



LX-series  
centrifugal spray granulation dryer

# Operation Instruction

**Wuxi Tianyang Drying Equipment Machinery Co., Ltd**



## LX centrifugal Spray granulation dryer

### I . Overview

On the basis of introducing foreign advanced drying technology, our company work hand in hand with many scientific research institutions and it develops independently, learns wildly from other's strong points, work hard through innovations in a pioneering spirit and develops & produces various types of domestic advanced spray granulation dryer equipments.

LX series centrifugal spray granulation dryers manufactured by our company are applicable to centrifugal granulation of special materials including those of porcelain industry, chemical engineering, dyeing agent, biology, medicine, ferrite and metallurgical powder etc. It is required that the granularity distribution can be randomly adjusted to the best distribution curve value and the main technical performance indexes achieve world advanced levels. The characteristic is that it can produce globular products with better fluidity, it has excellent granule quality distribution and it can randaomly adjust average product granule diameter.

### II . Working principle

1. The working principle is as follows: air is heated and then passes through the high temperature filter so as to assure that the air entering the tower body is clean hot air. Then the air passes through the hot air distributor on top of the drying chamber, the hot air which has passed the hot air distributor enters the drying chamber evenly and rotates in spiral form. In the meantime, the air sends the feed liquid to the centrifugal spray head. The feed liquid is sprayed to globular fog drop and this makes the contact area between feed liquid and hot air remarkably increase. The water rapidly evaporates and it is dried into finished product in extremely short period. The coarse finished product is recycled with the recycle bin at bottom of the drying chamber. The fine finished product passes to cyclone separator through the pipe installed at cone bottom and then it is recycled with recycle bin at bottom of the cyclone separator. The waste gas is discharged through the dust precipitator.
2. The flow chart of centrifugal spray granulation is as follows:

### III. Advantages of centrifugal granulation

Because LX centrifugal spray granulator has different spray form with YT seies pressure spray granulator, the drying result is also different. Because the material dried with YT series machine has a shrinkage hole in the middle, it assumes the shape of hollow apple, the yield is higher than that of LX granulator during pressing and sintering process. However, material dried with LX series machine assumes spherical shape, the uniformities of its fluidity, loose



specific weight and granularity are all much better than those of YT series dryer, this is extremely remarkable in special porcelain industries such as precision porcelain etc. Furthermore, because the complete appliance height of LX series machine is much lower than that of YT series machine, relative equipment manufacturing cost is lower, energy consumption is low, it is convenient to operate, in addition, it is convenient to transport and install.

#### IV. Structural description:

Depending on different heat sources that are selected by the users, generally including electric energy, vapor, natural gas, coal gas, flue gas, coal and oil etc., there are different heating furnace control forms, as for the detailed situations, please refer to the operation instruction of this type.

1. Heater:

The installation material at air inlet of the heater uses stainless steel fine filament to form a velvet mass or filter fabric, the air filter removes impurities from the air.

2. Hot air distributor:

The hot air enters the distributor along tangential direction through the spiral housing, the hot air enters the spray tower evenly & helically and fully conduct heat and material exchange with the fog drops to make the fog drops dried into particles.

3. Centrifugal spray nozzle:

The centrifugal spray nozzle is driven by motor belt, the motor drives the atomization disc, the lubrication of gear and bearing is supplied by injection from gear pump.

The feed liquid is transmitted to the feed pipe of the centrifugal spray nozzle, then it enters centrifugal disc evenly & continuously through feed liquid distributor and it is thrown away in high speed to form fog drops. In the meantime, the machine sprays the lique into even size fog drops with the action of friction and resistance from peripheral air.

4. Drying chamber:

The drying chamber consists of outer cylinder body, skeleton and inner cylinder body, the part between the outer cylinder body and inner cylinder body is the skeleton, other space is filled with super-fine glass wool to conduct heat preservation, the thickness of heat preservation layer is 55mm. In order to separate coarse and fine powder, the air outlet pipe is exported from the middle part of the cone, the recycled material at cone bottom is coarse granule powder and the recycled material through the cyclone separator is fine powder. The hot air inlet & outlet of the drying chamber are separately installed with hot resistances for measuring the temperature. The temperature indicator is installed on electric operation cabinet, illuminating lamp and observation window are installed for convenience of observing spray situation. A door is opened in drying cabinet for convenience of cleaning.

