SND

Nitrogen Dryer

Date：Jul. 2021

Version：Ver.A (English)

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1. General Description

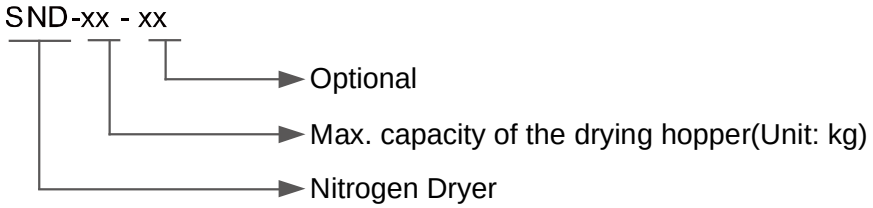
Please read through this operation manual before using the machine to prevent damages of the machine or personal injuries.

Don’t process the poisonous and flammable materials!

SND nitrogen dryer is suitable for drying small batch of common engineering plastics, such as PC materials, which is mainly used in optical applications. It can prevent oxidation when used in optical lens production.

Fig. 1-1：Nitrogen Dryer SND-10

1.1 Coding Principle



1.2 Feature

- Standard PLC control, P.I.D temperature control.
- Adopt nitrogen drying technology to prevent materials from oxidation and turning yellowish during the drying process.
- All materials contacted surfaces are stainless steel 304 to ensure no material contamination suitable for optical and medical products.
- The drying hopper and pipe are detachable for easy disassembling and cleaning.
- Adopt pneumatic material conveying to achieve continuous conveying.
- The nitrogen concentration displayer can monitor the nitrogen concentration in real-time to ensure the unit's status. It can adjust the nitrogen concentration according to the working environment. The max nitrogen concentration is up to 99%.

All service work should be carried out by a person with technical training or corresponding professional experience. The manual contains instructions for both handling and servicing. Chapter 6, which contains service instructions intended for service engineers. Other chapters contain instructions for the daily operator.

Any modifications of the machine must be approved by SHINI in order to avoid personal injury and damage to machine. We shall not be liable for any damage caused by unauthorized change of the machine.

Our company provides excellent after-sales service. Should you have any problem during using the machine, please contact the company or the local vendor.

Shini Hotline Service:
Headquarter and Taipei factory：
Tel: + 886 (0)2 2680 9119
Shini Plastics Technologies (Dongguan), Inc.：
Tel: +86 (0)769 8331 3588
Shini Plastics Technologies (Pinghu), Inc.：
Tel: +86 (0)573 8522 5288
Shinden Precision Machinery (Chongqing), Inc.:
+86 (0)23 6431 0898

1.3 Technical Specifications

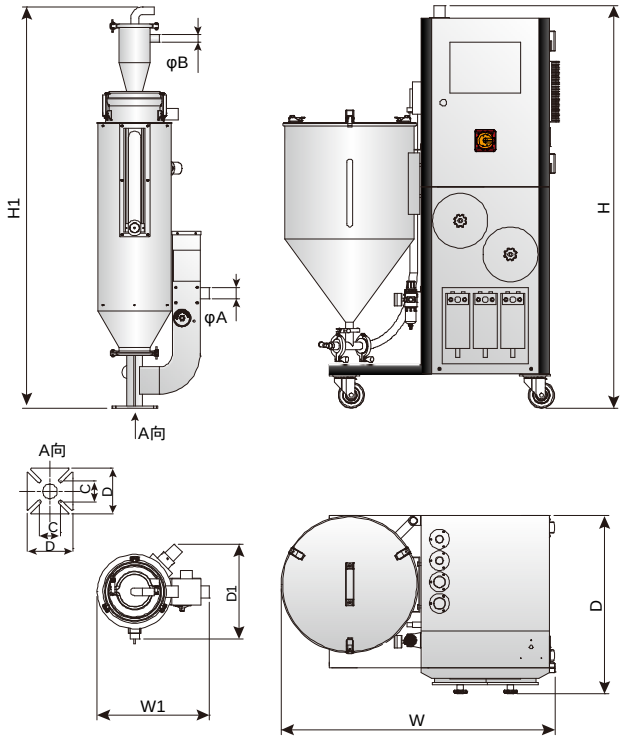


Fig. 1-2：Extermal Dimension

Table 1-1：Specifications

Model	SND-10
Ver.	A
Drying blower (KW)	0.1
Drying heater (KW)	0.6
Drying hopper capacity (L)	8~16
Drying temp. (℃)	140
Material storage tank capacity (L)	50
Max.Air Consumption (m³/h)	15
W×D×H(mm)	915×590×1315
W1×D1×H1(mm)	370×310×1310
A(mm)	38(1.5”)
B(mm)	25(1.0”)
C×C(mm)	70×70
D×D(mm)	150×150

Notes: 1) Compressed air: pressure 6~10kg/cm², oil content≤3mg/m³.

2) Power: 1Φ, 230VAC, 50Hz.

1.4 Safety Regulations

 Warning!

Electrical installation should be done by qualified technician only.

Make sure the specification of power switch and the rated current of load protection are appropriate and safe, and turn the main switch of the machine to "OFF" status before power connection.

When the machine is under maintenance status, turn both power switch and automatic operation switch to off.

1.4.1 Safety Signs and Labels

 Danger!

High voltage danger!

This label is stuck on the electrical boxes.

 Attention!

This label means that this area should be taken care!

 Warning!

High temperature, take care of hands!

This label should be stick to the shell of heater.

 Attention!

No need for regular inspection because all the electrical parts in the control unit are fixed tightly!

1.4.2 Transportation and Storage of the Machine

Transportation

1) SND series are packed in crates or plywood cases with wood planks at the bottom, which are suitable for quick forklift change.
2) After unpacking, casters installed on the machine makes it easy to move the machine.

