



MS-60M
Salt Spray Test Chamber
Instruction Manual



Anhui Mikrosize Precision Instrument Co.,Ltd

Add: A-4035 RuiFeng Business Expo, Wuhu City, China, 241000.

Web: www.mikrosize.com **Email:** mikrosize@mikrosize.com

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1.Method of Salt Spray Test for Surface Finishing

1.Scope of application: This standard specifies the salt water spray touch resistance test method for various metal substrates after electroplating, organic or inorganic coating and other surface treatments.

2.Test method: This method is a corrosion test method of spraying sodium chloride solution on electroplating coating film in mist form by using salt water spray testing machine. The main test conditions are shown in Table 1.

Table 1 Main experimental conditions

Projects	When preparing	In the experiment	Remarks
Concentration of sodium chloride solution (g/L)	50	40~60	It is better to calibrate the concentration once a day
PH	6.5	6.5-7.2	After collection, the ph value in the experiment was determined
Compressed air pressure (kgf/cm ²)		1.00±0.01	Continuous without interruption
Spray quantity (ml/80cm ² /h)		1.0~2.0	It should be collected for at least 16 hours and averaged
Pressure barrel temperature (°C)		47±1	
Salt water bucket temperature (°C)		35±1	
Laboratory temperature (°C)		35±1	Test at least twice a day with an interval of at least 7 hours
Laboratory relative humidity		≥85%	Other humidity requirements shall be agreed by the buyer and the seller
Test time			That is, the continuous time from the beginning of spraying to the end, or agreed by the buyer and the seller

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3.Preparation of test solution: dissolve reagent grade sodium chloride in distilled water (or water with total dissolved solids less than 200 ppm), and prepare a test solution with a concentration of 5 1%. After spraying the test solution at 35°C, the PH value of the collected solution should be 6.5~7.3. And before spraying, this test solution can not contain floating objects

Note:(1) Sodium chloride should not contain impurities of copper and nickel, and the content of sodium iodide in solid is less than 0.1%. Because the impurities may contain corrosion inhibitors, the total content of impurities must be less than 0.3%.

(2)The specific gravity of the specific test solution measured at 33~35°C should be 1.0258~1.0402, and the specific gravity measured at 25°C should be 1.0292~1.0443. The concentration of this test solution can also be calibrated by silver nitrate titration or other methods.

(3) The pH value of the test solution should be adjusted by dilute hydrochloric acid or sodium hydroxide solution of reagent grade, and measured by pH meter or other reliable methods. Because the water in which the test solution is prepared contains carbon dioxide, the solubility of carbon dioxide in water changes with temperature and affects the pH value of the solution, so the pH value should be carefully controlled, and the pH value can be adjusted by any of the following methods:

① Prepare the test solution at normal temperature, and spray it at 35°C, because the temperature rises, some carbon dioxide escapes from the solution and the pH value rises. Therefore, when preparing the test solution at normal temperature, the pH value should be adjusted within 6.5, so that the pH value of the collected solution can be between 6.5 and 7.2.

② Before adjusting the pH value, boil the test solution and then cool it to 35°C, or keep it at 35°C for 48 hours. When the pH value thus adjusted is sprayed at 35°C, it will not

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change much.

③ First, the water is heated above 35°C to remove dissolved carbon dioxide, and then the test solution is prepared and the pH value is adjusted, so that the adjusted pH value will not change too much when spraying at 35°C.

(4) In order to avoid blockage of spray nozzle, this test solution must be filtered or carefully tilted into the salt water bucket, or a glass sieve is installed at the front end of spray suction pipe for filtration.

4.Equipment: The equipment required for this test consists of spray nozzle, salt water bucket, test piece support, spray liquid collection container, laboratory, salt water supply bucket, pressure bucket, compressed air supply equipment and exhaust equipment, etc. The devices are shown in Figure 1, and the test is carried out according to the following conditions.

4.1 The brine spray testing machine and its required pipelines shall be made of inert materials, which cannot affect the corrosion test of spray or be corroded by itse.

