Hypochlorous Acid Generator

Operating Instruction

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⚠ Caution:

This manual introduces the operation, maintenance and common troubleshooting of the hypochlorous acid generator in detail. Before you use the device, you must read this manual carefully so that you can operate the device correctly and ensure that the operator and the machine are safe and sound. Safety, all indicators of produced water are under control. Any improper operation, maintenance and repair may cause personal injury, equipment damage, reduced efficiency or performance degradation.

1. Product performance, scope of application, contraindications

Hypochlorous acid generator refers to adding the right amount of sodium chloride solution and/or hydrochloric acid solution to the diaphragm electrolytic cell or no diaphragm cell, by electrolysis, chlorine ion in anode side lose electrons to generate chlorine, chlorine gas react with water to generate hypochlorous acid and hydrochloric acid, obtained hypochlorous acid as the main antiseptic slightly acidic PH 5.0 ~ 6.5 hypochlorous acid unit. The electrolytic reaction equation is as follows:

$Cl^- \rightarrow 1/2Cl2+e^-$

$Cl2 + H2O = HClO + H^+ + Cl^-$

$H^+ + e^- \rightarrow 1/2H^2$

Slightly acidic hypochlorous acid has the characteristics of broad-spectrum and rapid sterilization due to its high redox potential, low pH value and certain concentration of available chlorine. It can kill various bacterial propagules, various viruses and spores in a very short time. Such as Escherichia coli, Pseudomonas aeruginosa, Candida albicans, Staphylococcus aureus, Bacillus subtilis black var. spores and poliovirus. It is widely used in disinfection and sterilization in medical and health, scientific research, food processing, catering, agricultural production, animal husbandry and other industries. Especially in the field of medical and health care, it can be used for disinfection of operating rooms, supply rooms, stomatology, venues, instruments, disinfection of hands and skin, disinfection of endoscopes, etc.

Compared with acidic hypochlorous acid, most of the available chlorine in slightly acidic hypochlorous acid is in the form of hypochlorous acid molecules (uncharged), while the available chlorine in acidic hypochlorous acid is larger. Part of it exists in the form of chlorine gas; therefore, the hypochlorous acid molecules in the slightly acidic hypochlorous acid are very easy to break through the negatively charged bacterial cell wall and enter the interior of the bacteria, and the proteins, nucleic acids, plums, etc. inside the oxidative disease bacteria can kill the bacteria. Dead germs. Therefore, the bactericidal effect of slightly acidic hypochlorous acid is stronger than that of acid hypochlorous acid, and its stability is better, its corrosiveness is lower, and its impact on the environment is more green.

Because the slightly acidic hypochlorous acid will be reduced to ordinary water in a short period of time in the natural environment, it is an environmentally friendly disinfection product with no residue of harmful substances, harmless and pollution-free to human body, animals and plants.

Contraindications: Those who are allergic to chlorine are prohibited.

2. Product Features

This series of products is developed and produced by Shandong Shenghuai Environmental Technology Co., Ltd. It integrates advanced technologies such as machinery, electronics, automatic control, chemistry, disinfection, and water treatment, and realizes the whole process of automatic intelligent control of slightly acidic hypochlorous acid production. . It has the following characteristics:

2.1 Electrolyzer

The electrolytic cell, the core component of this series of products, has a titanium substrate and a ruthenium-iridium-titanium alloy coating for its pole plate, which makes it have the characteristics of stable effluent quality, high water production efficiency and long service life; its enhanced life test has reached 176H, which is far Much larger than the 40H specified by the national standard. The ion membrane in the electrolytic cell adopts ceramic ion membrane with reliable quality.

2.2 Brine

The R&D team has fully considered the needs of users. The brine of this series of products is supplied by saturated solution, which can be added at any time during the working process of the generator, which overcomes the defect that unsaturated solution needs to be shut down to prepare brine when preparing electrolytic solution, and makes user operation more convenient. Simple, more reliable water supply.