3) Don’t run the machine to avoid collision with other objects as to prevent machine abnormality during the transportation.
4) The machine and its attached parts can be kept at a temperature from -25℃ to +55℃ for long distance transportation and for a short distance, it can be transported with temperature under +70℃.

Storage

1) SND series dehumidifying dryers should be stored indoors with temperature kept from 5℃ to 40℃ and humidity below 80%.
2) Disconnect all power supply and turn off main switch and control switch.
3) Keep the whole machine, especially the electrical components away from water to avoid potential troubles caused by the water.
4) Plastic film should be used to protect the machine from dust and rains.

Working Environment

1) Indoors in a dry environment with max. temperature +40℃ and humidity no more than 80%.

Do not use the machine

1) If it is with a damaged cord.
2) On a wet floor or when it is exposed to rain to avoid electrical shock.
3) If it has been dropped or damaged until it is checked or fixed by a qualified serviceman.
4) It must keep at least 1 m space around the machine during operation. Please keep at least 2m distance between the device and inflammables.
5) Avoid the effect of vibration and magnetic force in working area.

Rejected parts disposal

When the equipment has run out its life time and can not be used any more, unplug the power supply and dispose of it properly according to local code.

Fire hazard

 In case of fire, CO_2 dry powder fire extinguisher should be applied.

1.5 Exemption Clause

The following statements clarify the responsibilities and regulations born by any buyer or user who purchases products and accessories from Shini (including employees and agents).

Shini is exempted from liability for any costs, fees, claims and losses caused by reasons below:

1. Any careless or man-made installations, operation and maintenances upon machines without referring to the Manual prior to machine using.
2. Any incidents beyond human reasonable controls, which include man-made vicious or deliberate damages or abnormal power, and machine faults caused by irresistible natural disasters including fire, flood, storm and earthquake.
3. Any operational actions that are not authorized by Shini upon machine, including adding or replacing accessories, dismantling, delivering or repairing.
4. Employing consumables or oil media that are not appointed by Shini.

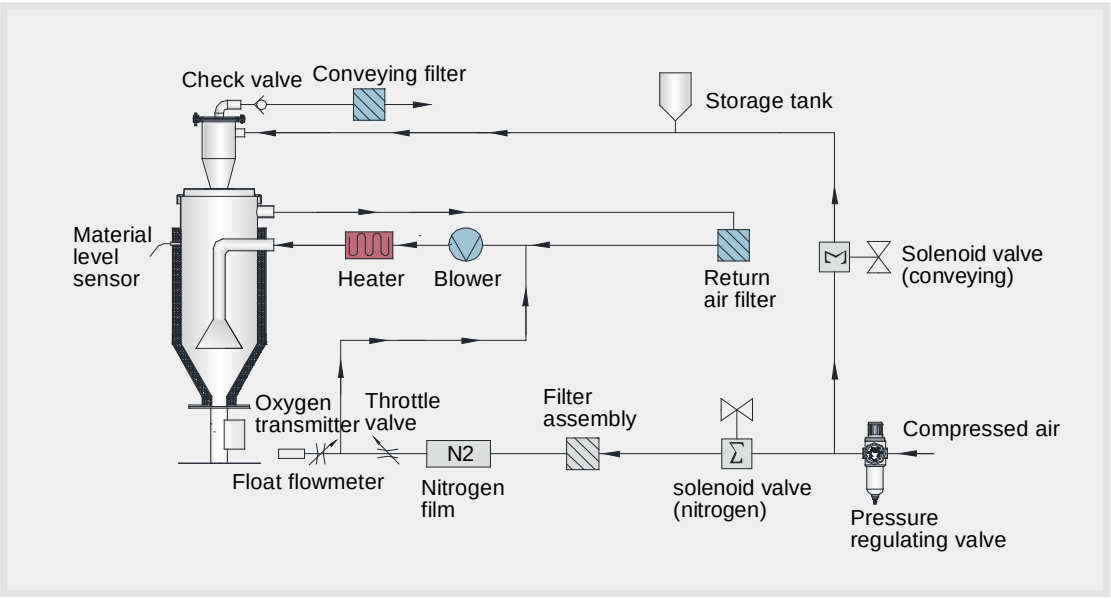
2. Structure Charateristics and Working Principle

2.1 Function Description

Working Principle

Dehumidifying: After machine startup, the compressed air is blown into the drying loop from the blower suction inlet through the filter & pressure regulating valve after passing the solenoid valve 1, filtering assembly, nitrogen film and throttle valve. The drying loop discharges air through the blower, and it generates high-temp. air to dry the materials in the drying hopper via the heater. The exhaust air returns to the return air filter and blower to form a cycle.

Conveying part: When the suction function is activated and the level switch detects, the solenoid valve 2 opens and the solenoid valve 1 closes. The compressed air passes through the solenoid valve 2 through the pressure regulating valve, and the materials in the storage tank is conveyed into the drying hopper by the positive pressure, and then the compressed air is discharged from the check valve through the feeding filter.



Picture 2-1：Working Principle

3. Installation and Debugging

This series of models only could be applied in working environment with good ventilation.

3.1 Machine Location

Installation Notice:

1) The machine can only be installed in the vertical position, make sure there's no pipeline, fixed structure and other object which may obstruct machine installation or cause items, human injuries above the selected location and adjacent areas.
2) For easy maintenance, leaving 1m space around machine is suggested. Keep machine 2m away from the inflammable materials.

   Note: Keep machine 2m away from the inflammable materials.

3) The machine should be placed on a flat surface to ensure the balance. If machine is need to install on a higher level (scaffolding or interlayer), it should make sure that the structure and size could withstand the machine.

