Spray Booth with Electric Heating

Operation Manual

Contents (Catalogue)

Attention

Before operating the equipment, please read this manual carefully and keep it for future reference. If you encounter problems that cannot be solved independently, please contact us using the address and contact details provided at the end — we will do our best to assist you.

Our company reserves the right to change the appearance of the equipment and improve its functions and structure without prior notice to users.

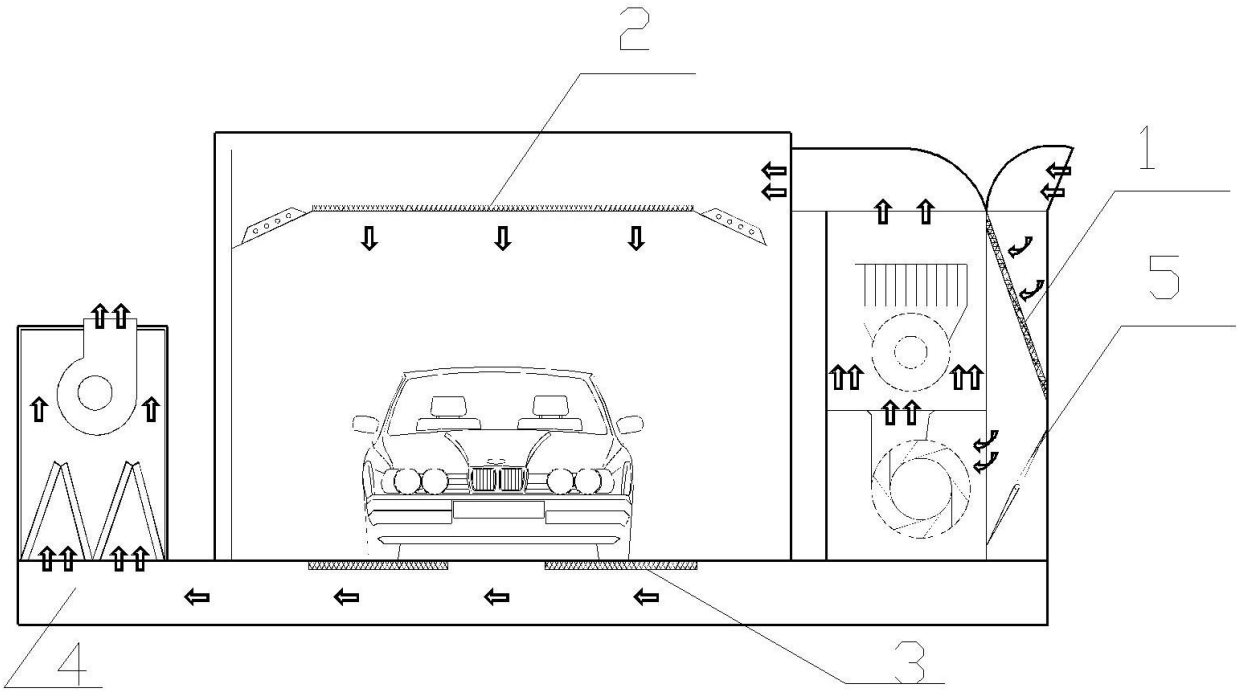
I. Working Principle

The automotive spray booth consists of a spray-drying room, an electric heating system, a control system, etc.

During painting, the intake fans draw fresh air through the air inlet section. First, the air removes large dust particles through the pre-filter (1); then the air passes through the upper part of the booth, where it is filtered again through the ceiling filter (2), after which it evenly flows downward, forming a descending “air curtain”.

Finally, paint mist and other contaminants (after painting) are filtered through the floor filter (3) and discharged outside through the underfloor base (4) and air duct. Positive pressure is constantly

maintained inside the booth to prevent dust from entering.

