

ShiCheng Oasis Mineral Equipment Manufacturing Co., LTD

High Voltage Electrostatic Separator Instruction



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High Voltage Electrostatic Separator

Operation Manual

Electric separator is a method to separate mineral materials by using the difference of their electrical properties in nature. Such as common minerals in magnetite, ilmenite, cassiterite, natural metals, etc., its electrical conductivity is relatively good; Quartz, cobaltite, feldspar, calcite, white tin ore and silicate minerals are relatively poor conductivity, so that they can use the difference in electrical properties, electricity separation.

Features:

1. Beautiful appearance, silo, hopper are all made of stainless steel, no rust, no paste, suitable for a variety of materials sorting.
2. Single-phase power supply is adopted to reduce the requirements for power supply, good safety and easy to use.
3. Adopt imported programmable controller, frequency converter and so on, so that the electrical performance of the whole machine is excellent.
4. Adopt digital display instrument, all kinds of measurement data display eye-catching and accurate.

One. Application

Φ250×200 high voltage separator is mainly used for conductor minerals and non-conductor minerals sorting, but also can replace the screening operation for the classification of the same material; And the sorting work used in grain processing and partial seed selection. At present, the main applications of high

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voltage separator are:

1) Selection of nonferrous, black and rare metal ores

For example, the separation of scheelite from cassiterite; Separation of magnetite, hematite, chromite and manganese ore; Sorting of tantalum niobite ilmenite, rutile and monazite; Gold sorting and so on.

(2) Separation of metallic minerals

For example, quartz, feldspar sorting; Separation of graphite, diamond, apatite, coal and asbestos.

(3) Production of ultra-pure iron concentrate

For example, the use of electric separation to produce high quality iron concentrate, containing more than 66% Fe, containing SiO₂ less than 3%, which has advantages in reducing coke ratio, saving energy and reducing costs.

(4) Sorting of various materials: it can be graded according to the shape and particle size of materials.

(5) Separation of broken metal powder, fine particles and other insulating materials.

(6) Remove non-ferrous metals from plastics.

(7) Recycling copper, aluminum and other useful metals from municipal solid waste.

(8) Seed selection of grains and other grains to remove impure hybrids.

(9) tea separation.

The corona electric field plays a very important role in the large-scale application of electric separation in various fields, which is higher than the previous electrostatic separation efficiency. At present, the high voltage electric field produced by our company can reach 60KV. At the same time, the electric separation method is more environmentally friendly and pollution-free than other separation methods, which provides a broader development field for the application of material separation.

Two. Working principle

1. When the material is brought to the corona electrode and the high voltage electric field under the action of polarization by the rotating drum, the material is subjected to various electric forces (including coulomb force, non-uniform electric field force and interface suction) centrifugal force and gravity. Due to the different electrical properties of various materials, these electric and mechanical forces make them fall in different trajectories, so as to achieve the purpose of sorting.

2. The stress of conductor and non-conductor materials under the action of high voltage electric field is as

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follows: After absorbing charge in the electric field, the conductor material can transfer quickly, and fall from the front along the direction of drum rotation under the action of centrifugal force and gravity. Due to its poor conductivity, the non-conductor material cannot transfer quickly after absorbing charge from the high voltage electric field, thus generating interfacial suction with the drum surface. The interfacial suction is greater than the resultant force of centrifugal force and gravity. So the material tight suction and drum until turned to the rear, with a brush forced brush, and between the conductor and non-conductor material is in the middle of the belt, that is, the so-called neutral material, this is the basic principle of electric selection.

Three. Basic Parameters and Size

1. Drum diameter x length	$\Phi 250 \times 200\text{mm}$	
2. Drum Speed	0~280r/min(Stepless)	
3. Corona electrode: filament diameter x number	0.2mm \times 1~5 pcs	
4. Static electrode: diameter x number	$\Phi 30\text{mm} \times 1$ pcs	
5. Electrode adjustment: radial movement	60mm	
	Circumferential Angle	45°
6. Brush: Outer diameter x roller diameter	$\Phi 105 \times \Phi 60\text{mm}$	
7. Brush speed	2 times of the drum speed	
8. Drum heat-up	50~60°C, Power: 900W	
9. Stock bin heat-up	100~300°C, Power: 900W	
10. Stock bin gate opening scale	0~20mm	
11. Feed chute Angle	0~30°	
12. Feed chute vibrator	Adjustable	
13. Processing material size	0.04~1mm	
14. Capacity	15~30Kg/h	
15. Transmission power	550W 1440r/min (JW7124 Type)	
16. High voltage power supply	1000W	

