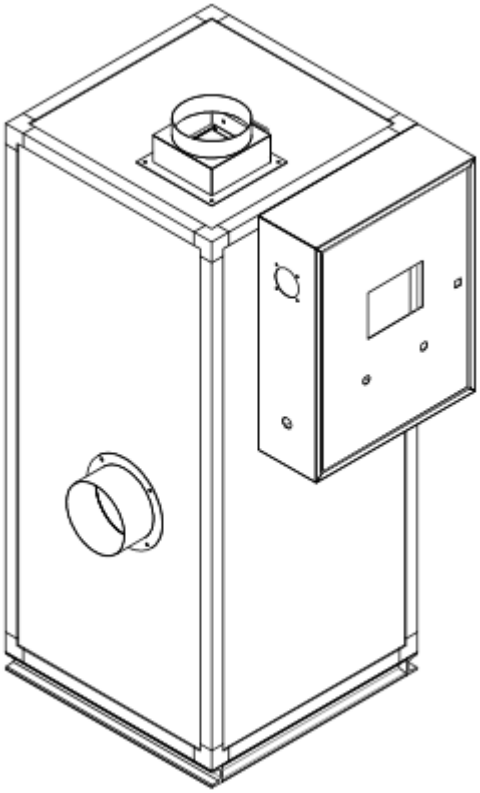
The desiccant dehumidifiers are developed to effectively treat applications that requiring low air humidity. The desiccant dehumidifier operates based on the adsorption principal. Treated air is simply passed through a porous wheel of solid desiccant and its moisture in the air is absorbed and the humidity level is lowered. After the wheel absorb the moisture, it will become saturates and in order to be used again it must be 'recharged' or also called as 'regenerated' by heating it up until the absorbed moisture is evaporated. The evaporated moisture will be driven off the desiccant wheel and goes right back to outdoor air or to surrounding ambient, which is not the treated room. The desiccant dehumidifier is designed so that the treated air is separated from the incoming air stream to dry the wheel, which will be exhausted to the outside.

The desiccant wheel is slowly rotating in the system to continuously absorb moisture to keep the treated air dry and regenerated using heat to help remove the absorb moisture from the desiccant. Roughly ¾ of the time the desiccant will be absorbing moisture out of the treated room air, and the remaining ¼ of the time it will recharge. The process mentioned above is shown as picture in 1.2 showing below.

1.2 Working process



1.3 Construction



1.3.1 Housing：

- Our Desiccant dehumidifier equipment is built with solid steel frame structure of 1.2mm thickness, which is insulated to prevent condensation on machine surface, powder coated paint for better anti-corrosion.
- The rugged steel frame structure, is meant for heavy duty usage, where it can be move and handle by forklift for transportation and installation purpose;
- The machine is design for easier maintenance. The machine panel can be easily screw and unscrew for machine troubleshoot. And the electrical panel can be easily located and opened hinge door with clip;
- The desiccant wheel is make of high quality material which can last long under normal usage with care. It is effective and reliable;

1.3.2 Process air duct：

- There are filters for each air inlets, it is conveniently to remove for cleaning purpose. It is suggested to clean the filter regularly to maintain the performance of the machine.
- Our centrifugal fan (or EC Centrifugal fan) is of high quality unit, the rotor blades and steel spiral case, high efficiency, low noise, high airflow;
- Process air outlet can be connected to other air treatment equipment according the user needs.

1.3.3 Reactivation air duct：

- There are filters for each air inlets, it is conveniently to remove for cleaning purpose. It is suggested to clean the filter regularly to maintain the performance of the machine.
- Reactivation blower will delay to stop while reactivation temperature up to 60 ℃, ensure that the water vapor and heat can be taken away totally;
- Reactivation heater The controller acquire signals of the heating temperature transmitter, then PID adjusts internally, adjust the power of SCR to ensure the wheel is in constant temperature, to allow better energy saving.

1.3.4 Desiccant rotor：

Desiccant wheel and the frame part are the core of the dehumidifier, whose performance characteristics directly influence the dehumidifier performance and characteristics:

- Both desiccant rotor and sealing strip are imported material from the USA;
- The desiccant rotor is made by special heat resistance composite materials, which is corrugated structure containing high performance of moisture absorption, forms lots of tiny air hole, has large air contact area, improving the dehumidification efficiency;

1.3.5 Driving system of wheel：

The slow rotation of wheel is realized through the motor and belt transmission device. Belt is located at the wheel rim, driven through the drive motor pulley;