5. Cyclone separator:



It separates the particles included in the discharged gas, the recycled particles drop into the particle collecting cylinder, the waste gas moves from separator to the centrifugal fan. Butterfly valve is installed in lower part of the cyclone separator, the butterfly valve is opened during operation and it is closed while changing the particle collecting cylinder. Big machines are installed with star form discharging valve for convenience of material discharging.

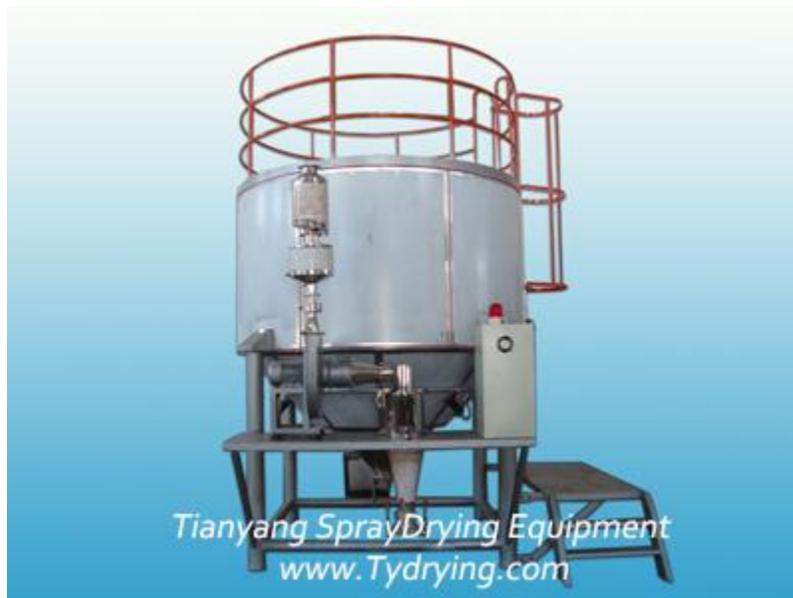
6. Centrifugal fan and regulating butterfly valve:

The centrifugal fan should be selected according to machine type and size, the fan air volume should be adjusted with butterfly valve installed at the air outlet. Pay attention not to close the butterfly valve tightly, otherwise the heater and air inlet pipe will be damaged.

7. Dust precipitator:

In order to assure that exhaust emission conforms to environmental protection requirements, dust precipitator should be used to purify the air and avoid pollution. This item is ordered by the option of users themselves.

The dust precipitator system is classified into wet type and bag type. In case of Venturi wet dust precipitator, it should be installed in the rear of fan, then eliminate flower dust in the exhaust gas with tap water or pump spray mist. The waste water flows back to waste water tank, the waste water tank separates powder lot through precipitation, the water is repumped with pump to purify the exhaust gas, the waste water tank reuse the powder lot after treatment. In case of bag dust precipitator, it should be installed between the cyclone separator and the fan, the exhaust gas is filtered through the silk hole of bag. When the machine is just started, you should feed slowly to prevent the bag from being bemoisted and silk hole from being blocked. In the meantime, you should clean frequently, removed dust on the bag to assure good ventilation and assure normal discharge of the exhaust gas without being blocked.





## V. Installation of centrifugal spray dryer

The terrace for installing the centrifugal spray dryer should be calibrated to horizontal status. The periphery should reserve drainage tray. Place the drying chamber on the required location and install ladder, air pipe, cyclone separator, heating device and collector according to the equipment installation drawing.

Connect the power source according to the electric circuit diagram, place the electric cabinet to position convenient for operation. In order to assure safe production, you should install the earth wire while installing the machine. Outlet of the centrifugal fan should be equipped with pipes equipped by the factor, the air outlet should be drawn outdoors to prevent air inside workshop from being bemoisted. Thus evaporation efficiency of the dryer can be increased and workshop noise can be reduced.