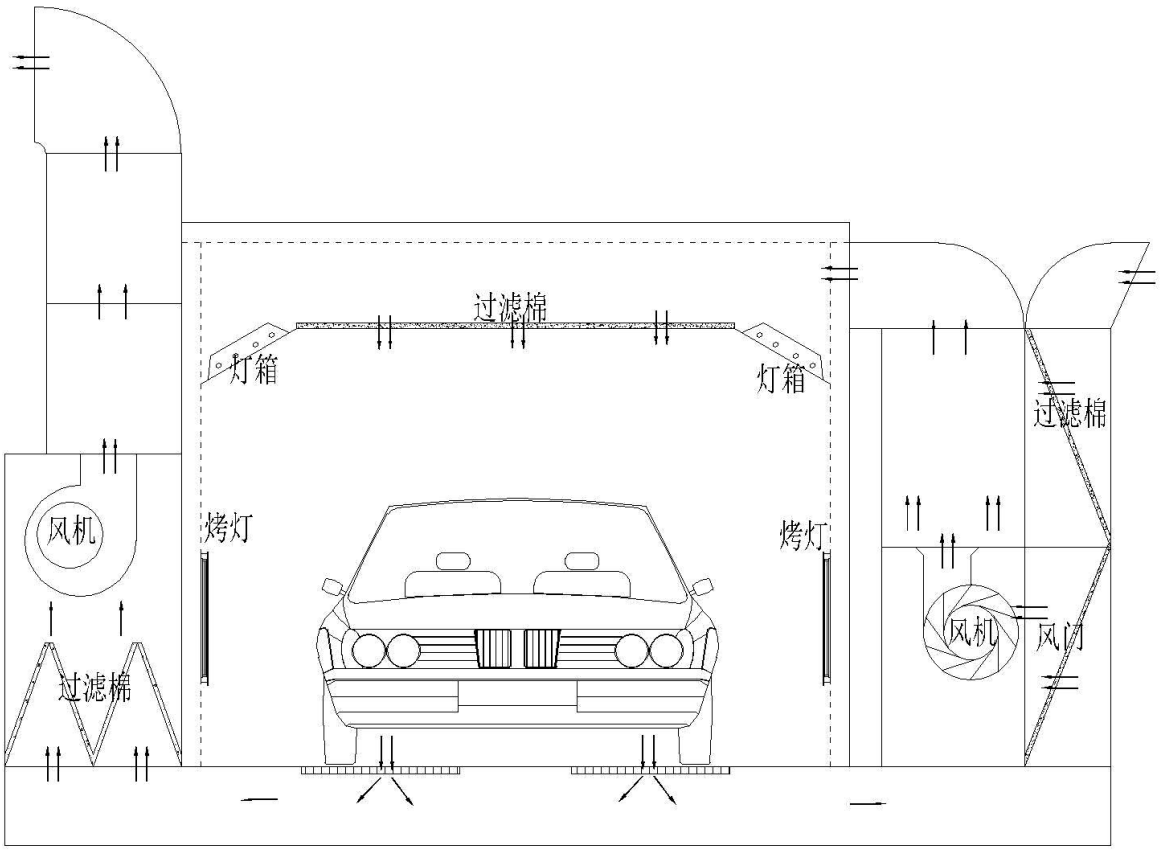


Painting at Normal Temperature:

When the temperature is lower than 20℃ (usually below 10℃), please first set the preheating temperature, turn the “Painting” switch to the “ON” position, and turn the electric heating switch “ON”.
The intake fan draws fresh air through the air inlet, removes large dust particles through the pre-filter (1); then the air passes through the upper part of the booth, is filtered again by the ceiling filter (2), evenly flows downward, and forms a descending air curtain. Please maintain the internal temperature not lower than normal.

At the end, paint mist and other contaminants (after painting) are filtered by the floor filter (3) and discharged outside through the underfloor base (4) and air duct. Positive pressure is continuously maintained inside the booth to prevent dust from entering.

During drying, the automatic electric heating system controlled by automation causes the temperature in the booth to rise continuously and rapidly. When the temperature reaches the set value, the automatic control system starts operating and maintains the set temperature until the process is completed.