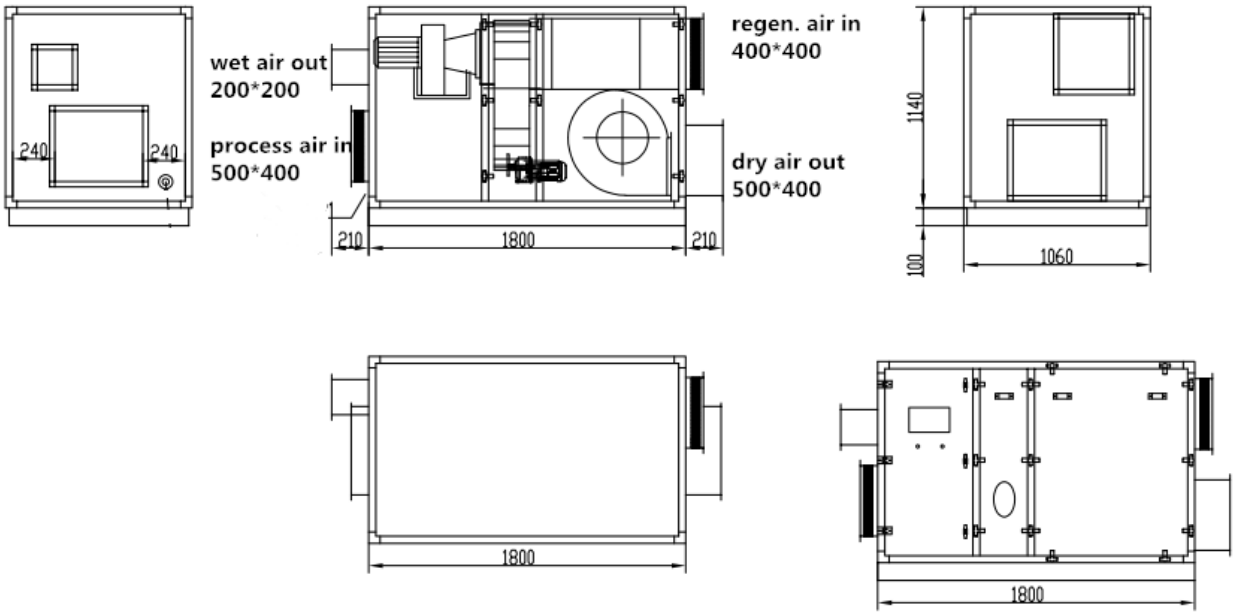
Belt tension device can ensure belt in the appropriate firmness, prevents belt slide and to deal with driving devices are in correct operation. The front panel can be open to check the wheel rotation direction.

1.3.6 Protective device：

Motor overloaded and short circuit protection: Processing motor, reactivation motor and the motor of wheel are introduced the overload and short circuit protection function.;

Stop protection：When dehumidifier stops in normal, reactivation fans (including wheel) will continue to run until reactivation heater cools down to 60 ℃ below;

1.3.7 Dimension

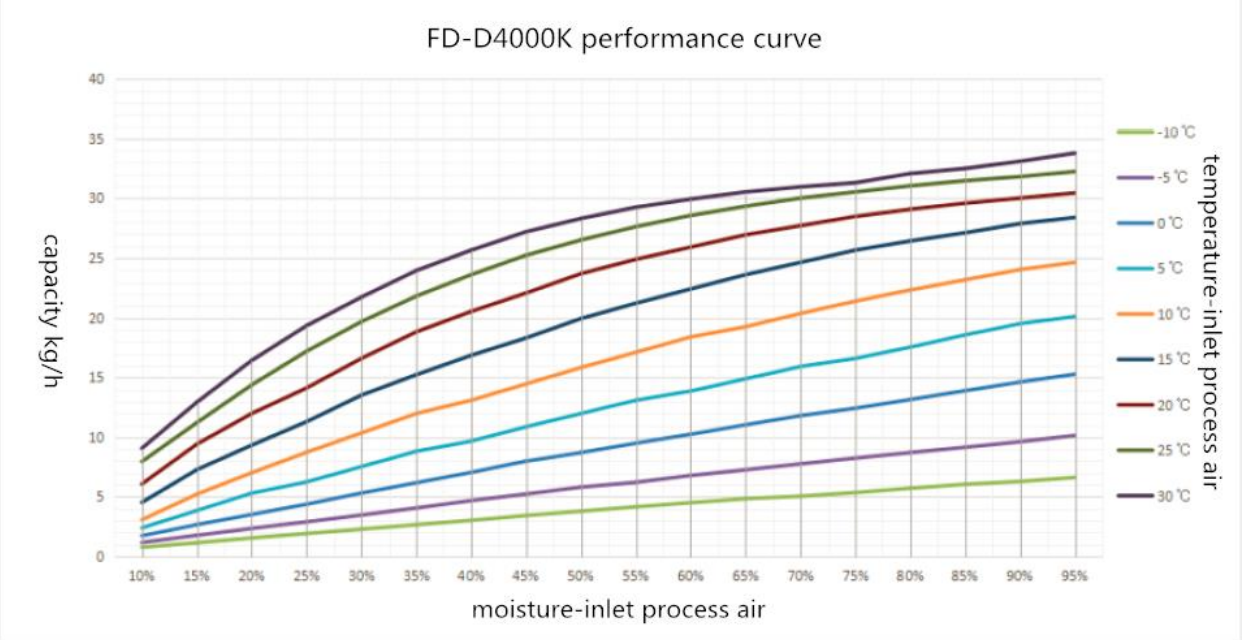


1.3.8 Technical Specifications

Model	FD-D4000K
Voltage /Frequency/Phase	380V/50HZ/3P 4-core cable
Rated Power	51.7KW
Capacity	30.24KG/H
Process air Volume	4200CMH
Regen. air Volume	1390CMH
Rotor	Φ770*200mm(Proflute)
Electric heater power	45KW

Note: the capacity data is calculated while the ambient temp.is 20°C and humidity keeps 60%RH.

1.3.9 Performance Chart



2 Installation

2.1 Introduction

This section content involves working instructions about installation; it provide helpful

information to assist in installation.