## VI. Operation of centrifugal spray dryer

In order to assure quality of the products, the equipment should be fully cleaned before use, in addition, it should be determined whether to conduct sterilization according to product requirements.

The following check should be carried out before the equipment is started:

1. The connection between the heater and air inlet pipe, connection between the air outlet pipe & drying chamber and connection between the air outlet pipe & cyclone separator should be checked. You should tighten the sealing material and clamp it tightly to prevent the unheated air from being sucked into the dryer.
2. The sealing material of drying chamber door should be packed, in addition, you should check whether it is tightly closed.
3. While installing material collector in lower part of the cyclone separator and at bottom of the drying chamber, you should first check whether the sealing ring has dropped off. You should tighten the particle collecting cylinder only after installing the sealing ring, the particle collecting cylinder should be clean and dry. While installing the dust discharging valve, you should check whether the connection in lower part of the dust discharging valve and cyclone separator is intact and whether it is tightly clamped.
4. Whether the centrifugal fan rotation direction is corect and whetherthe rotation is normal.
5. Whether the centrifugal fan adjusting butterfly valve is opened. Do not close the butterfly valve, otherwise the heater and air inlet pipe will be damaged, you should pay full attention to this point.



## VII. Operation

First start centrifugal fan, then begin to heat according to operation instruction of the heating furnace, in addition, check whether electricity leakage occurs. If it is normal, then carry out preheating of cylinder body. Because the hot air temperature determines evaporation capacity of the drying equipment, you should make best effort to increase the air inlet temperature.

When the outlet temperature of the drying chamber achieves predetermined outlet temperature, push the oil supply pump and spray nozzle operation button to make them operate. First add water to make the outlet temperature kept to required temperature. Then add the material. The charge volume should increase from low to high until the air discharge temperature achieves the requirement, you should pay special attention, otherwise wall adhering will occur. Because the temperature display has delay, the liquid volume adjusting speed should be slow. The feed liquid concentration should follow the characteristic of the dried material, it should assure good fluidity.

Pay attention: you must spray water to the feed liquid apt to cohesion while heating. On one hand, this can stabilize the outlet temperature, on the other hand, this can cool down the spray disk to avoid coking and blocking of nozzle, in addition, the evaporation capacity has also close relationship with the characteristics of the material.

The temperature and humidity of finished dried product are determined by air discharge temperature. During operation process, it is extremely important to keep the air discharge temperature constant. This depends on feed volume, the outlet temperature is generally constant after the feed volume is adjusted. However, if the solid content or viscosity of the feed liquid changes, it will affect the air discharge temperature.

If the required product humidity is too high, you can reduce the liquid feed volume to increase the air discharge temperature, if the product humidity is too low, you should operate reversely, you can increase liquid volume for heat sensitive material which has low required product temperature to reduce the air discharge temperature. But the product temperature will increase.

The finished dried products are collected into the material collecting cylinder. You should replace the cylinder before it is full. You should turn off the wind gear while replacing the material collecting cylinder.

In case of drying humidity absorbing products, the cyclone separator and air discharging pipe should be packed with heat insulating materials, this is necessary for avoiding the moisture regain of the dried particles.

In case that Venturi Wet dust precipitator is selected, pump or tap water spray is started immediately after the normal material spraying. In case that bag dust precipitator is selected,



you should check whether leakage occurs around. You should remove the leakage if it occurs, in addition, you should check whether the mechanical vibrational mechanism is safe and reliable and whether the action is sensitive.

## Machine stop:

When the material machining will soon complete, you should turn off the wind gear, detach the material collecting cylinder and then replace into an empty one. Then open the wind gear and fill in clear water into the feed cylinder (you had betterfully fill the feed cylinder with liquid). In the meantime, you should adjust the water volume entering centrifugal nozzle(the flow adjusting valve opening should be adjusted slightly smaller than the original one) to make the outlet temperature constant.This point is very important, otherwise the humidity remained in the drying room will change.

In order to initially clean the atomization disk and feed pipe,you should clean the atomization disk and feed pipe, spray with water and operate for about 10 minutes, then turn off the heater.Then slowly stop the water supply according to air discharge temperature.Open the drying chamber door, clean the accumulated particles on drying door wall & bottom and around the spray nozzle. When all the finished products are taken out from the drying chamber, you should turn off the fan and take out the parts to clean with the centrifugal nozzle.