4.2 The spray nozzle shall not spray the test solution directly to the sample, and the solution gathered at the top of the spray chamber shall not drip on the test piece.

4.3 The test solution dripped from the test piece shall not flow back to the salt water bucket, but be used for the test again.

4.4 Compressed air cannot contain grease and dust, so an air cleaner is required. The air pressure must be kept at 1.00 0.01 kgf/cm². Because the compressed air absorbs heat when expanding, it must be preheated (6) in advance, as shown in Schedule 1, in order to obtain uniform temperature spray.

Note (6): Preheat to increase the temperature and humidity of compressed air.

4.5 The spray sampler has a horizontal area of 80cm² and a diameter of about 10 cm, and is placed near the test piece (near the nearest and farthest places of the nozzle).

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4.6 The amount of spray liquid is calculated in the whole time. On the container, 1.0-2.0ml of saline solution should be collected on average every hour. The spray liquid should be collected for at least 16 hours, and the average value should be used to indicate the amount of spray.

4.7 The concentration of sodium chloride solution in the salt water bucket in the test should be maintained at 40 ~ 60g/L.

4.8 The temperature of pressure barrel shall be kept at 47 ± 1°C, and that of salt water barrel at 35 ± 1°C.

4.9 The relative humidity of the laboratory must be kept above 85%, and the requirement of higher relative humidity can be agreed by the seller and the buyer.

5.Sample

5.1 Location: The sample can be taken from the main surface of the product or the product itself. However, if the product cannot be tested or judged, it can be replaced by a test piece agreed by both parties. This test piece must represent the product.

5.2 Size: The standard size of the test piece is 150×70mm, or 100× 65 mm.

5.3 Number: The number of samples shall be agreed by the buyer and the seller.

5.4 Pretreatment before test

5.4.1 The samples shall be properly cleaned according to the nature and cleanliness of the coating. Abrasive and corrosive or inhibitory solvents shall not be used for cleaning, and the cleaning method shall not damage the surface. The stainless steel samples can be cleaned and passivated by nitric acid through agreement between the seller and the buyer. After cleaning (passing the water extraction test), the samples shall be dried with clean cloth or water, or dried with oil-free dry air. Magnesium oxide paste may be used when necessary. This paste is 100mL reagent grade.

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5.4.2 Unless otherwise specified, the notch of the sample and the exposed part of the substrate caused by hanging color, or the coating defect caused by identification marks. Appropriate protective layer should be coated during the test. Such as ceresin wax, vinyl tape and other insulators.

5.4.3 Hand-print pollution will cause serious bad test results, and the sample shall not be contaminated by any hand-print after being cleaned.

6.Placement of sample: During the test, the position of sample in the test room meets the following conditions:

6.1 The main surface of the sample inclines from 15 to 30 degrees to the plumb line, and when viewed from above the laboratory, it should be parallel to the main flow direction of spray. Special parts have major surfaces in many directions. When testing is needed at the same time, multiple samples should be placed, and each major surface must receive salt water spray at the same time.

6.2 The arrangement of the samples shall make the spray fall freely on all the samples, and shall not hinder the free falling of the spray.

6.3 The samples shall not touch each other, metallic conductors or substances with capillary effect, and other objects other than the support frame.

6.4 Do not drip saline solution from one sample to other samples.

6.5 The identification mark or assembly hole of the sample shall be covered below.

7.Operation: When the temperature of laboratory and salt water bucket is adjusted to 35°C, the temperature of pressure bucket is 47°C, and the spraying pressure is kept at 1.00 0.01 kgf/cm², spraying can be started.

7.1 Test conditions: See Table 1 for test conditions.

7.2 Test time: continuous time from the beginning to the end of spraying. Test time is an important quality data of electroplating layer, and the required time can be agreed by the

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buyer and the seller.