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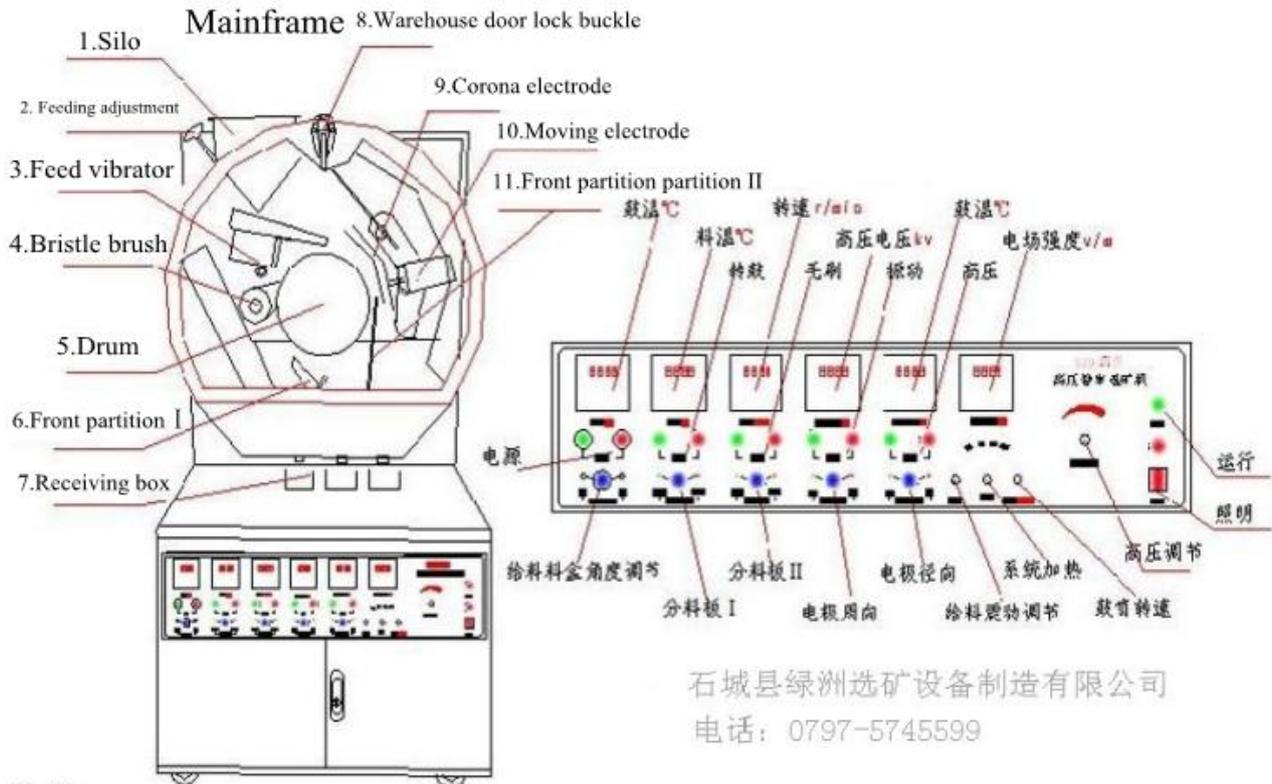
17. Maximum voltage	60KV
18. Maximum electric field intensity	650KV/M
19. Weight	400Kg
20. Dimension: L x W x H	800×850×1700mm

Four. mechanical structure overview

According to the special needs of experimental research work, the design of the machine considered to ensure the sorting effect on the basis of meeting the requirements of various experimental research, sorting process, many parameters should be able to be adjusted and compared, it is best to observe the operation in the whole process of work, but also more convenient, intuitive, The mark scale is easy to correct and can clearly see the whole process of sorting, in addition to convenient operation, beautiful appearance, generous, so the support of the drum adopts the cantilever shaft structure, plus a plexiglass safety guard, high voltage power supply and electrical part in the lower part of the machine, according to the user needs, the overall equipment design for the split structure, the appearance diagram is as follows:

(Physical picture of electric separator).





1. Silo; 2. Feeding adjustment; 3. Feed vibrator; 4. Bristle brush; 5. Drum ; 6. Front partition I ; 7. Receiving box; 8. Warehouse door lock buckle; 9. Corona electrode; 10. Moving electrode; 11. Front partition partition II

The whole machine is divided into: frame, control cabinet, rotation, electrical equipment, sorting funnel, drum electrode, brush, feeder, silo, safety cover and more than ten parts.

The bunker is equipped with SM3-220/0.3 tubular electric heating element three, the heating temperature is automatically controlled by the digital temperature indicator regulator, the maximum temperature is not more than 300°C, there is asbestos insulation layer around to improve the heat utilization rate, the amount of feed through the hand wheel 1 adjust the size of the gate opening to control, there is a pointer and scale indicating the size of the gate opening.