2.2 Transport & storage

In order to guarantee the quality and reliability of the desiccant dehumidifier, each will be inspected before their delivery. If the equipment has to be stored for long period before installing, the following items should be paid attention:

- Do not abandon or destroy the original package.
- Avoid any physical damage.
- Prevent dust, frost and rain.

2.3 Inspection

First, check if there are any damages during the transportation. Opening the package, and then connecting the power to test products. If any damage is found, please contact the manufacturer / distributor. Secondly, connect the machine with appropriate layout of the duct work. If environmental and installation conditions are not satisfactory, please contact the manufacturer too, and the designers will help you to improve the work.

2.4 Moving

The weight of dehumidifier is nearly 500kg, in order to prevent any injury or damage, do please use carrying & lifting device to move. Avoid turning upside down. The dehumidifier is design for easy use of carrying & lifting device.

2.5 Location

The dehumidifier is suitable for indoor usage. **For the convenience of maintenance and inspection, some space around the machine should be retained (800mm gap at least).** In order to prevent condensation inside the machine, the dehumidifier should not be put into the condition in which the air temperature is below the dew point. In addition, if the machine is installed outdoors, some protective measures should be done to prevent rain, snow and dust and etc.

2.6 Installation base

Dehumidifier must be installed on horizontal ground or platform, and the ground or platform must have enough capacity to bear the total weight of the dehumidifier. After installation works, it is better to re-check whether the dehumidifier is level. If the dehumidifier is required a fixed installation, the mounting holes should be done in the prefabricated steel feet.

2.7 Duct connection

The dimensions of the process air and regenerative air ducts shall be in accordance with the recommended values of ISO 7807. For the installation of duct and elbow flange pipe joints, the bolt length should not exceed 20mm. When installing the dehumidifier inlet and outlet connections, the following recommendations should be noted:

● Minimize the length of the duct to reduce the static pressure loss of the air system.

● All rigid (galvanized) pipe connections must be airtight to ensure performance.

● The air duct should be insulated to avoid condensation on the outer wall of the pipeline when the temperature of the airflow in the pipeline drops below the outside air dew point temperature, resulting in corrosion of the pipeline; and energy loss can be avoided.

● Pipes installed directly on the dehumidification unit should be adequately supported to reduce the load and pressure due to gravity and operation of the pipe.

● Ensure that there are no restrictions on the operation and service when designing pipes and installing pipes.

● In order to reduce the noise and vibration along the pipeline, the regenerative outlet can be installed with a good quality, airtight soft connection.

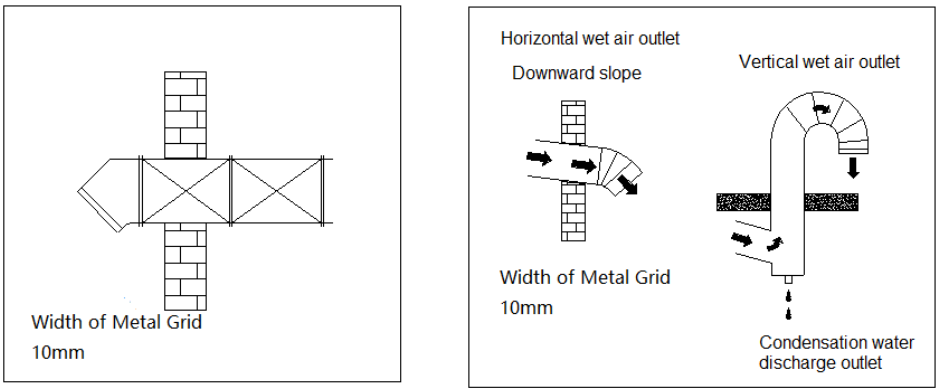
● A regulating damper must be installed on the outlet pipe for the process air and regeneration air.

● The total resistance of the treatment side and regeneration side piping must not exceed the pressure head provided by the fan in the unit.

● If the system is introduced into the dehumidification unit from outside, the air inlet should be at a sufficient height from the ground to prevent the inhalation of dust and debris. The entrance must be kept away from sources of contamination that may be contaminated, such as energy exhaust, steam and harmful gases. To prevent humid air from humidifying the process air (inlet),

the outdoor process air inlet must be at least 2 meters away from the wet air outlet. In addition, piping design should be considered to prevent rain and snow from invading.

● In the wet air pipeline of the regeneration system, the air has a high moisture content, and the inner wall of the pipeline is liable to form condensed water. The horizontal pipe should be installed down the slope from the dehumidification unit. In addition, condensate discharge should be placed at the lowest point of the pipeline to prevent internal water accumulation. The wet air pipe must be insulated to prevent condensation on the inner wall of the pipe when the air dew point temperature in the pipe is higher than the outside air temperature, resulting in corrosion and accumulation of water.