7.3 Post-test treatment: When the spray test is finished and the upper cover of the laboratory is opened, take out the sample carefully without dripping the solution, and do not damage the main surface. Wash away the adhered salt particles with clean water below 38°C, remove the corrosion products except the corrosion points with a brush or sponge, and immediately dry them with clean compressed air.

8.Record: Unless otherwise agreed by the seller and the buyer, the following records shall be recorded in this test: (Attached Table 2 is areference record table)

8.1 The quality of salt and water used when preparing brine.

8.2 Record of test temperature.

8.3 The device of spray applicator shall be recorded as follows every day:

8.3.1 Spray quantity

8.3.2 Collect the specific gravity or concentration of the solution at room temperature

8.3.3 Collect the PH value of the solution

8.4 Type, shape, size and number of samples.

8.5 Pretreatment and cleaning of samples and methods of treatment and cleaning.

8.6 Placement method of sample in the test room.

8.7 The coating method used in accordance with Section 5.4.2.

8.8 Spray time.

8.9 If the test time is interrupted, the reason and time of the interruption shall be recorded.

8.10 All results of other inspections.

9. Judgment method: The judgment of the corrosion status of the measured surface can be carried out according to the chart of relevant grade number standard. If it is difficult to judge bubbles and cracks by standard chart, it can be judged by magnifying glass with

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ruler, or by the method agreed by the seller and the buyer in advance.

Table 1 Pressure of compressed air and required preheating temperature during spray test at 35°C

Compressed air pressure	(kPa)	84	98	111	126
	(kgf/cm ²)	0.86	1.00	1.14	1.29
Required. Preheating temperature (°C).		46	47	48	49

1kpa-0.4 psi

for reference:1kpa-0.4 psi

Attached table 2: record of salt water spray test

Test date:		Test number:	
Test date: (Spray time) If the test is interrupted, the reasons are as follows:			
1.the quality of sodium chloride			
2.Quality of distilled water			
3.Spray applicator:		mL /80cm/h	
3.1 spray quantity			
3.2 Collect the specific gravity or concentration of the solution at room temperature			
3.3 PH			

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4.Sample:	
4.1 Types	
4.2 shape	
4.3 scale	
4.4 Number	
5.Compressed air pressure	Kgf/cm
6.Relative humidity of laboratory	
7.Laboratory temperature	°C
8.Pressure barrel temperature	°C
9.Salt water bucket temperature	°C
10.Others	°C
Judge	1. According to the standard drawing:
	2. Judging by other methods:

2.Basic Equipment Parameters

1.Studio size:	90×60×50cm (l/W, H)
2. Overall dimension:	140×81×111cm (l/D, W/H)
3.Volume (L) :	270L
4.Power supply:	AC220V
5. Equipment power:	2.5KW
6. Open the cover manually	
7. Laboratory temperature:	35°C±1°C/ 50°C±1°C
8. Pressure barrel temperature:	47°C±1°C/ 63°C±1°C
9. Temperature uniformity:	≤±2°C
10. Temperature fluctuation:	≤±0.5°C
11. Salt fog settlement:	1 ~ 2ml/h.80cm ²
12. Spray pressure:	1.00±0.01 KGF /cm
13. Spray method:	continuous spray + alternating spray

3. Brief introduction of Structure

Inside the laboratory

1. Spray tower: the built-in glass nozzle is placed inside the spray pipe, and the spray is dispersed into the laboratory through the guide passage of the tower pipe and then through the conical disperser.
2. Spray regulator: adjust the spray amount, increase the spray amount, and decrease the spray amount. The brine preheating tank is located at the bottom of the spray tower. The brine in this tank is injected through the reagent inlet and then slowly flows into the brine preheating tank through the pipeline. The water level of the brine preheating tank is controlled by the floating ball, which can automatically control the water level. There is a water outlet for cleaning at the bottom of the tank.
3. Collector: the amount of mist sprayed from the nozzle will settle in the funnel cup of 80cm² by self-falling body, and then flow into the measuring cup through the pipeline.
4. Storage rack: This rack is made of PVC, so the weight of concentrated point is limited to no more than 2kg, and it can bear less than 10kg if it is scattered. There are two rows of round holes on both sides of the shelf, and the placing sticks are divided into 15 degrees and 30 degrees in the vertical plane.
5. Filter: yellow plastic ceramsite filter, used to filter impurities in salt solution, to ensure that the nozzle is not blocked by impurities.
6. Heated water tank: this tank is attached to the bottom of the laboratory, which is used to hold water and keep the temperature and humidity of the experiment stable, and its functions are heating, humidifying and heat preservation.