The feeding chute is installed on the electromagnetic vibrator. The Angle of the chute can be adjusted by controlling the automatic control button of the cabinet "feeding". The speed of the vibrator can be adjusted by the cabinet "feeding" knob.

The drum is equipped with three SM3-220/0.3 tubular electric heating elements. The surface temperature of the drum is automatically controlled by a digital intelligent temperature controller. The maximum temperature is not more than 80°C. Two-stage triangular pulley deceleration ratio is 5:14, that is, when the motor is rated at 1440r/min, the drum speed is 280r/min, according to the need to rotate the panel of the speed control knob can change the motor speed, to achieve the purpose of continuously variable speed.

Electrode using grid arc composite electrode, corona extremely $\Phi 0.2\text{mm}$ chromium wire tensioned on the arc bracket, the electrode is a brass tube with an outer diameter of 30mm, through high pressure to produce corona electric field and electrostatic field combined with the compound electric field. The whole electrode is fixed on the electrode rack with a cone sleeve. In order to ensure the correct orientation and a certain cylindrical tip on the cone shaft, the radial distance of the electrode is automatically adjusted radially by the cabinet panel, and the circumferential Angle of the electrode is adjusted automatically by the circumferential adjusting electrode on the cabinet panel. When the dust is stuck, you can rotate the hand wheel positively and negatively and adjust it after the activity.

The brush is used to force the material adsorbed on the surface of the drum in the non-conductor (tailings) hopper above the brush under the brush, in order to improve the sorting effect, the brush with wild boar coarse hair arranged in a spiral shape, the speed is 2 times that of the drum, in order to prolong the service

life of the brush and the method of operation, the brush mounted on a can swing the shell, the use of electromagnet and a swing arm when working to make the brush close to the drum, Play the role of the brush, the electromagnet will be powered off after work, the brush depends on the weight of the shell itself pendulum away from the drum, in order to reduce the loss of the brush, adjust the length of the electromagnet rod, can change the brush near the drum when the compression.

The sorting funnel is made of stainless steel, which is equipped with two adjustable sorting boards. The sorting board is a resin board with good insulation to prevent discharge. The position (Angle) of the sorting board can be adjusted through the automatic sorting board on the cabinet panel. The safety shield is the main part to ensure the high voltage safety of the whole machine, the use must pay attention to its reliable grounding with the frame, the work should be finished to open the front door for cleaning, the front door switch installed in the front of the cover above, the work must be closed after the door to the high voltage power began to work, these are adopted interlock device, to ensure safety, in order to facilitate the observation of sorting, The front door is made of clear plexiglass and is lit at the top.

Five. Electric apparatus

The electrical part of high voltage chooser mainly includes high voltage power supply, PLC control part, intelligent temperature control, overcurrent protection, and frequency converter speed control circuit. The following are explained:

(I) High-voltage power supply:

1. High voltage DC power supply is an important part of high voltage piezoelectric selector, this machine uses high voltage power supply, by high voltage transformer and a group of high voltage silicon stack, all placed in a closed tank, high voltage transformer input with autotransformer, DC high voltage negative electrode through the high voltage cable connected to the electrode, positive electrode through the milliammeter and overcurrent detection device grounding.

2. The high voltage power supply adopts the zero voltage power supply protection measures, the position sensor detects the automatic transformer slide arm position, the signal is sent to PLC, only when the automatic transformer in the zero position, the high voltage can start. In this way, the danger of undue high pressure can be avoided.

3. High voltage power supply overcurrent protection: the rated output current of the high voltage current of the machine is 18mA, can not exceed this value for a long time, so the overcurrent protection device is set in the circuit, to protect the high voltage power supply. According to the electric separator working often have the characteristics of instantaneous discharge, usually called "light" phenomenon. In the course of the experiment, due to a variety of reasons caused by instantaneous "lighting" when the high pressure overcurrent, if the "lighting" time is very short, continuous times are not much, in order to ensure the continuous sorting work, intelligent identification by PLC, the brief lighting, weak overcurrent condition does not intervene in normal work; If there is continuous ignition, strong overcurrent situation cut off the high pressure, buzzer alarm, vibration feeding stop, this state indicates that the high pressure is too high, should be appropriate to reduce the high pressure value to remove the alarm and continue to work.

(I) Intelligent temperature control:

When sorting, some materials have different thermoelectric properties, and some materials need to be heated. The surface moisture needs to be heated. Some materials can not be heated, so in the mine bucket and drum equipped with SRM3 tubular electric heating element, the use of heating selector switch and intelligent digital temperature indication regulator respectively select and achieve constant temperature automatic control, must pay attention to the use of temperature indication to meet the requirements before feeding sorting.