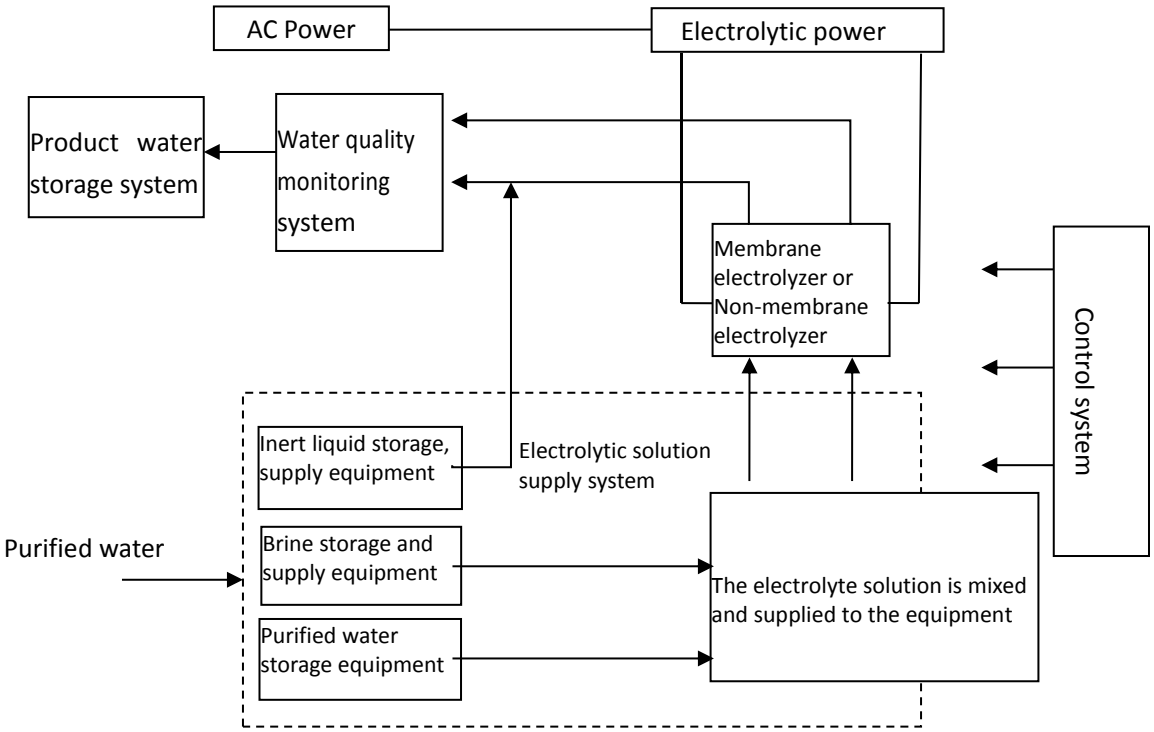
2.3 Brine supply pump

It is driven by a stepping motor that can precisely control the speed, so that the supply frequency of the pump can reach 100-1000
Hz. The increase of the working frequency of the supply pump makes the concentration of the mixed electrolytic solution more uniform and accurate, so that the fluctuation of the electrolytic current is controlled within a very small range of 0.1A, instead of the 2A achieved by the current technology, thus ensuring the control of the effluent quality. more accurate.