Outside the laboratory

1. Dry and wet bulb thermometer: read the temperature and humidity in the test room.
2. Metering bucket: collect the spray amount of each spray test.
3. Sealed water tank: use the principle of water seal to avoid salt spray leakage.

3. Brief introduction of Structure

4. Saturated air bucket: placed at the bottom of the control box and made of PP high-pressure pipe. Its function is that the air is heated and humidified by this barrel, so that the air reaches saturation humidity and then sprayed to the nozzle.
5. Reagent inlet: reagent inlet, which replenishes the saline solution in the saline tank.
6. Test cover: a roof-type oblique angle 100-degree perspective cover, which is used to cover the upper part of the laboratory and integrate it into a whole.
7. Pressure regulating valve: this valve is used to adjust the laboratory pressure by pressure gauge display when the air pressure is too high or too low (test condition $1\text{kg}/\text{cm}^2$).
8. Pressure table: the pressure displayed by the pointer of this table is the pressure reached when the air is heated by the saturated air barrel and transmitted to the nozzle (test condition $1\text{kg}/\text{cm}^2$).
9. Fog outlet: pipeline with diameter of 54.5mm. Combined with this fog outlet in the outdoor, there should be no water so that the fog can be discharged naturally.
10. Laboratory and saltwater bin drainage valves: 1/2 "caliber line combined with drain pipe in drain gutter to discharge laboratory wastewater and saltwater from saltwater bin.
11. Automatic inlet of laboratory and pressure bucket: automatically replenishes the water needed by laboratory and saturated bucket until it is in normal use.

Control system:

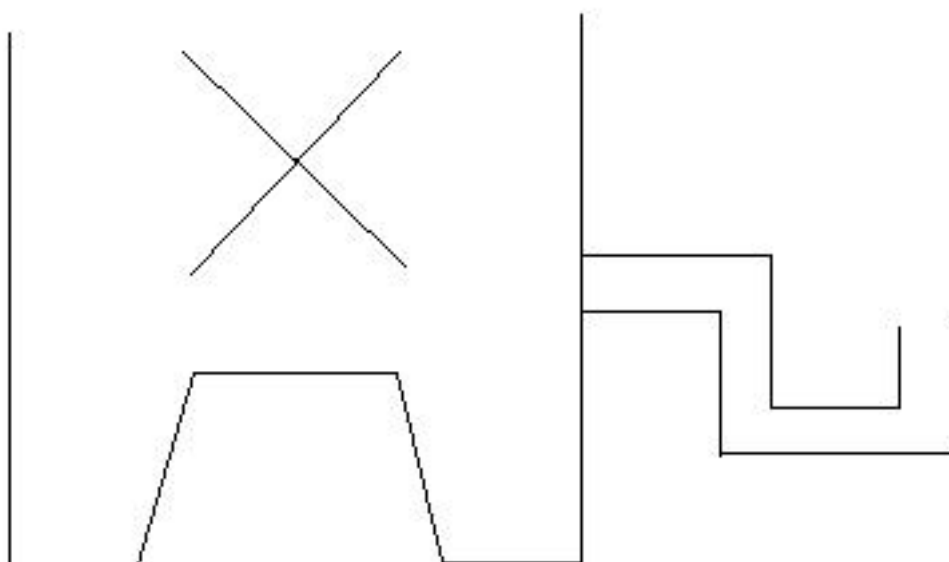
1. Laboratory temperature control: control the temperature of the laboratory, set according to the standard temperature, with salt water test at 35°C and corrosion resistance test at 50°C .
2. Saturated air barrel temperature controller: control the temperature of saturated air barrel, and set the temperature to 47°C for salt water test and 63°C for corrosion resistance test.