(II) Speed regulation part of frequency converter:

(1) Frequency conversion speed regulation part is specially used to adjust the drum speed. During the working process, the drum speed of the electric separator should be adjusted according to the different granularity of the ore. In general, the coarse grain is used at a low speed and the fine grain is used.

(2) High speed. In order to adapt to the requirements of dressing, stepless speed regulation is more ideal, it can be flexible and convenient to obtain the best speed according to the requirements of dressing. Therefore, the machine adopts the frequency converter stepless speed regulation.

Six. Use and precautions

(I) Operation process

(1) In the sorting experiment, the pole distance and inclusion Angle should be adjusted first, and then the plexiglass door should be closed. First of all, the high pressure adjustment knob to the minimum position,

drum speed control knob, feed speed control knob to zero. Turn the heating selector switch to the required position, and then plug in the power. At this time, the stop button of the general power supply, drum, brush, vibration and high voltage is in the red light, and the machine is in standby state. Press the start button of the general power supply, the green light of the general power supply is on, and each instrument is on, indicating that all parts of the whole machine are ready to start working.

Press the lighting switch, lighting daylight light, toggle heating switch, heating begins, when the temperature regulator display reaches the given temperature, the high pressure adjustment knob to the minimum, then start the high pressure button, adjust the high pressure adjustment button, adjust to the required high voltage value, then the ammeter has a reading. Start the drum, brush, press the feed start button, adjust the feed adjustment knob to the appropriate, and then open the gate of the silo to the required opening, you can carry out sorting, and finally adjust the sorting board according to the material flow situation.

(II) Parking

Close the bucket gate in sequence, stop feeding the ore, adjust the high pressure to zero, cut off the high pressure input, brush away, change the speed knob to zero, stop the motor rotation, turn off the power, and finally open the front door for cleaning.

(III) Installation instructions

The machine is a high voltage equipment, to be specially buried ground, ground resistance is required to be no more than 4 ohms, the shield and the frame connection should be connected tightly and reliably.

(IV) Precautions for operation and use

(1) When installing the equipment, pay attention to connecting the grounding device to ensure the safety of the machine and operators.

(2) The warehouse door must be carefully closed, otherwise it will alarm after starting, prompting you to close the warehouse door again. If it still alarms after closing the warehouse door, please connect the power supply or high voltage close again, then the alarm can be lifted.

(3) Insert the power plug into the 220V power socket. At this time, the red indicator light of five stop buttons on the electrical control panel of the machine will light up, indicating that the machine is in the standby state.

(4) The position of various switches and knobs should be set to the appropriate point, such as: if the material to be heated, flip the heating switch to the "drum material" file, otherwise, can be shifted to the

"drum" file; Adjust the high pressure adjusting button to zero; Speed control and twist to zero, lighting switch can be turned on or off as required, feeding dustpan amplitude adjusted to zero; Add the material to be selected in the hopper, adjust the corona pole Angle and distance to the appropriate position according to the characteristics of the material.

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(5) After the preparatory work is ready, press the power switch. At this time, the green light of the power supply will be on, and all instruments will be on.

(6) Next start the high pressure, and according to the characteristics of the material to adjust the high pressure to the appropriate value, start the drum, and according to the characteristics of the material to adjust the speed button to the appropriate value, start the brush, vibration, and adjust the feed button to the appropriate vibration value, at this time the working light, indicating that the sorting work is normal.

(7) Due to the characteristics of different materials, in the process of sorting, high voltage will appear the phenomenon of lighting, lighting serious, automatic circuit will protect, at the same time buzzer alarm, the lamp is off, pr(5) After the preparatory work is ready, press the power switch. At this time, the green light of the power supply will be on, and all instruments will be on.

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appropriate vibration value, at this time the working light, indicating that the sorting work is normal.

(7) Due to the characteristics of different materials, in the process of sorting, high voltage will appear the phenomenon of lighting, lighting serious, automatic circuit will protect, at the same time buzzer alarm, the lamp is off, prompt should be appropriate to reduce the high pressure, at this time, press the high pressure stop button, or power start button can be removed alarm, and then can continue to carry out sorting work, so after hearing the alarm, It is necessary to find out the cause, remove the fault before continuing, remember to make the high pressure is lower than before the alarm, in order to make the separation smoothly.

(8) in the sorting of different materials, we must do a good job of records, electric field pole in the electrohalo and material is very important, but also the key to find sorting, so the adjustment of high pressure is often the basis of our calculation, so the adjustment of high pressure is repeated many times, but also the process of material sorting.

(9) After use, please unplug the power plug, otherwise the machine will always be in standby state.

(10) Before using the electric separator, we must be familiar with the operation instructions before carrying out the operation.

***Spare parts**

1, high voltage electrostatic wire: ten meters

2, stainless steel receiving box: 3

3.High-power hair dryer

4. Fuse: 2 (control box)

5.Small brush: 1 piece