If accidents occur during operation of the equipment and you must stop the machine to check, you should stop filling of the feed liquid and rapidly turn off the heater and spray nozzle.

In order to produce fine quality products, equipment cleaning is an important link, especially the materials apt to pollution used in production of dairy products and medicines etc. need regular cleaning. The cleaning frequency and thoroughness should be determined according to the following factors:

1. Product category and product changing situation
2. Daily production time period
3. Feed liquid concentration and hot air temperature
- 4.Situations occring during service of equipment ( whether there is wall adhesion or coking phenomenon)
5. In case that the equipment idles for a long period or it changes into different product, it is necessary to conduct thorough cleaning.

## Cleaning items:

### 1. Daily cleaning

Clean or sterilize all locations contacting with the material, for example, charging cylinder, feeding cylinder, feed liquid distributor of the centrifugal nozzle and centrifugal spray disk.



Clean the locations contacting with finished products, such as drying chamber, discharging pipe cyclone distributor etc.

## 2. Thorough cleaning

Apart from thorough cleaning to the above items, it is necessary to conduct cleaning to the air filter and centrifugal fan.

## Cleaning method:

1. Dry cleaning——use various kinds of brushes, brooms and dust precipitator to clean.
2. Wet cleaning——clean with 60~80°C hot water
3. Chemical cleaning——clean(rinse) with alkali liquids, acid liquids or various kinds of detergents

Acid rinsing: prepare nitric acid solution ( $\text{HNO}_3$ ) with 1~2% concentration, heat to below 65 degree and conduct rinsing, then clean with clear water.

Alkali rinsing: prepare sodium hydroxide ( $\text{NaOH}$ ) with 0.5~1% concentration, heat to 60~80 degree and conduct rinsing, then clean with clear water.

After completing wet water and chemical cleaning, you should seal the entire equipment, then sterilize the whole system for about 30 minutes through hot air.

Pay attention that this equipment should not be cleaned with chlorine and its compounds.

The clean of air filter should be determined according to the quality of peripheral environment. In case of high dust content in the air, cleaning should be carried out once every 3~6 weeks (work for 8 hours everyday) . In case of high dust content in the air, cleaning should be carried out once every 6~8 weeks (work for 8 hours everyday) . As for the fine stainless steel wire, it is also laid on the air filter frame after being cleaning with alkaline rinsing method.

## VIII. Maintenance of centrifugal nozzle

The centrifugal nozzle is required to work stably under high speed status, attentions should be paid to the following points in maintenance.

1. If there is noise or vibration during operation of the spray nozzle, you should stop immediately, take out the spray nozzle to check whether there is residual material inside the spray disk and you should clean immediately if there is. Check rolling bearing & bush and shaft, replace immediately in case of abnormality.
2. In order to prolong service life, you should pay special attention to cleanliness of the



lubrication oil. It is recommended to use 5# or 7# high speed machinery oil or aero high speed machinery oil (this item is applicable to engine type with above 20kg evaporation capacity) .

3. After operation is completed, you should detach the spray disk and feed liquid distributor and soak it in water, then thoroughly clean the residual material, especially for the residual material on the spray disk, if it can not be removed by clear water, you should use tools to brush it clean. Otherwise it will cause unbalance and it will seriously affect the service of the spray nozzle.
4. You should take special care while detaching and install the atomization disk, do not bend the shaft. In addition, you should control the gap between disk and housing with wad (attached part).
5. It is forbidden to horizontally place the spray nozzle. If you improperly place it, the main shaft will bend to cause unbalance of rotation and that will affect the service.