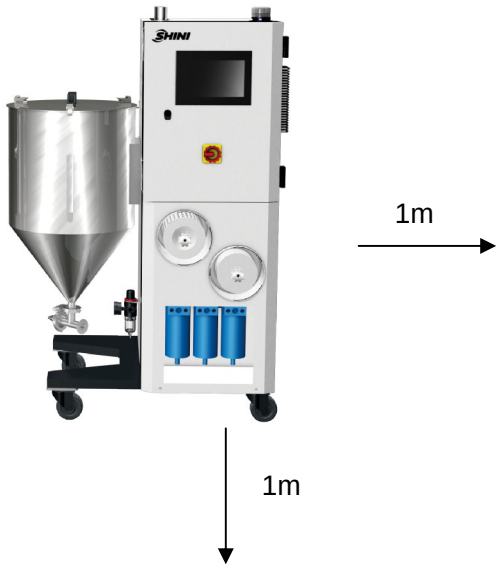
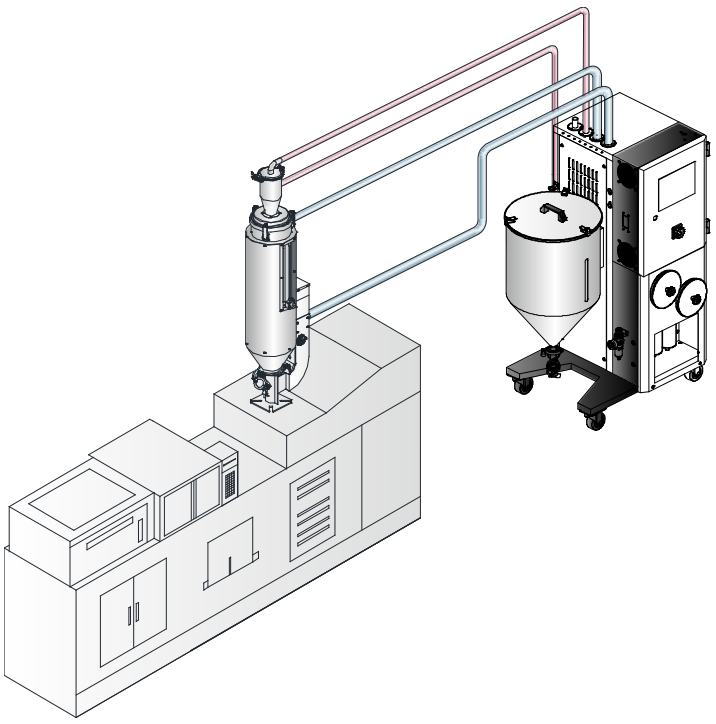


Fig. 3-1：Installation Space

3.2 Power Connectors

1) Make sure voltage and frequency of the power source comply with those indicated on the manufacturer nameplate, which is attached to the machine.
2) Power cable and earth connections should conform to your local regulations.
3) Use independent power cable and ON/OFF switch. The cable's size should not smaller than those wired in the electrical requirement of control panel.
4) The power cable connection terminals should be tightened securely.
5) The machine requires a 3-phase 4-wire power source, connect the power lead (L1, L2, L3) to the live wires, and the earth (PE) to the ground.
6) Power supply requirements:
   Main power voltage: ± 5%
   Main power frequency: ± 2%
7) Refer to the electrical wiring diagram to complete the electrical installation.

3.3 Installation Diagram



Pic. 3-2：Installation Diagram

3.4 Compressed Air Connection

Table 3-1：Compressed Air Specification

Item	Range	Remark
Quality level	335	According to standard GB / T 13277-1991, the concentration of solid particle is not more than 5mg / m3, the dew point temperature is about - 20 ℃, and the oil content is not more than 25mg /m^3.
Air source pressure (bar)	6~10	--
Air flow (L/min)	180~300	--
Pipe size	PM20	quick connector

4. Application and Operation

4.1 System Initialization Screen

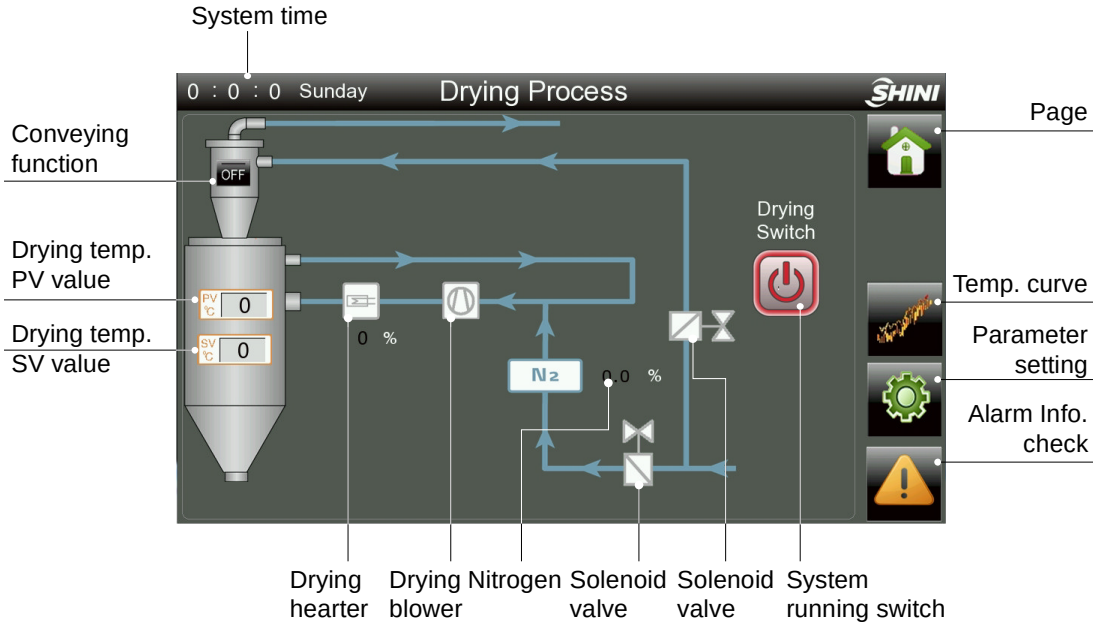
After the system is powered on, the touch screen displays the initial screen, as shown in the picture below:

Touch the <English> or <Chinese> button at the screen bottom to select the English or Chinese screen, and then enter the drying monitoring screen.