2.4 One machine for multiple purposes

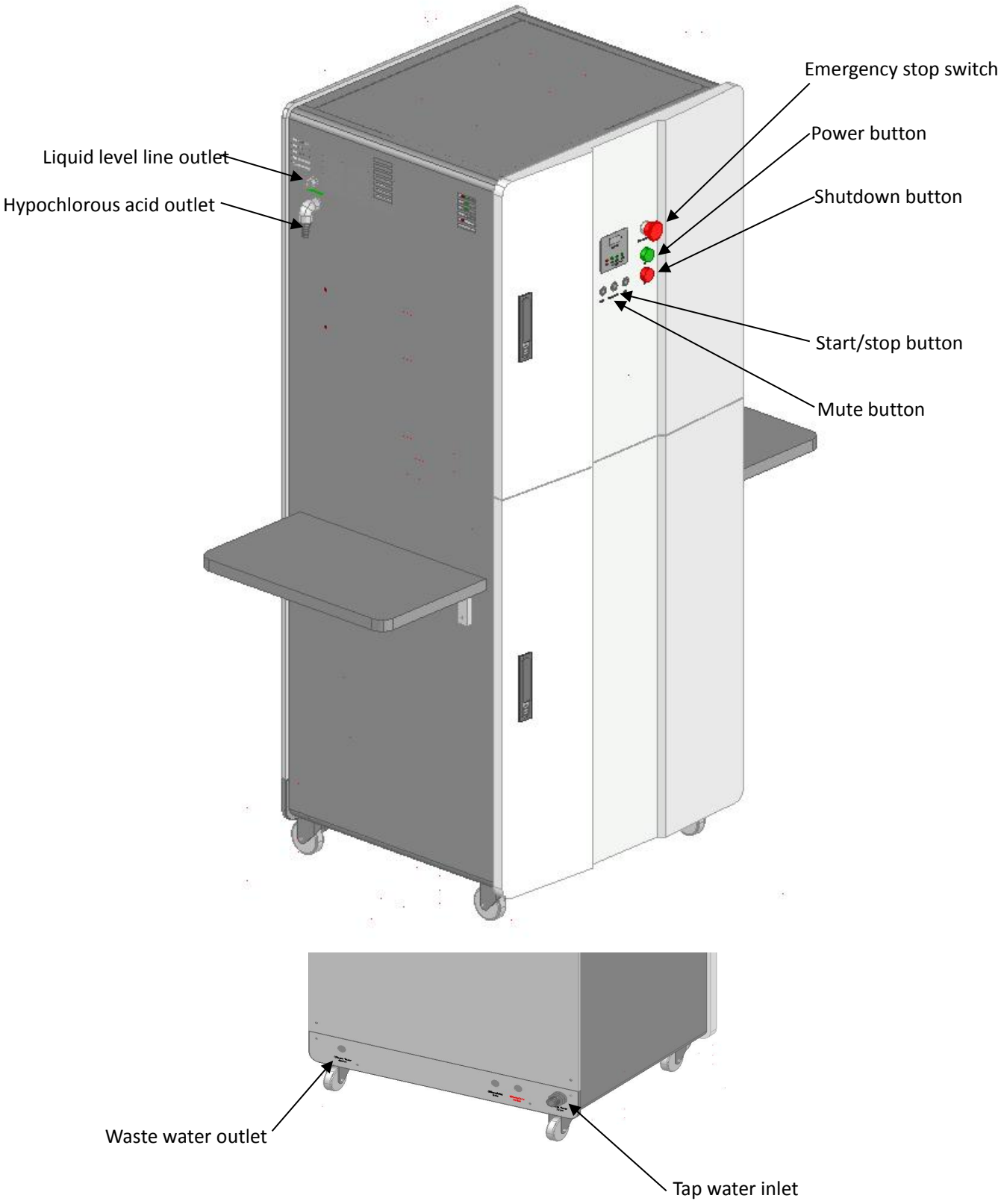
This machine also has the function of generating slightly acidic hypochlorous acid and acid hypochlorous acid, which can be flexibly converted according to user needs.