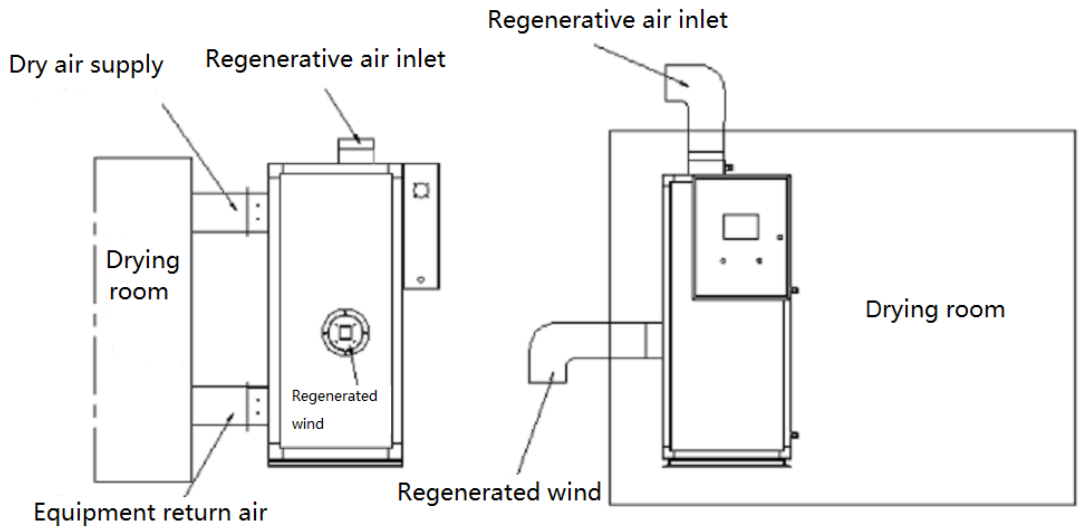
Outdoor air inlet　　Regenerated wet air outlet

*Installation diagram of the outdoor inlet and outlet ducts of the dehumidification system.

2.8 Installation Guide

Indoors: The regeneration air inlet and outlet are ducted to the outdoors. The process air inlet can be free return, while the dry air outlet can be ducted to designated area to be treated or can be evenly distributed within the treated room.

Outdoors: The process air inlet and outlet are to be ducted to the treated area. The regeneration air inlet and outlet can be ducted to outdoor if the machine is installed outside of the treated room, or it can be allowed to free flow if it is installed at outdoor.



Outdoor installation diagram　　Indoor installation diagram

LUKO Desiccant Dehumidifier is design for easy ducting connection. For inspection and maintenance, please ensure there are enough space in front of the unit. This is to provide clearance for opening the access door and remove the desiccant wheel.

To load, unload, moving or relocating the machine, it is recommended to use material handling equipment such as Hand Pallet Jack, Forklift and others. Please do not place the dehumidifier in explosive areas, it is not designed for explosive environment or with explosive materials.When installing the duct work, it is to avoid recirculation of outlet air to inlet. For instant, please make sure the Wet Air outlet is far from Regeneration Air Inlet and the Process Air Inlet is distant away from the Dry Air Outlet.

It is also recommended to minimize the length of the duct used. As the longer the ducting is, the performance of the machine will be affected. The Dry Air outlet of the unit can be fitted with a Volume Control Damper to regulate the airflow volume when necessary. The damper can also be installed at the wet air outlet, if you would like to reduce the dehumidification capacity.

Please beware that Condensation may occur in the ducting that connected to Wet Air Outlet. This is due to the higher moisture content of the wet air that is being discharged. It is therefore recommended that the duct for the Wet Air Outlet to be insulated and installed at an angle so that the condensed water will not flow back to the dehumidifier. A 10mm diameter hole shall be provided in the lower part of the duct for the discharge of condensate water.

The size of the duct should meet the recommended values of ISO7807. Installation of duct and elbow flange pipe connections shall not exceed 20 mm in bolt length. When installing the dehumidifier inlet and outlet connecting pipes, you should pay attention to the following suggestions:

- Minimize the duct length, this is to reduce the static pressure loss. To ensure better performance, all rigid (galvanized) duct connections must be airtight.
- The air duct should be insulated to avoid condensation on the outer wall of the duct when the air temperature in the duct falls below the dew point of the outside air, this would also cause corrosion of the duct. Insulation can also prevent from energy loss.
- Ensure that there are no blockage on the operation to provide maintenance and servicing of the machine. In order to reduce noise and vibration, a good quality and air-tight soft connection can be installed between the outlet of the regenerative fan and the regenerating duct.
- Damper can be installed on the outlet duct of the dry air and wet air.
- If the system is to be used for dehumidifying fresh air, the process air inlet should be at a sufficient height above the floor to prevent the ingress of dust and debris. The process air inlet must be kept away from possible sources of air pollution. In order to prevent wet air outlet recirculate back to process air inlet, the process air inlet must be at least 2 m away from the wet air outlet. In addition, the location of installing the machine should be considered to prevent rain and snow.

2.9 Electrical connection

 Be careful! All electrical connection works must obey local electrical equipment installation standards, done by qualified professionals. The machine needs three-phase AC power supply, as per the specification table in 1.3.8 above.

- It is forbidden to connect the power supply beyond the specified voltage and frequency.
- Before the three-phase AC power is supplied, its real status should be checked to ensure that its voltage and frequency fluctuation does not go beyond ±10%.
- Unit must be grounded. Setting the power isolation switch to ensure the machine is totally off power during checking work. The main switch to be directly connected with the main power devices.

2.10 Sensitive elements connection

 The installation of temperature and humidity sensors, the following requirements should be abided：

- Temperature and humidity sensors should be installed above ground 1 m to 1.5 meters, making sure the device can detect the representative data in the dehumidifying area;
- The sensors should be installed away from dry air or wet air or airflow from outside;
- Temperature and humidity sensor should stay away from direct intact with cooling equipment, do not directly exposed to sunshine place, as the change of the temperature will affect the actual assessment;
- External control system must be compatible with the low voltage control circuit of dehumidification equipment.