Picture 4-1：System Initial Screen

4.2 Drying Monitoring

The drying monitoring screen is as shown in the Picture below:



Picture 4-2：Machine Running Monitoring Screen

4.2.1 Opening System

Touch the < Running Switch > to make it display ON state, and the system is put into operation.

4.2.2 Shut down the system

Click the <running switch >again to make it display the OFF status, and the system stops running.

Note: After the system shutdown, the drying blower requires a delayed shutdown cooling time, which is generally set as 3 mins.

4.2.3 Set the Drying Temperature

Touch < drying SV value > on the drying barrel, and a numeric keyboard pops up, and enter the temperature value through the keyboard.

4.2.4 Conveying Monitor

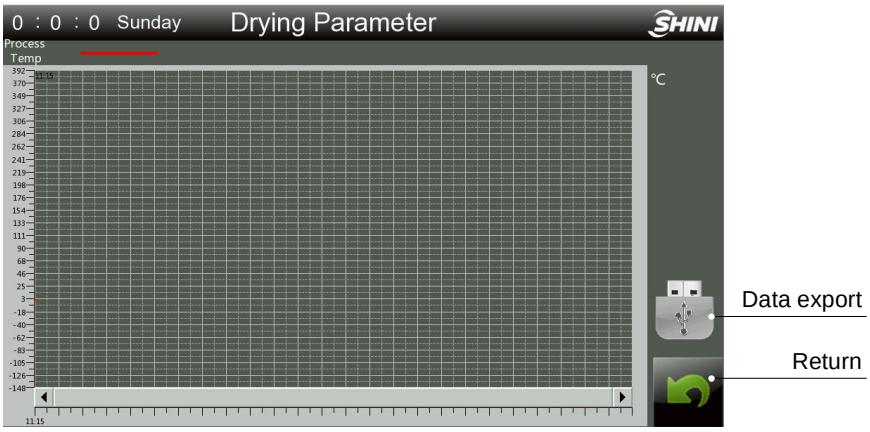
Click the < Conveying Function > switch in the middle of the hopper to make it display ON state. At this time, the conveying function is turned on. As long as the system detects the hopper shortage, the system will start to convey immediately; Under the ON state, click the <ON/OFF> switch again to turn off the conveying function.

Attention!

The drying temperature has the maximum and minimum setting values, and the drying temperature has been set to 160 ℃ at the factory. Please don't reset it if no special occasion!

4.3 Temperature Curve Monitoring

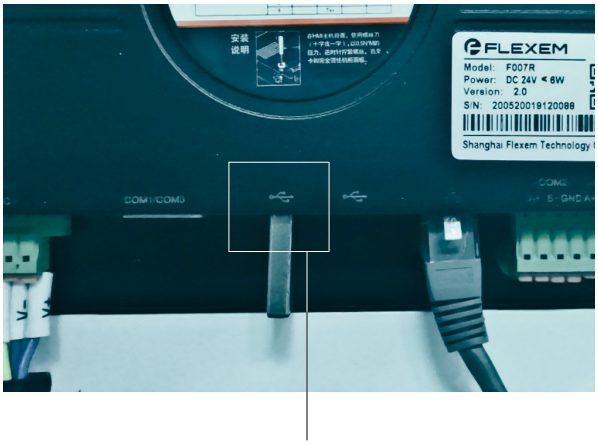
Touch the <Temp. Curve> button in the drying monitoring screen to enter the temperature variation trend screen, as shown in the figure below:



Picture 4-3：Temperature Curve

4.3.1 Data Export Steps

Click the < Data Export > button to export the temperature data to the USB disk.



Attention!

1) The data export takes 5 ~ 10s.

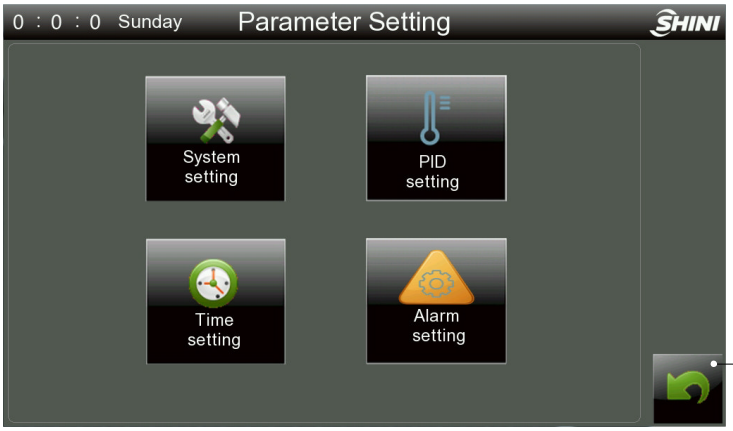
2) To prevent data loss, it’s forbidden to plug and unplug the USB disk during data export.