3. Brief introduction of Structure

- 3.Interval timer: adjustable 0.1s-99hr, used to set the time required for interval spray test, and automatically stop when the time is up.
- 4.Accumulator: direct reading 0-9999.9hr, used to set the time required for continuous spray test, and automatically stop when the time is up
- 5.The temperature controller of the heating tank: controls the water temperature of the heating tank. The controller is in coordination with the laboratory temperature control. If the ambient temperature around the test machine varies too much, it also needs to be adjusted.
- 6.Brine spray test: the temperature controller of the laboratory is set at 35°C, and the temperature controller of the heating tank is set at 47°C (40°C-50°C).
- 7.Corrosion resistance test: the temperature controller of the laboratory is set as 50°C, and the temperature controller of the heating tank is set as 65°C (60°C-70°C).
- 8.Safety temperature controller for saturated air drum: Safety protection device for saturated air drum, the safety temperature setting value is 5°C higher than the actual temperature (located in the control box).
- 9.Power switch: lighting up and tilting, controlling the total power supply of the whole machine.
- 10.Timer switch: lighting up the rocker, controlling the power supply of the time controller.
- 11.Spray switch: illuminate the lamp and control the spray system.
- 12.Demisting switch: illuminate the tilting plate, control the demisting system, and clear the salt mist in the box.
- 13.Low saltwater alarm light: lights up when the water level of the saltwater preheater tank is below the lower limit and disconnects the operating system.
- 14.Laboratory low water alarm light: when the water level of the heating tank is lower than the lower limit, the light will be on and the power will be cut off.
- 15.Pressure drum low water warning light: when the saturation drum water level is lower than the lower limit, this light will turn on and cut off the operating system.

4. Installation Instructions and Precautions

1. 220V single-phase 15A power supply
2. There is room for maintenance on both sides about 50cm away from the wall behind the machine placement position.
3. Please connect the air duct to the air inlet valve in front of the air compressor.
4. The drainage pipe can be drained by PVC1/2 "hard pipe, and attention should be paid to the water pipe going down. The exhaust pipe needs to be PVC2 1/2 "hard pipe, which extends to the outdoor for discharge. Pay attention to the installation of the exhaust pipe, which can be parallel and downward from the machine.



5. Please avoid direct sunlight in the installation position of the machine, so as not to affect the test conditions.
6. The installation position of the machine should not be close to other electrical equipment, precision instruments or flammable items as far as possible to avoid danger.
7. This machine is made of PVC plastic. Please do not collide hard to avoid cracking. Please do not exceed the test standard to avoid deformation due to overheating.

5.Operating instructions

1.Plug into the power plug and connect the air compressor pipe to the compressed air inlet at the rear of the machine.

2.Connect the water inlet pipe to the automatic water inlet. The machine has an automatic water feeding device, so it must be connected to the water inlet pipe. Otherwise, it cannot operate normally.

- Pay attention to cover the test and handle with care to avoid damage.

3.Connect the drain pipe and exhaust pipe.

4.Fill the sealed tank with water one centimeter below the height of the inner tank

A) Method of preparation: test the PH value of 9.5 liters of pure distilled water Between 6.5 and 7.2.

B) Add a little glacial acetic acid if the PH value is greater than 7.2.

C) Add a little sodium hydroxide if the PH value is less than 6.5.(Generally, pure water is not required for the above b and C)

D) Add 500g sodium chloride (NaCl) and stir well.

5.Pour the brine into the entrance of the test, and automatically flow into the brine preheating tank in the test room, economy 15 liters, standard 30 liters.