II. Technical Parameters

Internal dimensions: 6900 mm × 4000 mm × 2650 mm
External dimensions: 7000 mm × 5450 mm × 3400 mm

Galvanized assembled base, height 280 mm, three rows of guide plates, two rows of grilles, 2 ramps 600 × 2000 mm (W × L).

Main door: 3-section, 3000 × 2600 mm (W × H)
Service door: 1-section, 650 × 2000 mm (W × H)

Wall panels: EPS (expanded polystyrene) with color steel cladding, thickness 50 mm, width 950 mm, tongue-and-groove connection, composite structure.

Lighting:

— ceiling lighting: 8 units × 4 pcs = 32 pcs × 36 W
— side lighting: 8 units × 2 pcs = 16 pcs × 36 W (optional)

Generator unit layout type:
upper air supply — center side, upper exhaust — rear side, square frame made of profile steel, painted steel.

Intake Fan:

A: one turbo fan or two centrifugal fans (depending on configuration)
Fan parameters:
— Air volume: 28,000 m³/h
— Power: 7.5 kW or 2 × 3 kW

B: one centrifugal fan
Fan parameters:
— Air volume: 28,000 m³/h
— Power: 7.5 kW or 5.5 kW

Pressure controller: electric damper for switching "painting → drying" (air circulation inside the booth; usually this function is not available with electric heating)

Filtration system: pre-filter, high-efficiency filter (ceiling filter), exhaust fiberglass filter, exhaust activated carbon filter.

Roof: single-layer curved metal roof

Control system: painting, painting with temperature increase, drying, drying temperature controller, time setting, lighting switch, emergency alarm, emergency stop.

Voltage / frequency:
3-phase 380 V, 50 Hz; 1-phase 220 V

Total power: < 45 kW

III. Control System Description

Note: The following operating procedure applies to one unit. Repeat the steps to start the remaining units sequentially. The shutdown order is the reverse.

Important Notice:

When the equipment is operating, the service door of the booth must be opened after the intake fan reaches normal operating condition. After the exhaust fan reaches normal operation, the main working door can be closed.
When closing, check the air pressure at the service door. The service door should open and close easily. If overpressure or negative pressure is too high, check the fan operation.

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1. "Painting" Switch: Working Principle

Painting at Normal Temperature:

Adjust the intake fan switch according to the arrow direction (turn right — ON; turn left — OFF). The main fan starts after the switch is turned on.

Painting at Constant Temperature:

Simultaneously with starting normal painting, turn the heating switch according to the arrow direction. When the lighting is turned on, the drying lamp lights up, and the internal temperature increases simultaneously with painting. The temperature must be set before starting, and the painting indicator lights up at the same time.
The thermostat automatically controls the operation of the heater.

Attention: During constant-temperature painting, the set temperature must not exceed 25℃ to ensure painting quality.

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2. Lighting Switch:

Turn the switch clockwise — the light turns on. During drying, the lighting must be turned off for safety reasons.

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3. Heating Switch:

Turn the switch clockwise. After setting the thermometer and timer, turn on the lighting switch — the heating will start operating.

To adjust the temperature, press the "∧∨" buttons on the digital display to set the required temperature.
For example, if 60 is set, the drying temperature will be 60°C. When the booth temperature reaches 60°C, the power supply to the lamps is automatically cut off. When the temperature drops below 60°C, the lamp power is automatically restored. When the drying time reaches the set value, the drying lamp stops working immediately.

Note: Before drying, carefully check that the set temperature is correct. Maximum temperature — below 80℃.

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4. Power Indicator:

The indicator light is on when the control unit is powered.

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5. Painting Indicator:

The painting switch is linked to the entire painting system. When the painting indicator is on during normal operation, painting can begin.

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6. Drying Timer:

Used to set the drying time. When the set time is reached, the heater power is automatically turned off.

Time setting method: press the “↑, ↓” buttons on the digital display to set the required value.
For example, if 30 is displayed, it means 30 minutes of drying (must be set before activating the drying mode).