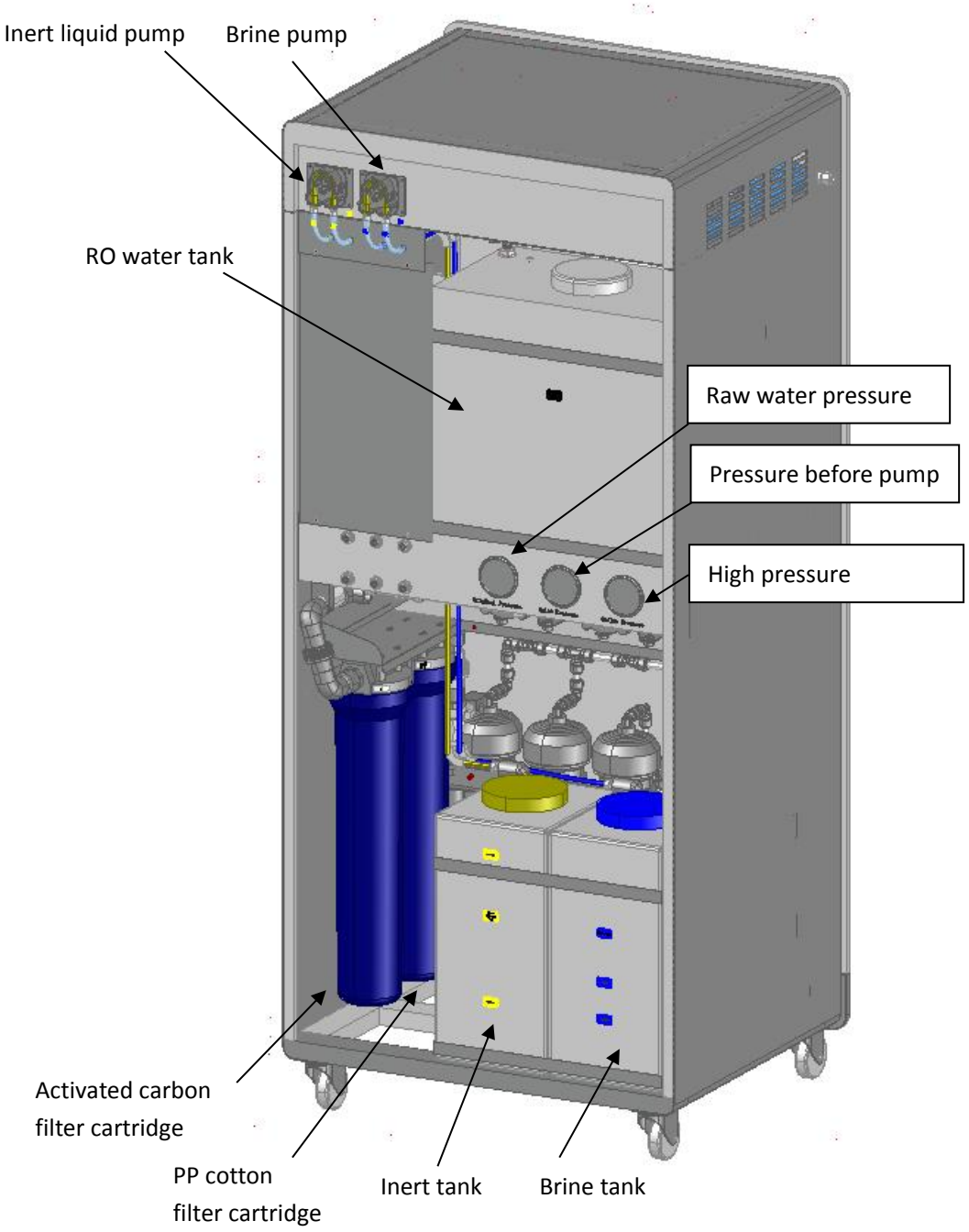
3. Working principle:



After starting the machine, the purified water enters the purified water tank and the brine tank, and the purified water and saturated brine are prepared; when the water starts to be produced, the electrolytic solution mixing and supply equipment mixes the purified water and saturated brine into an electrolytic solution and flows into the electrolytic tank, and the electrolytic power supply begins to flow to the electrolytic tank. Power supply, the acid electrolyzed water after electrolysis is mixed with a certain proportion of inert liquid (when preparing slightly acidic hypochlorous acid) and then stored in the acid water tank.

4. Instrument composition and structure




Inert liquid pump
Brine pump
RO water tank
Raw water pressure
Pressure before pump
High pressure
Activated carbon
filter cartridge
PP cotton
filter cartridge
Inert tank
Brine tank

5. Installation and debugging

Installation and commissioning personnel must be trained by the company and pass the assessment before they can carry out installation and commissioning work. Or the personnel approved by the company can complete the installation and commissioning work under the guidance of the qualified personnel trained by the company.

5.1 The site environment shall comply with the requirements in Items 9.1-9.4 and 11.8.

The power supply line is required to be a copper wire with a cross-sectional area greater than 2.5mm2, and a leakage protector should be connected to the power supply circuit.