3 Operations

3.1 The touch screen boot screen is displayed as follows:

3.2 Circuit protection(See:Circuit diagram)

3.3 Start-up preparation

3.3.1 The unit should have independent power supply system and power distribution cabinet, voltage 380V, frequency 50Hz adopt three-phase five-wire system power supply, power supply voltage requirements are stable, unit operating voltage range is 95%~108% of rated voltage (grid voltage changes are large) In the case, it should be equipped with a voltage regulator), the maximum allowable phase voltage imbalance of the power supply voltage is 2%, and its calculation formula is:

$$\text{Phase voltage imbalance rate} = \frac{Maximum\ deviation\ of\ phase\ voltage\ between\ average\ voltage}{Average\ voltage} \times 100\%$$

★Note: The phase voltage unbalance rate exceeds 2%, please do not start up!

3.3.2 Check if the power supply is correct and the grounding is firm and reliable.

3.3.3 Connect the sensor correctly according to the circuit diagram;

3.3.4 Thermal relay setting value, factory setting, please do not change;

3.3.5 Check if the wiring is loose, if it is loose, it must be tightened;

3.3.6 Check if the temperature and humidity setting values are reasonable and whether the power-on conditions are met

★ Note: The sensor wiring is strictly in accordance with the diagram, and should not be loose. The wiring is shielded

3.4 Parameter setting and boot operation:

After power-on, the display will first self-test. After the self-test is successful, press “Enter system” data monitoring screen, as shown in Figure 1:

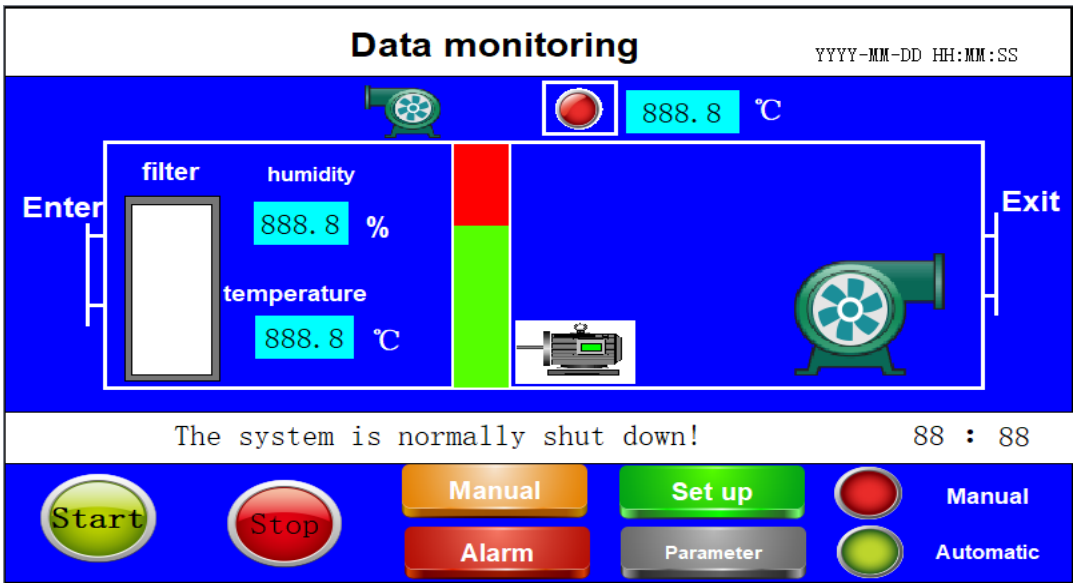


Figure 1

In this screen, the flow chart of the combined rotary wheel dehumidifier system can be displayed. This screen can display the return air temperature and humidity value, the regeneration temperature value, the pre-heating temperature value, the heating valve opening degree and the cold water valve opening degree, etc., which can be more intuitive. Understanding the principles of the system.

Press the “Start-up” button on this screen, the unit will automatically run according to the set related parameters. Press the “Stop it” button, the unit will stop the machine according to the set parameters.

The user can view the alarm information on this screen. When the fault is removed, press the “Alarm record” button to eliminate the alarm.

(1) Press the “Manual Mode” screen in Figure 1 to enter the output test screen, as shown in Figure 2:

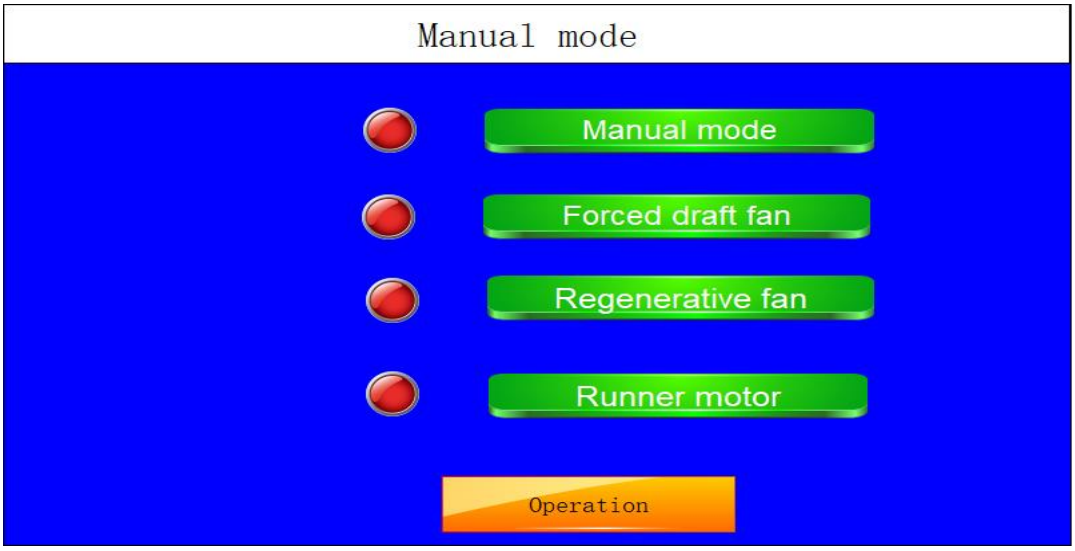


Figure 2

(2) On this screen, you can manually press the "runner motor", "Regenerative fan", "Air Blower" button to test whether each motor is running normally.

(3) In this screen, you can press the “Running picture” button to return to Figure 1. This button function is the same for all screens, and will not be explained later.

(4) (2) Press the “Parameter” button in Figure 1 to enter the unit parameter setting screen, as shown in Figure 3:

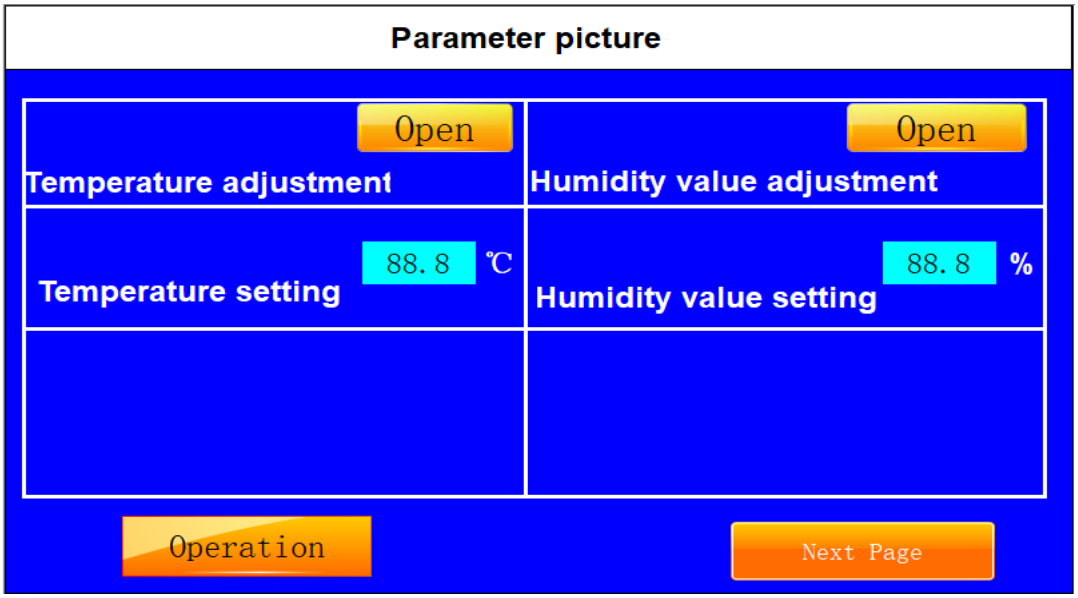


Figure 3

On this screen, the user can set the required parameter value. By pressing the small square after each display column, the numeric keypad will pop up on the screen. After setting, press “Enter” to exit and the setting value will change. The user can set each parameter before

starting the machine, or modify it while the unit is running.

This screen can adjust the relevant parameters of the machine according to actual needs.

(3) Press “PID Parameter” in Figure 1 to view the current temperature-related PID parameters.