4.4 Parameter Setting

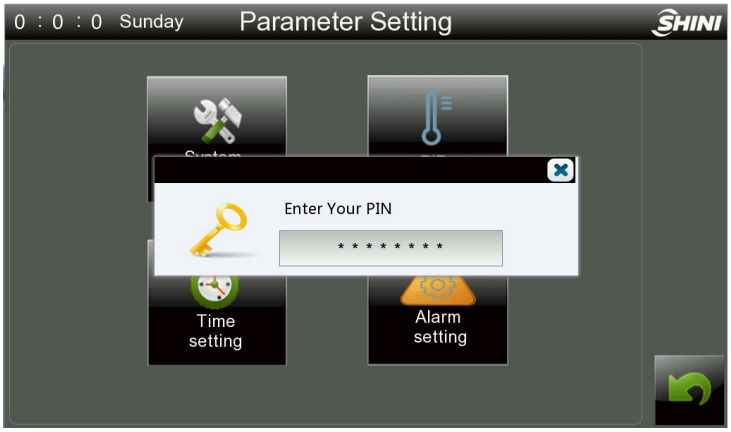
Touch <Setting Button > on the “Drying Monitoring” interface to enter the parameter setting screen. When setting relevant parameters, it needs to enter the

password to determine whether the user is qualified ((Operator: 3588, Administrator: 3333).

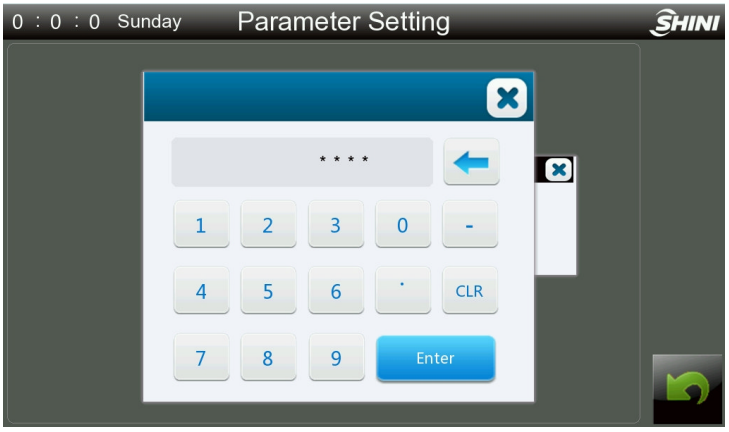
It's unavailable to enter the screen when the password is wrong, and the system will pop up the password box to let the user input the password again. Click to return to the drying monitoring interface.



Picture 4-4：Parameter Setting



Picture 4-5：Password Input

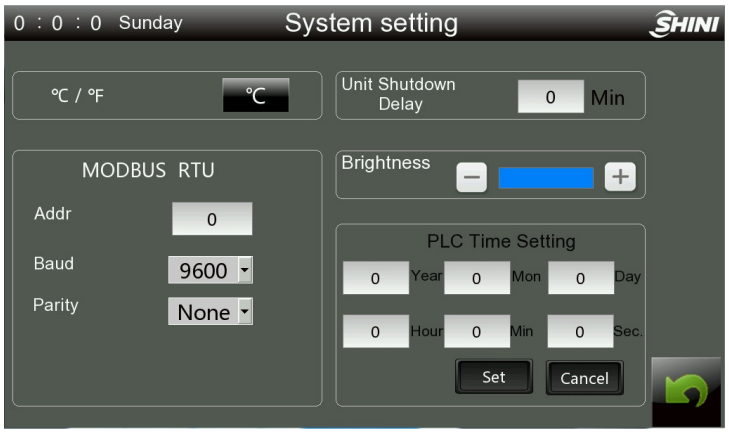


Picture 4-6：Password Keyboard

4.4.1 System Setting

Click the <system setting> button in the parameter setting screen to enter the screen, which can set:

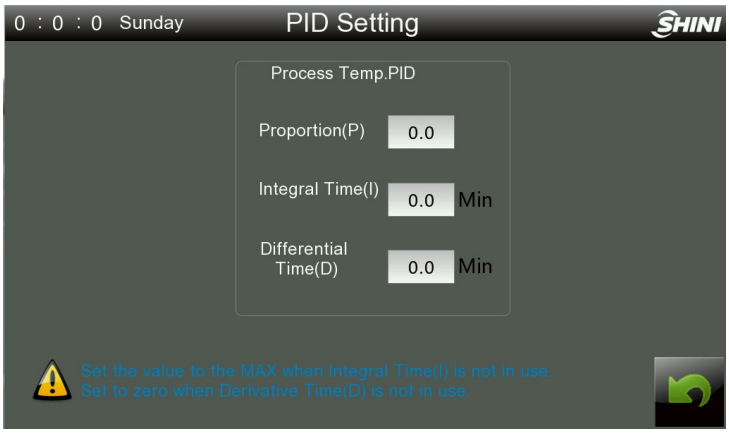
1) System delay stop time: the default min. time is three mins., if the input value is less than three mins., the system will prompt the user to enter the value again.
2) PLC system time
3) Temperature conversion between ℃ and ℉;
4) Adjust the brightness of the touch screen
5) Modbus Rtu comm. parameter：
   (a)Station address：1-247
   (b) Baud rate：9600/19200
   (c) Parity check: no parity, odd parity, even parity



Picture 4-7：System Parameter Setting 1

4.4.2 PID Setting

Click the <PID> button in the parameter setting screen, and the system will pop up the PID temp. control parameter screen as shown in the picture below.

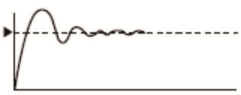
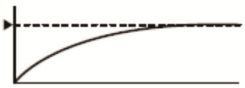


Picture 4-8：PID Parameter Setting

When the temperature control is incorrect, the user can adjust the P.I.D temperature control parameters by manual to achieve the best control effect.