Temperature Controller Operation Method

Temperature Controller Settings

(Heating temperature for painting is set to 20℃, drying temperature is set to 60℃.)

Heating / Drying with Temperature Controller

Press “∧ ∨” on the temperature setting panel — the range is 0–60.
If the displayed room temperature is lower than the set temperature, the ON indicator lights up and the heating lamps operate.
If the displayed temperature is higher than the set temperature, the ON indicator turns off and the heating lamps stop operating.

The upper display shows the booth temperature, and the lower display shows the set temperature.

Attention: The set temperature must be higher than the displayed temperature for the electric heating to work properly.

V. Installation and Commissioning of the Electrical System

1) Installation

First, check the appearance of the control cabinet and panel components for obvious damage. Then check the components inside the cabinet and the wiring for loss or looseness.

Ensure the correct connection direction of fans, electric heating lamps, and lighting, and route cables in pipes or cable trays.

Load cables to the control cabinet must be installed strictly according to electrical installation standards. Minimum cable cross-sections:

— heating lamp power cable: ≥ 3 mm²
— lighting power cable: ≥ 2.5 mm²
— fan (3 kW): ≥ 3 × 2.5 mm²
— fan (5.5 kW): ≥ 3 × 4 mm²
— fan (7.5 kW): ≥ 3 × 6 mm²
— control cabinet power cable: ≥ 4 × 16 mm²

Wall wiring must be protected by sheathing; where possible, keep away from heat sources. Wiring near rotating mechanisms must be securely fixed.

The control cabinet housing and lamp holders must be connected to the room grounding system and connected to the grounding conductor (grounding plate recommended if available).

Electrical installation must be carried out under the guidance of professional electricians or technical personnel, strictly according to the wiring diagram and standards. Unauthorized operation is prohibited.

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2) Commissioning (Debugging)

Check the flexibility/free rotation of the fan mechanical transmission (visually or by hand).

Visually check whether the settings of thermal protection, circuit breakers, and the main switch match the diagram.

Supply power and check whether the fan starts normally.

Setting Normal-Temperature Painting Mode:

The control circuit breaker is ON, the emergency stop button (SB) is released, the power switch is ON — the power indicator lights up, the temperature controller displays values.
The normal-temperature painting switch is ON — the indicator lights up.
The internal circulation damper is open in ventilation position.
The fan group starts — the booth enters normal painting mode.

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5. Setting Painting with Heating Mode

When the ambient temperature is too low to ensure painting quality, the temperature must be increased using electric heating.
Set the heating temperature for painting (usually about 20℃), then turn on the “Painting with Heating” switch — the indicator lights up.
When the main timer starts counting, the air enters ventilation state. The temperature controller participates in system control and automatically manages heater operation; the room temperature is maintained near the set value.
Other electrical principles are the same as for normal painting.

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7. Setting Drying Mode

① First turn off the painting switch, set the drying temperature (factory setting — 60℃), turn off the lighting, turn on the heating, and set the drying time.
② Supply power to the electric damper: the damper position changes from closed to open; during drying, air circulates inside the room.
③ The drying indicator lights up, the exhaust fan stops, and only one intake fan operates at rated speed.

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8. Lighting Check:

Supply power — the contactor closes and all fluorescent lamps turn on.

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The setting of the mechanical thermostat must correspond to 115℃.

10. Temperature Controller Setting (factory setting 0–60):

— 20℃ for painting with heating
— 60℃ for drying

12. Electric Damper Setting

After installing the electric damper, ensure the damper direction is correct and that it opens evenly (level).
During drying, the electric damper is closed — air circulates inside the room.
During painting and normal-temperature painting, the electric damper is open — ventilation state.

VI. Common Problems and Troubleshooting

The power circuit breaker trips (shuts off) immediately when the fan starts.

Check: thermal protection setting → fan main circuit insulation → phase-to-phase insulation (with load disconnected) → phase-to-ground insulation.