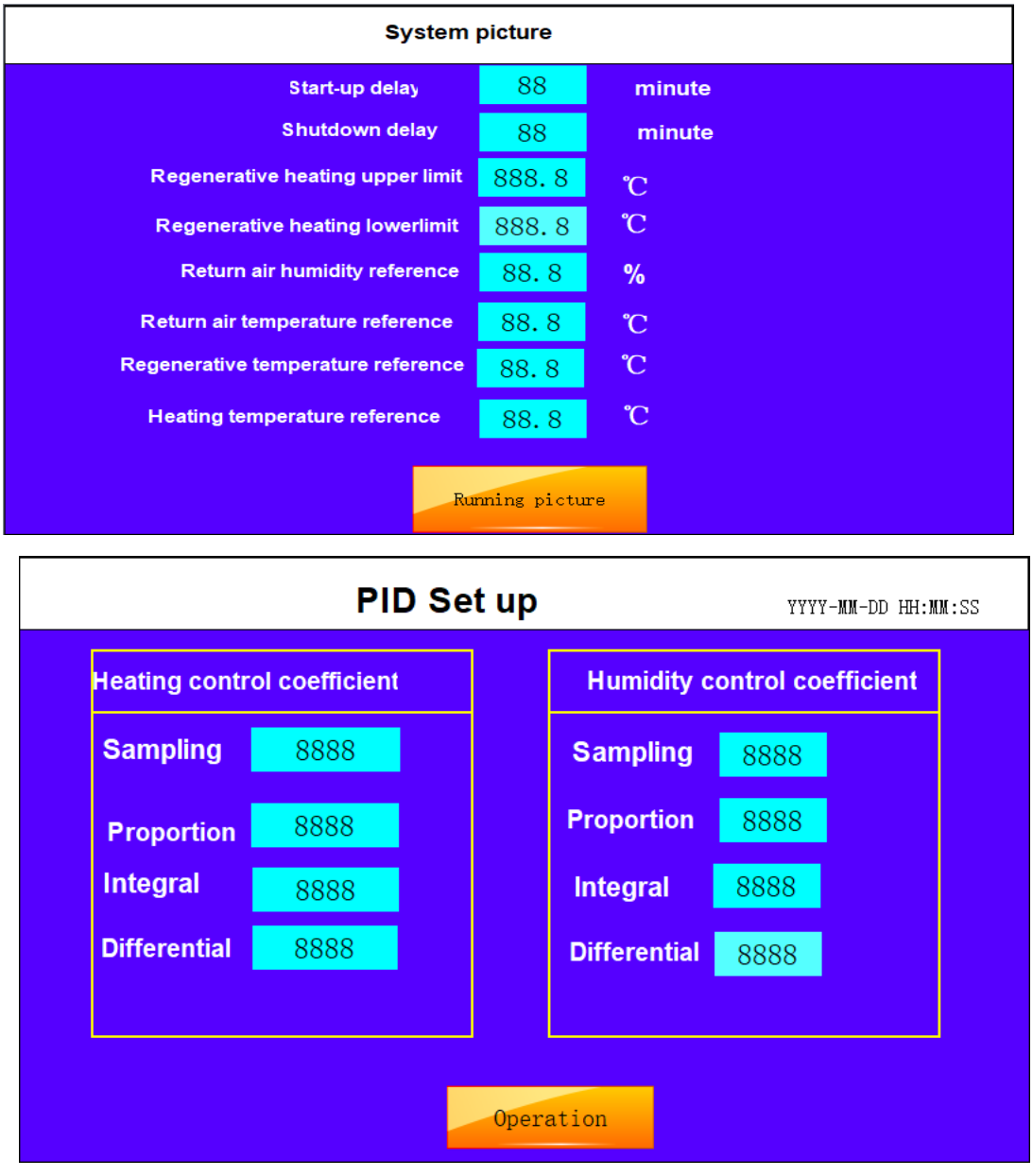


Figure 4

After the relevant PID parameters of this interface are shipped, each parameter has been set, and the user does not recommend to modify the relevant parameters during the use.

Note: The running unit must first run the motor of the rotary wheel and the regenerative fan. If the motor of the rotary wheel and the regenerative fan are not running, other components cannot be operated. When the unit fails, the corresponding running parts of the unit will be removed. The part is not eliminated and reset. Can not be put into operation before. Clearly display and clear alarm functions.

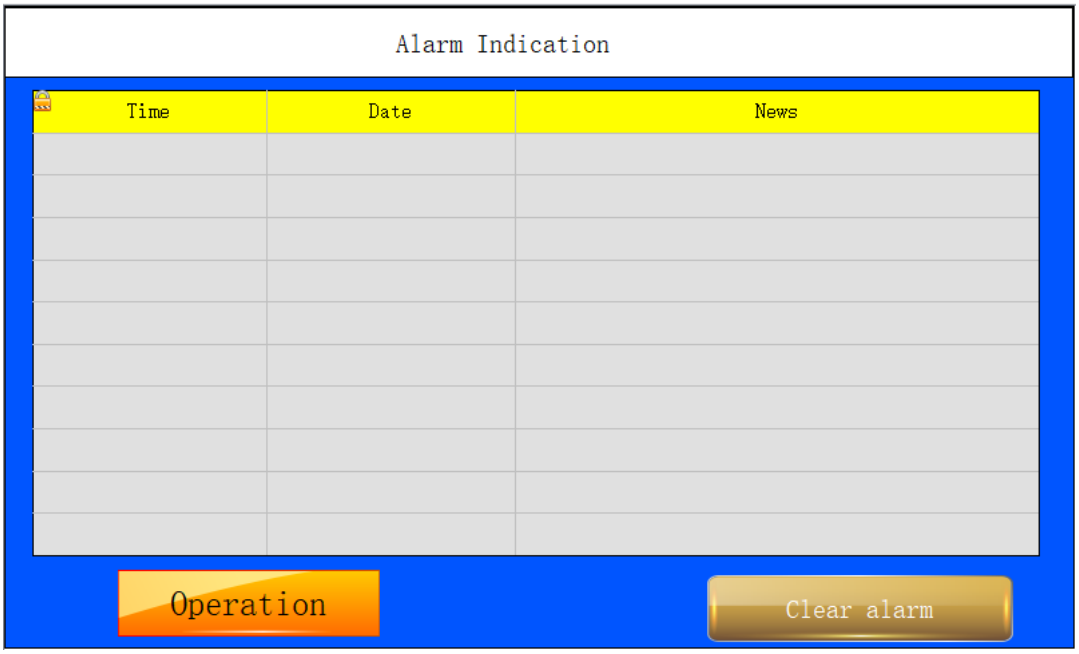


Figure 5

4 Maintenance

4.1 Introduction

The dehumidifier can be operated for a long time and requires only a small amount of maintenance. Maintenance of the dehumidification equipment is beneficial to the long-term good operation of the unit. The frequency of maintenance depends on the operating conditions of the unit and the quality of the installation.