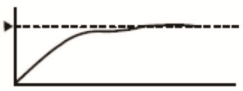
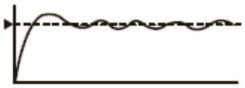
Adjustment of Proportion (P)

Table 4-1：Adjustment of Proportion

P increases		After the oscillation, the curve will be settled and back to setup point.
P decrease		The curve increases gradually in order to maintain a long reliable period against over oscillation.

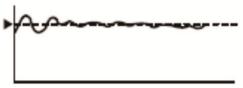
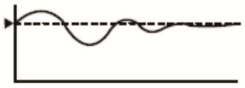
Adjustment of Integral Time (I)

Table 4-2：Adjustment of Integral Time

I increases		For default value requires a longer time for steady status. But, it still has over pulse/under pulse and oscillation occurs.
I decrease		After the occurrence of over pulse/under pulse and oscillation, but the curve tends to rise rapidly.

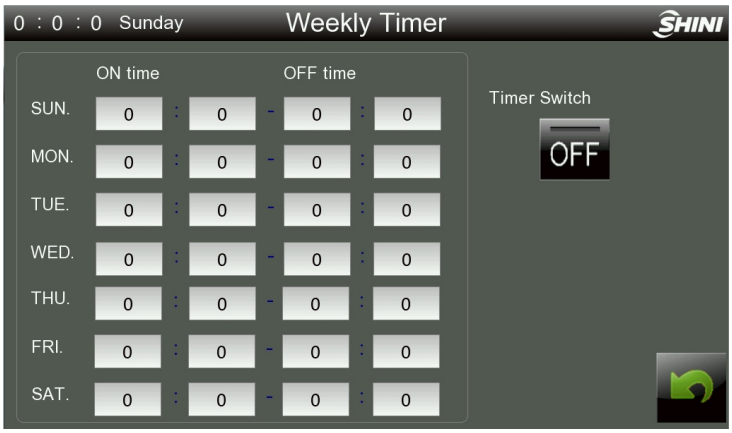
Adjustment of Differential Time (D)

Table 4-3：Adjustment of Differential Time

D increases		Over pulse/under pulse and steady time become less, but the curve has small oscillation.
D decrease		Over pulse/under pulse increases, the duration for setup value requires certain time.

4.4.3 One-week Timer Setting Screen

Touch the <One-week Timer> button on the parameter setting menu to enter the timer parameter setting screen as shown in picture below:



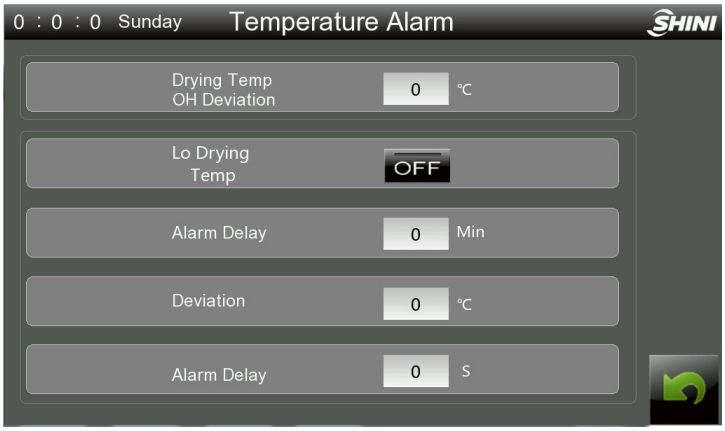
Picture 4-9：One-week Timer Setting

Prompt：

After setting the auto-run time, pressing button "OFF" to activate one week timer.

4.4.4 System Alarm Setting

Click the <alarm setting> button in the parameter setting interface to enter the alarm setting, and then click to <return> to the parameter setting interface.



Picture 4-10：System Alarm Setting

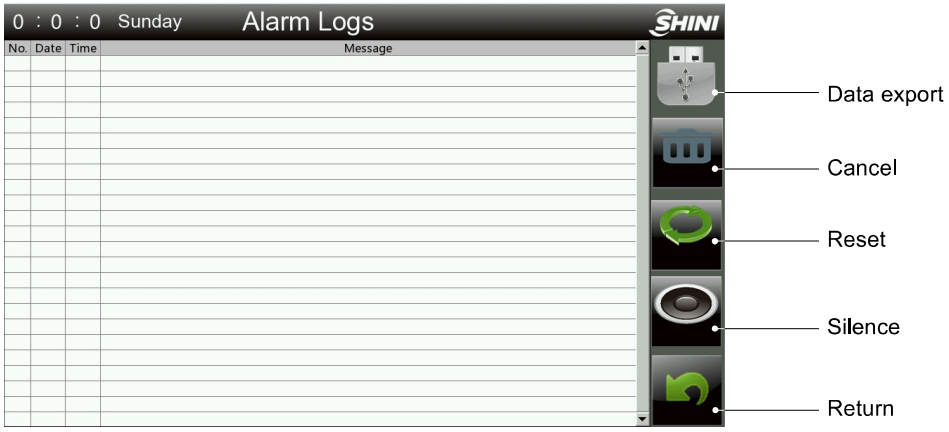
Overheat deviation: Input the overheat deviation value (Default value is 15 ℃). In system running process, when it detects the PV value (drying or regeneration) exceeds the SV value (drying or regeneration) + overheat deviation value, the system will send out overheat alarm immediately.

Failure alarm function principle: Turn on the low temp. alarm switch, and input the heating failure alarm delay time. Within the heating failure alarm delay time, if the control temp. PV value can't reach - 5 ℃ of the set SV value, the system will send out the heating failure alarm, which will not release the alarm until the control temp. PV value reaches or even exceeds - 5 ℃ of the set SV value;

Low temp. alarm: Input the low-temp. deviation value (Default value is 15 ℃) and input the low-temp. alarm delay time (Default value is 60s). After running the system and the PV value rises to SV value, if the system detects that the PV value (drying or regeneration) is lower than the SV value - low temp.deviation value, and lasts the low temp. alarm delay time, it will send out low temp.alarm. When the system detects that PV value (drying or regeneration) is greater than the SV value - low temp. deviation value, the system will cancel the low temp. alarm.