- Decoration Angle according to the required standards, such as the standard test piece test 130×70 (mm) can be used 15 degrees 30 degrees oblique.

6.Set test temperature

Taken in accordance with the required standards set (the key to reduce the " √ ", "delta") for adding

A. Neutral salt spray: laboratory temperature 35°C

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The temperature of the saturated air barrel is 47°C

B. Copper accelerated salt spray: laboratory temperature 50°C

The temperature of the saturated air barrel is 63°C

Note: There is a special type of copper accelerated salt spray. To use this test, we need to confirm whether the equipment can carry out the copper accelerated salt spray test

7. Set test time: 0.1S-9999HR

(H: hour M: minute S: second button "+" means increase button "-" means decrease button)

8. Press the power switch to warm the laboratory to the set temperature.

9. Press the spray switch

A. Open the outlet valve in front of the air compressor and adjust the pressure to the primary pressure of 2kg/cm².

B. Adjust the pressure regulating valve to the pressure of 1kg/cm², the pressure can be obtained from the pressure gauge (increase clockwise, decrease counterclockwise) secondary pressure.

10. Press the timer switch to start the timer at the set time.

11. After the test, turn off the switch in sequence.

Operation step 1:

At first, plug in the power plug (power supply 220V), plug in an 8mm air pipe at the compressed air inlet, and the air inlet pressure at the back is 2KG; connect a water pipe at the automatic water inlet (laboratory and pressure barrel automatically replenish water); install a 54.5mm mist exhaust pipe at the exhaust port to exhaust salt mist outdoors.

5. Operating instructions



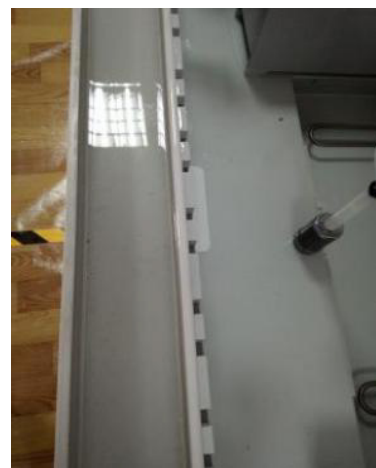
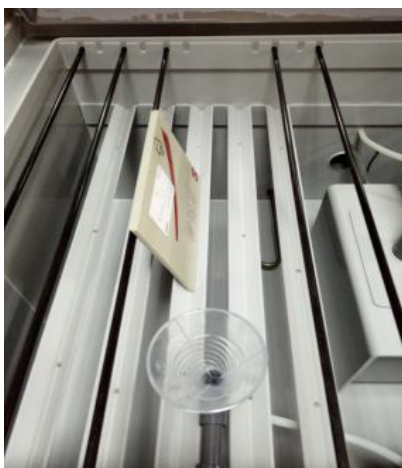
Operation step 2:

Open the power switch, the laboratory low water level indicator, indicator light, low brine prompt laboratory and salt water to add water, laboratory and pressure barrels in automatic filling water can add water (the two can be injected into water), pressure barrels of the factory when the water is full, low water pressure barrel is not bright, pressure barrels of water can also be manually add; After the water is replenished in the laboratory, the low water level lamp in the laboratory will not light up. Saline will be prepared according to the proportion of 5%, 250g of sodium chloride will be prepared to mix 5000ml of saline (purified water or distilled water is needed to prepare the saline), and then it will be poured from the entrance of the test, and the low water lamp will not light up when the saline is added enough.



5. Operating instructions

Press the lid switch to open the lid automatically, add clear water to the sealing groove of the lid to seal the lid, and then place the tested product on the V-shaped groove at an angle of 15 degrees or 30 degrees. After the product is placed, press the lid switch to close the lid automatically.



Operation step 3:

Set the test temperature conditions and test time on the power panel, including neutral and acid salt spray, laboratory temperature 35°C, pressure barrel temperature 47°C, copper accelerated salt spray, laboratory temperature 50°C, pressure barrel temperature 63°C, and the test time can be set on the timer according to your requirements. The longest time can be set to 0~9999H, and the time unit is seconds, minutes, hours, and press "+" to increase.