## IX. Technical parameters of various models in LX series

Item \ Model	LX						
	5	10	15	30	50	100	200
Maximum water content evaporation capacity (kg/h) (the actual water content evaporation capacity is determined by cylinder port temperature)	5	10	15	30	50	100	200
Spray form	Centrifugal granulation atomization (speed governing)						
Rotation speed (rpm)	0-12000 (adjustable)						
Heat source	Electric energy, vapor, fuel oil, coal gas, natural gas, liquid gas etc.						
Spray tower diameter (mm)	1800	2200	2400	2800	3200	3800	4400

## X. Analysis of troubles that may occur during production

During the production process, sometimes abnormality will occur, especially in case that the new equipment is initially operated, the operator is not fully acquainted with the operation and lacks control experience, it is more apt to some troubles. Now we list the possible cause and remedies as the following table for reference during operation.



Trouble	Cause analysis	Remedial measure
Water content of the product is high.	<ol style="list-style-type: none"><li>1. The air discharging temperature is too low.</li><li>2. The feed volume is too high.</li></ol>	<ol style="list-style-type: none"><li>1. Properly reduce the feed volume to increase the air discharging temperature.</li><li>2. Properly reduce the feed volume.</li></ol>
The tower is adhered with wet particles everywhere.	<ol style="list-style-type: none"><li>1. The feed volume is too high and it can not be fully evaporate.</li><li>2. The drying and heating is insufficient before starting spraying.</li><li>3. While starting the spray, the flow rate adjustment is too rapid.</li><li>4. The filled material can not form stable fine flow and this makes charge volume fluctuate.</li></ol>	<ol style="list-style-type: none"><li>1. Properly reduce the feed volume.</li><li>2. Do not spray until the air discharging temperature achieves the specified value.</li><li>3. Initially the flow rate should be low. When you adjust it to increase it, you should pay attention to delay of temperature display.</li><li>4. Clean the material pipe to avoid blockage.</li><li>5. Adjust the solid content of material to assure good fluidity.</li></ol>
Evaporation capacity decreases	<ol style="list-style-type: none"><li>1. The air volume of the whole system decreases.</li><li>2. Temperature of hot air inlet is too low.</li></ol> <p>The equipment has air leakage and that introduces cool air.</p>	<ol style="list-style-type: none"><li>1. Check whether the centrifugal fan rotation speed is normal.</li><li>2. Check whether the centrifugal fan adjusting butterfly has proper position.</li><li>3. Check whether the air filter and air heater pipes are blocked.</li><li>4. Check whether the electric net voltage is normal.</li><li>5. Check whether the electric heater is normal.</li><li>6. Check the tightness of equipment, especially connections of various components.</li></ol>
There is impurities in the product	<ol style="list-style-type: none"><li>1. The air filter effect is not good.</li><li>2. The equipment is not clean.</li></ol>	<ol style="list-style-type: none"><li>1. Change filter or reassembly.</li><li>2. Reoperate after thorough cleaning.</li></ol>
Product particle is too fine	<ol style="list-style-type: none"><li>1. Solid content of the feed liquid is too low.</li><li>2. The spray disk rotation speed is too high.</li></ol>	<ol style="list-style-type: none"><li>1. Increase solid content of the material.</li><li>2. Adjust the speed ratio of belt wheel to make the spray disk rotation speed decrease.</li></ol>
The centrifugal spray nozzle vibrates while rotating	<ol style="list-style-type: none"><li>1. There is residual material on spray disk.</li><li>2. The shaft has permanent bending and deformation.</li></ol>	<ol style="list-style-type: none"><li>1. Immediately stop the spray machine rotation.</li><li>2. Detach the spray disk to clean.</li><li>3. Replace the deforming axle.</li></ol>

Note:

1. In order to satisfy the needs of users, you can come to our company to negotiate regarding special requirements.
2. Our company has spared sample and we can provide trial spray service of product specimen to the users.
3. Our company will train the operators free of charge.



**Contact :**

Manufacturer: Wuxi Tianyang Drying Equipment Machinery Co., Ltd

Address: №1008, West Xiyu Road, Qianzhou Supporting Area, Huishan

Economic Development Zone, Wuxi City

Tel: 86-510-83389683; 86-510-83393682 013906177584

FAX: 86-510-8339706

After service: 86-510-83393682; 86-510-83397906

Zip code: 214181

Homepage: [www.tydrying.com](http://www.tydrying.com) [www.tygz.net](http://www.tygz.net)

E-mail: tydryer@126.com