4.5 Alarms Fault Records

Touch the <Alarm Fault Records> button at the bottom of the dehumidification and drying monitoring screen or conveying monitoring screen to enter the alarm fault record screen, which is shown as below:



Picture 4-11：Alarm Fault Record

Click the < Data Export > button to export the data to USB disk.

Attention!

It takes 5-10S to export the data.

In order to prevent data loss, it's forbidden to plug out the U disk when exporting the data.

1) When the aarm fault records exceed the display range, you can check all the alarm information by click the scroll down and up keys.
2) According to the displayed alarm information, check the troubleshooting methods of the faults to solve the troubles.
3) Press the <Return> button to exit the alarm fault record screen.
4) Press the < Reset > button to dismiss the alarm and reset to the normal state.

Table 4-4：Alarm Information List

Alert Message	Results	Possible Causes
Drying blower overload	The drying stops and the red alarm light flickers.	Low voltage, blower fault, thermal overload relay setting current is wrong.
Drying overheat	The drying stops and the red alarm light flickers.	Temp. control parameter setting error, contactor conglutinated, drying thermocouple failure, and drying blower failure.
Drying blower contactor conglutinated	The drying stops and the red alarm light flickers.	Contactor mechanical failure or bad contact
Drying EGO overheat	The drying stops and the red alarm light flickers.	EGO set value is too small or the circuit has wrong connection.
Drying thermocouple broken	The drying stops and the red alarm light flickers.	Thermocouple disconnected or bad contact, thermocouple polarity is reversely connected.