5.2 Installation

5.2.1 Unpacking: Check whether the package is damaged or contaminated before unpacking; check whether the accessories are complete after unpacking; put the machine in place stably.

5.2.2 Installing the pump tube: Check whether the case is damaged; open the case door and check whether the parts are loose, falling off or deformed. Install the brine pump and inert pump (when slightly acidic hypochlorous acid is generated) pump tubing in place according to 7.2.

5.2.3 Add solid salt and inert liquid: add solid salt and inert liquid according to 6.1 and 6.2.

5.2.4 Pipeline installation: Connect the "tap water inlet" to the tap water supply source with a PVC pipe over Φ20, and open the valve of the water supply source. Connect the "waste liquid port" to the sewer with a PVC pipe of Φ20 or more. Connect the hypochlorous acid outlet of the main unit to the inlet of the acid water tank with a snakeskin tube.

5.2.5 Connect the acid water tank liquid level line to the main engine liquid level line outlet.

5.2.6 Insert the power plug into the power socket.

5.3 Debug

Press the [Power On Button] to turn on the generator, and the built-in pure water system of the generator starts to produce water into the RO water tank and the brine tank.

In the process of RO water production, the indicated value of the raw water pressure gauge and the pressure before the pump should be 0.05~0.3MPa, and the indicated value of the high pressure pressure should be 0.6~0.8MPa.

30 minutes after the RO water tank and the brine tank are full, press the [Start/Stop] button, after that, the generator will display a prompt such as "E1: Electrolysis current is too large" or "E2: Electrolysis current is too small", etc., you can mute according to 6.5 After that, press the [Start/Stop Button] again until the gas in the brine and inert liquid pipes is emptied, and the machine

enters the normal water production state.
When the acid water tank is full, the generator automatically stops and enters the standby state.

5.4 Leak detection:
Check the generator's internal and external pipes for leaks.

5.5 Water quality testing:
15 minutes after entering normal water production, take a bucket of hypochlorous acid water and check whether its indicators meet the requirements of 9.6.

6. Using the operation

6.1 Add solid salt: Observe whether the bottom of the brine tank is full of solid salt, and the height should be between the upper and lower marks; if it is missing, please add solid salt.
Note: The solid salt should not touch the bottom of the float valve and should be spread evenly.

6.2 Add inert liquid: Observe the liquid level of the inert tank. If it is close to the lower mark, please add the inert liquid to the upper line.

6.3 Turn on the water system: Open the tap water source valve and observe whether the tap water source pressure meets the requirements of 9.2; press the [start button] to start the generator.
Press the [Start/Stop Button] to start making water. When the acid water tank is full, the generator automatically stops and enters the standby state.
During water production, click [Start/Stop Button] to stop water production.

6.4 If the generator has a fault prompt, you can click the [silence button] to eliminate the alarm, and use the generator again after troubleshooting according to item 8.

6.5 Before leaving get off work, please press the [shutdown button] to turn off the power and the valve of the tap water supply.

6.6 If there is an emergency danger, immediately press the [emergency stop switch] on the front door of the machine. After the danger is eliminated, turn the [emergency stop switch] clockwise and use it normally again.