Notes for normal operation of dehumidifier:

1.After normal use for 6 months, add lubricating oil on the wheel chain after opening the observation window to maintain the lubricating effect of the chain.

2. The unit shall be turned on for 2-3 months to check whether the regenerative air inlet filter is blocked and clean up in time.

3.In case of sudden power failure during normal use, please pump out the regenerative air inlet filter in time and open the access doors on both sides of the runner to dissipate the heat as soon as possible. After the power supply is restored as soon as possible, turn on the runner motor and the regeneration fan to operate until the regeneration heating temperature drops to the normal temperature. When the equipment is in normal use, sudden power failure will cause the electric heating tube to burn out and the dehumidification wheel to be damaged.

Components	Inspection and maintenance procedures	
	Half a month	12 months
Process air and regeneration air filter	Clean the filter box. If the filter is dirty, replace the filter.	Clean the filter box. If the filter is dirty, replace the filter.
Process air and regenerative air draught fan	Check for mechanical damage and clean the motor and draught fan as required.	Dust and debris in the cooling grooves on the surface of the motor casing must be removed. Check the terminals of the motor to ensure that the wiring is not loose. Check the impeller of the fan for damage. If there are signs of corrosion, take immediate measures. Check the air volume and adjust the damper as required, see the commissioning section of the unit.
Rotary wheel drive motor Assembly	Check the drive belt for signs of damage and if the installation is proper.	Check the motor wiring and make sure the wiring is not loose and check for signs of damage and overheating.
Electric control box and wiring	Inspect the components and wiring in the electrical control box for signs of damage and overheating.	Inspect the components and wiring in the electrical control box for signs of damage and overheating. In normal operation, if a coil of a component is always working or is not always working, it should be periodically operated or reset several times

	Make sure there are no loose connections.	in order to move its coils and contacts. Make sure there are no loose connections. Clear miscellaneous on all parts Things and dust. Remove dust and debris from the heat sink of the electrical control box.
Regeneration, rear heater	Remove debris and dust trapped on the bilge and surface of the heater.	Check all pipes, wires and control parts for looseness and tighten them if loose. Remove debris and dust trapped on the bilge and surface of the heater.
Dehumidification rotary wheel	Check for signs of overheating and blockage. Remove dust from the surface of the rotary wheel.	Check for signs of overheating and blockage. Remove dust from the surface of the rotary wheel.
seal	Check for signs of damage and displacement. Replace if worn or damaged.	Check for signs of damage and displacement. Replace if worn or damaged.
Unit and duct connection	Check for air leaks and the connection between the unit and the duct is normal.	Check for air leaks and the connection between the unit and the duct is normal. Check for dust and damage inside.
Temperature and humidity control	Check for dust and clogging. If it is, please clean it up in time.	Check the operation of all external humidity probes and calibrate as required.

If the air to be treated has a high dust content, the relative maintenance work needs to be carried

out frequently.

 Warning!The dehumidification unit has a high voltage inside, and the power supply of the dehumidification unit should be cut off before performing any maintenance work.

 Warning!The high temperature area (regeneration heating section) inside the dehumidification equipment should be cooled after the unit and the connected piping are cooled.

 Warning!The adjustment, maintenance and repair of the unit shall be carried out by qualified technicians. The personnel concerned shall clearly understand the high temperature and high pressure inside the dehumidification unit.

4.2 Inspection and Maintenance Procedures

The procedures for inspecting and maintaining the general components of the unit are listed in the table and may not include the contents of the external parts associated with the equipment. If necessary, please refer to the other information provided by the device manufacturer.

5 Troubleshooting

5.1 Introduction

The purpose of this chapter is to help the crew of the unit analyze the cause of the fault and master the method of troubleshooting. FD series dehumidification equipment can be easily controlled automatically according to the requirements of the control method. For troubleshooting purposes, please refer to the circuit diagrams and related materials provided with the random group.

 Warning!The dehumidification unit has a high voltage inside, and the power supply of the dehumidification unit should be cut off before taking any measures to eliminate the malfunction.

 Warning!There is a high temperature area (regeneration heating section) inside the dehumidification equipment, so the unit and the connecting pipes should be cooled before maintenance.

 Warning!The adjustment, maintenance and repair of the unit shall be carried out by qualified technicians. The personnel concerned shall clearly understand the high temperature and high pressure inside the dehumidification unit.

5.2 Troubleshooting Procedures

If the unit fails, please refer to the fault analysis and corresponding solutions provided below before contacting the equipment supplier. It may be easy to eliminate the fault. The following table does not include the contents of the external parts related to the equipment. If necessary, please refer to the other information provided by the device manufacturer.

Fault phenomenon	possible reason	Trouble-shooting measures
Equipment downtime	Power supply failure. Switch selection is not selected to start The circuit breaker of the power lead is tripped	Check the power supply of the device Select to start Replace the circuit breaker Inspection wiring circuit

	Wiring error air switch trip	
The rotary wheel does not turn	The motor of rotary wheel is stuck	Remove obstacles
The heating pipe does not work	Fuse burned	Replace the fuse
The crew is not working	Power supply problem Humidity controller setting problem Overheating inside the unit	Overhaul circuit Update settings humidity Quickly dissipate heat inside the body
Dehumidification capacity decreases	Regeneration heating capacity is not enough. The rotor drive system is faulty. The humidity controller is not working properly.	Check the operation of the heater. Check the wheel drive belt and drive motor. Check the parameters of the humidity controller