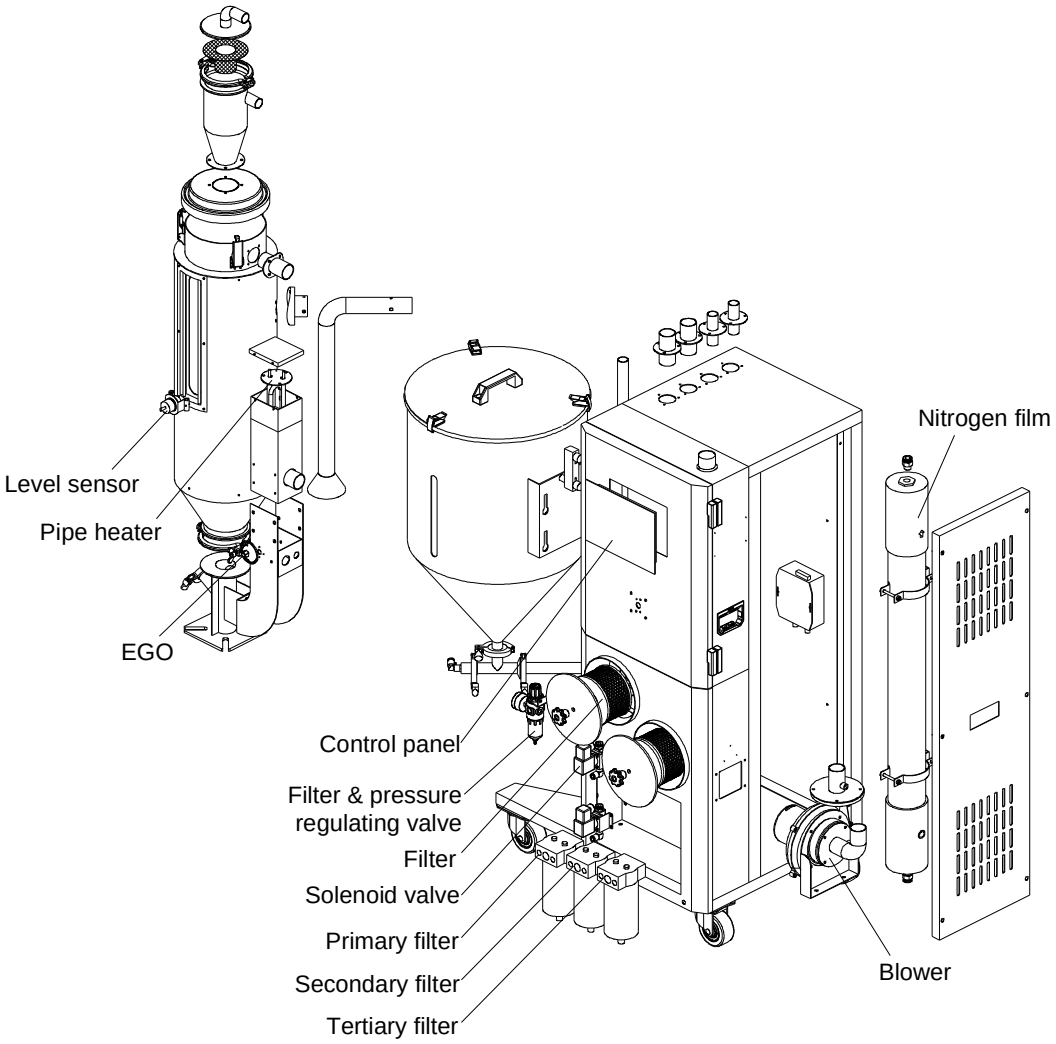
5. Trouble-shooting

Table 5-1：Trouble-shooting

Symptom	Possible causes	Actions taken
After the main power switch is turned on, the power indicator doesn't light on.	1. Power off	1. Power on
	2. The main power switch is broken	2.Replace the power switch
	3. Power line fault	3. Check the power circuit
	4. Control circuit safety device failure	4. Replace the safety device after checking the circuit
	5. Control transformer broken	5. Replace the transformer
The heater overheat alarm light is on, and the buzzer gives the alarm. The system stops working.	1. Thermostat parameter setting error.	1. Set the temperature controller parameters correctly
	2. Poor temperature test	2. Replace the thermocouple
	3. Heater main contactor's contact conglutinated.	3. Check / replace the heater contactor
Large temp. control deviation.	1. The start time is too short.	1. Wait for a while
	2. The temp. controller parameter setting is improper.	2. Check thermostat parameters and reset the improper parameters.
The heater temp.can't rise.	1. The temp. setting is too high.	1. Set the temperature below 140 ℃
	2. The heater contactor is damaged.	2. Replace the contactor
	3. The pip heater is broken	3. Replace the pipe heater
	4.Thermocouple fault r	4. Replace the thermocouple
	5. Controller output fault	5. Replace / repair the controller
	6.Drying blower fault	6.Maintain the drying blower
Once the main power switch is turned on, the circuit breaker will trip.	1. Main circuit is short circuit	1. Find the circuit.
	2. Transformer short circuit or grounding	2. Replace the circuit breaker
	3. Bad circuit breaker	3. Replace the circuit breaker
Once the system switch opens, the circuit breaker will trip.	1. Blower motor coil short circuit or bad contact	1. Check the blower motor
	2. Bad circuit breaker	2. Replace the circuit breaker
The nitrogen concentration is low.	1.Compressed air disconnected or insufficient pressure	1.Check whether the compressed air is connected and the air pressure is sufficient

	2.The nitrogen solenoid valve is closed during feeding	2. Check whether the drying hopper has material shortage.
	3. Solenoid valve fault	3.Replace the solenoid valve
	4.The filter has is used for too long	4.Replace the filter unit
Unable to convey the materials	1.Compressed air disconnected or insufficient pressure	1.Check whether the compressed air is connected and the air pressure is sufficient.
	2.Storage hopper short of materials	2.Replenish the storage hopper
	3. Solenoid valve fault	3.Replace the solenoid valve
	4.Level sensor fault	5.Check / replace the level sensor

6. Maintenance and Repair



Pic. 6-1：Maintenance and Repair Drawing

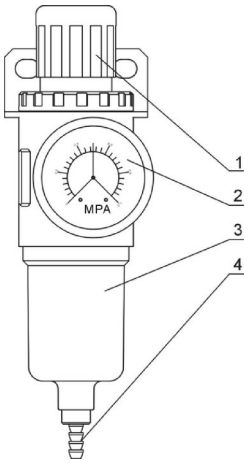
Attention!

1) Confirm whether the level switch can detect the material level normally every day. Methods: Observe whether the switch can send out the action signal correctly when the material level reaches the switch position.
2) Conform whether the connecting pipe is loose, air leaked weekly.
3) Confirm whether the bolts, nuts, etc. are loose monthly.

4) Confirm whether the temperature display on the control panel is normal daily.
5) When the drying temperature can't reach the set value, confirm whether the pipe heater is damaged. If it is damaged, change the pipe heater monthly.
6) Confirm whether EGO is normal daily.
7) Confirm whether the filter & pressure regulating valve is normal, and conduct spot inspection weekly.
8) Clean the filter daily. Method: Loosen the nut, remove the filter, spray it from the filter's inner ring the outer ring with an air gun, and check whether the seal ring is broken. The service life of the filter is 4~12 months.
9) Confirm whether the solenoid valve is normal and check it weekly.
The replacement cycle of primary filter and secondary filter is one year, and that of tertiary filter is three years. The replacement cycle can be shortened according to the compressed gas's cleanliness.
10) Clean the blower.
11) Clean the dust inside and outside the blower monthly;
12) Replace the bearing, oil seal and silencer regularly according to the service environment;
13) Replace the blade, shell and metal mesh to improve the service environment, and replace them regularly.
14) The service life of nitrogen film is 5 ~ 10 years.

6.1 Filter & Pressure Regulating Valve

6.1.1 Filter & Pressure Regulating Valve Drawing



Parts list：

1. Pressure adjusting knob　　2. Pressure gauge　　3. Cup　　4. Water outlet

Pic. 6-2：Filter & Pressure Regulating Valve Drawing

6.1.2 Filter & Pressure Regulating Valve Operation steps

1) Switch on the air source.
2) Pull the black pressure adjusting knob 1 upward and rotate it, observe the pressure gauge 2, generally a 0.5 Mpa pressure is advisable.
3) Push back the black knob 1.

6.2 Filter

Please periodically clean the dust on the air filters, once per week.

Cleaning steps：

1) Take out the air filter carefully.
2) Blow off the dust on the air filter screen and the cover with pressure air.
3) Wipe off the barrel wall of air filter with dishcloth.
4) After cleaning, place all parts in reversed order carefully.

Note: Don't let foreign object enter into the barrel, when taking out the air filter.

6.3 Maintenance Shedule

6.3.1 General Machine Information

Model _____ SN _____ Manufacture date _____

Voltage_____Φ_____V Frequency _____ Hz Power _____ kW

6.3.2 Check after Installation

☐Check that the pipes are connected correctly.

☐Check that the material clearance door is firmly closed.

☐Check whether the welded joint has cracks.

Electrical Installation

☐Voltage: _____ V _____ Hz

☐Fuse melt current：1 Phase _____A

☐Check the phase frequency of power supply.

6.3.3 Daily Checking

☐Check the switch of the machine.

☐Check all the electrical wires.

6.3.4 Weekly Checking

☐Check if there are loose electrical connections.

6.3.5 Monthly Checking

☐Check the timing start-up function of the machine.