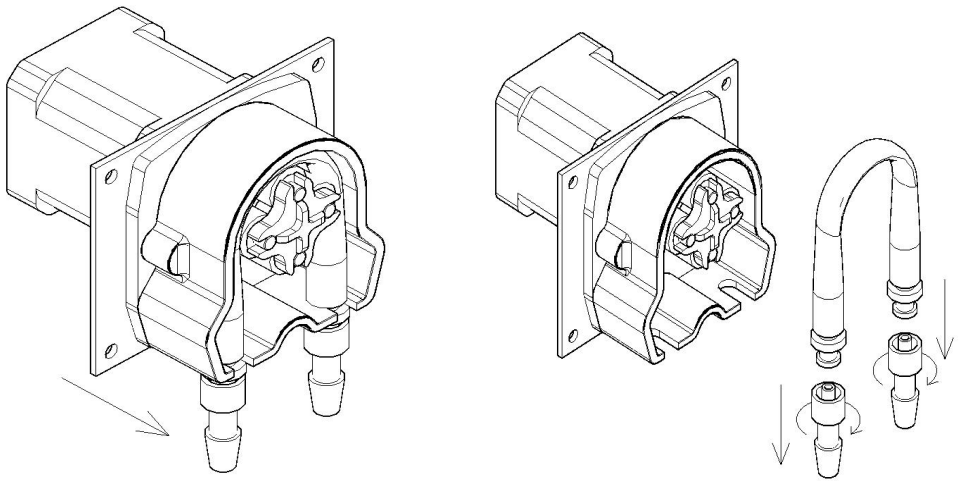
7. Maintenance

7.1 Clean the brine tank, inert tank and filter every three months

Press the locking ring at the pipe interface of the water tank, unplug the water inlet pipe of the brine tank and the water pipe on the water outlet of the filter, and unplug the liquid level line plug of the inert tank; after emptying the water tank, add an appropriate amount of tap water and wash it with a brush or gauze Clean the water tank and filter, rinse with RO water for 3 times, put the water tank back in place; insert the water pipe, connect the liquid level plug of the inert liquid tank, and add solid salt and inert liquid according to 6.1 and 6.2. After booting, execute 5.3.

NOTE: Do not contaminate the inert liquid level plug with liquid during cleaning.

7.2 Replace the pump tubing of the brine pump and the inert pump every three months:



7.2.1 Use a flat-blade screwdriver to pry off the transparent cover from the notch on the side of the transparent cover of the peristaltic pump.

7.2.2 As shown in Figure 5, pull the two joints of the pump tube outward at the same time, and pull out the old pump tube.

7.2.3 As shown in Figure 6, unscrew the pump pipe joint and remove the old pump pipe.

7.2.4 Screw the new pump tube into the joint in the opposite direction of 7.2.3. The screwed pump tube should be smooth and not twisted.

7.2.5 First push the left joint into the left gap of the peristaltic pump, then plug the pump tube into the gap between the pump body and the roller, turn the roller clockwise, plug the pump tube into the pump body, and then put the right joint Push in the notch on the right side of the peristaltic pump.

7.2.6 Turn the roller clockwise to check whether the pump tube is smooth and in place, and fasten the transparent cover.

7.2.7 Perform 5.3.

7.3 Replace the water filter every three months

Note: The replacement frequency should be appropriately adjusted according to the frequency of use and the quality of local tap water.

7.3.1 Close the valve of the tap water supply source.

7.3.2 Open the lower door of the chassis, open the pressure relief valve, and close the pressure relief valve after 10 seconds.

7.3.3 Use the filter cartridge wrench (Item 14.2, Attachment 8) to cover the filter cartridge from the lower end of the filter cartridge upwards, then turn clockwise to remove the two filter cartridges.

7.3.4 Take out the old filter element, clean the inside of the filter cartridge, and put the filter element (Appendix 6 and 7 of item 14.2) into the bucket.

7.3.5 Screw the filter cartridge of the PP filter element into the rear filter cartridge seat counterclockwise by hand, then use the filter cartridge wrench (Item 14.2, attachment 8) to cover the filter cartridge from the lower end of the filter cartridge upwards, and then turn the filter cartridge counterclockwise to tighten the filter cartridge. .