If abnormal noise occurs in the fan during startup — turn off the power.
Check: thermal protection setting too low → fuse rating → whether all three phases are powered → whether the fan housing overheats (check overload).

Heating lamps do not turn on; check:
— circuit power supply
— whether the contactor is closed
— whether the temperature is set correctly
— whether the time is set correctly

VII. Important Warnings and Notices

Operators must receive strict training.

Installation and troubleshooting must be performed by professionals.

Before installation, check the completeness of components and documentation.

Check correct insulation and terminal tightening; ensure grounding resistance meets national standards; ensure insulation resistance meets national standards; the system must be grounded.

Safety instructions must be strictly followed.

Before powering on, carefully check installation and wiring to ensure everything is correct.

Do not place hands near moving parts during operation to avoid finger injuries.

Disassembly while the equipment is operating is prohibited.
When disassembling the control unit and transmission components, disconnect the main power supply.
Do not place flammable materials on the equipment to avoid accidents.
This manual must be carefully read before startup.
The operator must ensure that all moving and electrical parts will not cause accidents or injuries during equipment operation!!

VIII. Maintenance

The operator may operate the equipment only after training. To achieve maximum efficiency, the user must monitor operation and perform daily and periodic maintenance. Recommendations:

Check whether power supply and air supply are normal, and whether power cables and exhaust are damaged.

Drain condensate daily from the pressure regulating valve. Turn off the power every day before leaving. Only after power is off may the next procedure be performed.

Use a dry, soft cloth for cleaning. Areas with heavy contamination that cannot be wiped should be cleaned with compressed air.

While wiping, check for loose screws. If found, tighten immediately.

With frequent use, protect the booth from contamination and ensure that intake and exhaust are not blocked.

After approximately 100 painting cycles, replace the ceiling filters (according to actual conditions).

After one month of use, replace the coarse inlet filter (pre-filter) of the heating unit (according to environmental conditions).

Every two months, service door hinges; apply a small amount of lubricant to the roller bearing and clean the interior of the booth with compressed air. Clean the thermocouple sensor monthly.

If the booth is not used for a long time, turn off the main power switch of the electrical cabinet. If moisture accumulates inside the room, open the door for one hour every morning.

Every year, intake and exhaust fans must be cleaned and serviced.

IX. Correct Operating Procedure

Before startup, remove all foreign objects from the booth.

Operators must be trained, especially in safety procedures.

If there is more than one operator, one must be designated as responsible for startup, and others are not allowed to participate.
Before each startup, the responsible person must ensure that no one is near the equipment. Startup is allowed only when no people are present. Others must be warned before startup.

During operation, if any operator detects an abnormal situation, the emergency stop must be pressed and others must be notified.

If it is not necessary and protective measures are not ensured, it is forbidden to touch operating parts with the body or objects, especially rotating parts and air inlets.
If adjustment is required, only trained personnel may touch the equipment, and other operators must be warned.

If a person not responsible for the switch wants to adjust/check/debug, they must inform the responsible operator in advance.

Before releasing the emergency stop, check the surroundings (people, equipment, transport/transmission parts) for safety; otherwise, startup is prohibited.

During disassembly or cleaning, press the emergency stop. Any non-standard actions during operation, including cleaning, are prohibited.

When cleaning the booth and surrounding area, water must not enter the control unit, power input area, or electrical devices.

If maintenance is prolonged, disconnect the main power supply and hang a warning sign “Equipment Startup Prohibited” in a visible place.

Without permission, it is forbidden to disassemble or modify components, especially safety elements. Safety signs must be preserved.

After repair, before startup (except for cleaning the area), manually rotate/check moving parts or perform a “test run” to ensure there are no obstructions.

When all operators leave, the power supply must be turned off and locked to prevent unauthorized startup.
Unqualified personnel are prohibited from operating the equipment.

If a malfunction occurs during operation, inform maintenance personnel or the supplier. Independent repair is prohibited.
Before shipment from the factory, all control elements are adjusted. The customer may change parameters if necessary, but this is usually not required.