5. Operating instructions

Operation step 4:

After the test temperature and time are set, turn on the spray and timing switch (the normal spray pressure shows 1KG), and the machine starts spraying timing. When the time is up, the spray will automatically stop. After the test is finished, turn off the switch in sequence, and check whether the spray quantity is normal at the metering cylinder. The average spray quantity is 1 ~ 2ml per hour, and the average value is taken after 16 hours.



6.Judgment And Treatment Of Functional

Status	Reason	To deal with
The laboratory can not rise to the set temperature	1. The temperature setting of the laboratory temperature controller is too low 2. The laboratory safety protection switch is set too low 3. Heating system failure 4. Electromagnetic relay failure 5. Controller failure	1. Set the temperature controller to the required temperature 2. Set the safety protection switch at the required temperature 3. notify the company 4. notify the company 5. notify the company
Saturation barrel temperature cannot rise to the set temperature	1. the temperature controller of saturation barrel is too low 2. The safety protection switch of saturated barrel is set too low 3. Heating system failure 4. Electromagnetic relay failure 5.Controller failure	1. Set the temperature controller to the required temperature 2. Set the safety protection switch at the required temperature
Insufficient spray quantity	1. the spray regulator is placed too low 2. The glass filter in the preheating tank is blocked 3. The pressure setting is too low	1. turn the spray regulator up 2. Clean the glass filter 3.Adjust the pressure regulating valve to 1kg/cm², and the air compressor is marked with a pressure regulating valve to adjust the pressure to 2kg/cm²
When spraying is impossible, PS: Installation method of air pipe and suction pipe of nozzle(-type pipe is suctionpipe,L-shaped air pipe)	1. the air compressor is not running 2. The main switch of the air compressor outlet is not turned on 3. Malfunction of solenoid valve 4. Pressure gauge failure or low pressure 5. Failure of electromagnetic contactor 6. Nozzle blockage	1. open the air compressor button 2. Turn on the main switch of the air compressor 3. notify the company 4. notify the company 5. notify the company 6. Remove the nozzle and clean it (Please disassemble carefully)

6.Judgment And Treatment Of Functional

When the insufficient water level alarm light is on,	Indicates low water level	Check whether there is water entering the water inlet source
There is normal spray and the air compressor is not running	The air compressor itself has the function of self-protection	Use as usual
Can't run after turning on the power	When the water level in the heating tank is too low, the operating power will be cut off	
When the temperature controller displays EEE	1.Temperature controller failure 2.The temperature sensor failure	1. notify our company to handle it 2. Inform our company to handle it
When the spray amount is too high,	1. the spray regulator is placed too high 2. After long-term use, the diameter of the glass nozzle is too large	1. lower the spray regulator 2. Replace the new glass nozzle

7. Maintenance Matters

1. If the salt water in the preheating tank has not been used for more than one week, please do not use it again, so as not to affect the test results and block the nozzle.
2. If the time interval is long before the next test, clean the interior of the laboratory after the test, and drain the water in the laboratory and the water in the preheating tank of brine.

Drain the water in the heating water tank-Pull out the rubber plug of the heating water tank and open the drain valve of the laboratory at the back of the equipment.

Water discharge in the sealed water tank-Pull up the silica gel in the middle of the inner wall of the test chamber.

Drain the water in the brine tank-Pull up the silica gel inside the brine tank, and open the laboratory drain valve at the back of the equipment.

3. To ensure the accuracy of the test results, please replace the glass nozzle after 4000 hours.

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Anhui Mikrosize Precision Instrument Co.,Ltd

Factory Producing Add: N013 Shuiku Road Shatou, Changan Town, Dongguan, China.

International Trading Office: A-4035 RuiFeng Business Expo , Wuhu City, China.

Web: www.mikrosize.com Email: mikrosize@mikrosize.com