7.3.6 Install the activated carbon filter cartridge on the front filter cartridge seat with reference to 7.3.5.

7.3.7 Open the valve of the tap water supply source and observe whether there is water leakage.

8. Fault resolution

Common faults are as follows, the manufacturer can provide technical support

Fault phenomenon	Fault reason	Solution
Available chlorine is abnormal.	①Electrolyzer damage； ②Pump tube aging； ③Less solid salt。	①Replace the electrolytic cell； ②Execute item 7.2； ③Execute item 6.1。
Alarm E1: electrolytic current too high Alarm E2: electrolytic current too low.	①Gas in brine pump pipeline； ②Lack of salt inside； ③Aging of brine pump pipe； ④Brine filter blocked.	①Execute item 5.3.3； ②Execute item 6.1； ③Execute item 7.2； ④Execute item 7.1 。
Alarm E3: Salt water pump frequency too high Alarm E4: Salt water pump frequency too low	①Gas in brine pump pipeline； ②Lack of salt inside； ③Aging of brine pump pipe； ④Brine filter blocked.	①Execute item 5.3.3； ②Execute item 6.1； ③Execute item 7.2； ④Execute item 7.1 。
Alarm E7: Inert agent Solution Tank is empty	Inert agent Solution Tank is empty	Execute item 6.2。
Alarm E8: Pure Water Tank is Empty	RO membrane aging and blocking	Replace RO membrane.
Alarm E12: Pure Water us too high	RO membrane aging	Replace RO membrane.
Alarm E13: Inlet Pressure Low	①Tap water pressure too low ； ②Water filter element blocked； ③Damaged water inlet solenoid valve.	①Increase the diameter of the tap water pipeline and increase the tap water pressure； ②Replace the filter element； ③Replace the water inlet solenoid valve.

9. Performance indicators

9.1 Power supply: a.c. 220V, frequency 50Hz, grounding resistance <100Ω.
Power: 1800VA;

9.2 Water supply:
① Municipal tap water that complies with the "GB 5749-2006 Sanitation Standard for Drinking Water";
②Static water pressure: 0.1～0.3MPa, water pressure when the generator enters water: 0.05～0.2MPa;
③Water temperature: 10～35℃;
④The sewer is smooth and the diameter is ≥30mm.

9.3 Installation and use environment requirements: temperature 5 ~ 40 ℃, humidity ≤ 80%, atmospheric pressure 70kPa～106kPa, good ventilation, no direct sunlight.

9.4 Solid salt purity: above chemical purity, powdered solid salt without other additives.

9.5 Host size: width 870mm, thickness 610mm, height 1780mm;
Host weight: 173kg (without water).

9.6 Hypochlorous acid water properties and physical and chemical indicators:
① Properties: Colorless transparent liquid with slight chlorine smell;
② Available chlorine content: 1200mg/L±10%;
③ pH value: 5.0～6.5.
④ Redox potential (ORP): ≥800mV.

9.7 Water output: 2 0 0 L/h±10%.

9.8 Electrolytic cell electrode life: ≥10000h.

9.9 Type of protection against electric shock:
① Electrical shock protection classification: It belongs to Class I.
② Degree of protection against electric shock: no applied part.
③ Degree of protection against harmful ingress of liquid: ordinary equipment
④ The degree of safety when used in the presence of flammable anesthetic gas mixed with air or flammable anesthetic gas mixed with oxygen or nitrous oxide: it cannot be used in the presence of flammable anesthetic gas mixed with air or mixed with oxygen or nitrous oxide Equipment for use with mixed flammable anesthetic gases.
⑤ Operation mode: It belongs to continuous operation.

10.Quality Guarantee

10.1 After delivery, from the date of machine installation in customer's workshop, it is guaranteed for 1 year (except the easy broken parts and accessories); the working life of the electrolytic cell is guaranteed for 10000h. Beyond the warranty period, the *seller and agent* shall provide lifelong paid technical services.
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10.2 Machine damage caused by human factors and force majeure factors is not covered by the warranty.

10.3 The damage to the machine caused by the use of non-original parts is not covered by the warranty. The use of non-original accessories, materials and software may cause deviations from the working state and technical specifications of the equipment. Please use original parts, materials and software, and repair by authorized maintenance personnel after training by the manufacturer, or by other personnel under their guidance, otherwise, our company will not be responsible for all damages and damages caused thereby. damage.

10.4 The designed service life of this machine is 5 years.

10.5 Production date: see the instrument nameplate.

11. Notes

11.1 Before each use of hypochlorous acid water, the content of available chlorine, pH value and ORP value shall be checked manually (see 9.6). If it exceeds the limit, stop using it and notify the manufacturer for repair.

11.2 Hypochlorous acid is not drinkable.

11.3 Hypochlorous acid water has a certain corrosive effect on metals other than stainless steel, so it should be used with caution.

11.4 Hypochlorous acid water is sensitive to light, and its physical and chemical indicators will decay with time. It should be used as soon as possible after it is produced, and it is best to use it immediately; it should be stored in a dark and airtight environment; it should not be stored at room temperature for more than 3 days.

11.5 When sterilizing items containing more organic matter, the organic matter on the items should be cleaned before disinfection.

11.6 Those with sensitive skin should wear waterproof gloves during disinfection operations.

11.7 Do not mix hypochlorous acid water with other chemicals.

11.8 Since hypochlorous acid water will volatilize a certain amount of chlorine gas, the installation and disinfection application site should have good ventilation. After the disinfection operation is completed, rinse the disinfection site with clean water to avoid discomfort to the human body. It can also avoid long-term use to cause corrosion to the site and pipeline.

11.9 Disposal of instruments and consumables after disposal and disposal of equipment discharges shall comply with local regulations.

12. Transportation and storage of hypochlorous acid generator

12.1 Before packaging, transportation and storage, the pipes in the machine should be flushed with pure water, and then all the liquid in the water tank should be drained.

12.2 After packaging, the generator should be stored between 5°C and 45°C, with a relative humidity of not more than 93%, in a well-ventilated room without corrosive objects.

12.3 The generator shall be packaged in a box, the inner package shall be packaged in a plastic film bag, and the outer package of the generator shall be packaged in a corrugated cardboard box or a wooden box.

12.4 The generator shall be transported by general means of transportation, and shall be protected against rain, moisture, shock and severe vibration.

13 Safety Attentions

Warning:

1) Non-professionals are not allowed to open the electrical box, disassemble or repair the generator, otherwise it may cause personal injury, death or equipment damage.

2) When the machine has water leakage, it is necessary to cut off the power first and then carry out maintenance.

3) Do not install or place the water tank or other items above the machine to avoid damage to the machine caused by liquid leakage.

4) In case of emergency, quickly press the emergency stop button (showed in Figure 4) to suspend the machine; after the danger is relieved, turn the emergency stop button clockwise to restart the machine.

14 Configuration Checklist

14.1 Host ----------1 set

14.2 Attachments:

1) Instruction manual ----------1 pc
2) Product certificate ----------1 pc
3) Warranty ---------- 1 pc
4) Waste pipe 2 ---------- 1 set
5) Lye tube ----------1 set
6) Activated carbon filter element ----------1 pc
7) PP filter element ----------1 pc
8) Filter cartridge wrench ----------1 pc
9) Fuse (16A) ----------2 pcs

14.3 Consumables:

Solid salt ----------10 bottles (500g/bottle)
Inert solution ----------2 bottles(500mL/bottle)

15. Storage, scope and method of use of hypochlorous acid water

15.1 Storage: Hypochlorous acid water should be made of non-metallic materials that are corrosion-resistant and free of leachables, and should be protected from light, airtight, and non-leaching.

15.2 Scope and method of use:

15.2.1 Disinfection of surgical instruments after manual cleaning before sterilization: soak them in flowing rinse for 2 minutes, rinse with clean water for 30 seconds, then dry or wipe with sterile cloth.

15.2.2 Disinfection of endoscopes: According to the requirements of the "Technical Operational Specifications for Cleaning and Disinfection of Endoscopes", first wash with detergent and multi-enzyme lotion, then rinse with clean water, then immerse in hypochlorous acid water, and use special connection The device flushes hypochlorous acid water into each port of the endoscope, soaks it for 3-5 minutes, rinses it with clean water for 30 seconds, takes it out and dry it or wipe it with a sterile cloth.

15.2.3 Disinfection of general medical items: rinse with hypochlorous acid water and soak for 3-5 minutes after cleaning.

15.2.4 Sanitary hand disinfection: first rinse with alkaline reducing potential water for 20 seconds, then flow with hypochlorous acid water for 1 minute, and then rinse with alkaline reducing potential water or clean water for 10 seconds.

15.2.5 Disinfection of the skin: immerse the non-woven fabric in hypochlorous acid water and repeatedly scrub the area to be disinfected for 3-5 minutes.

15.2.6 Sterilization of perineal and vaginal surgery: rinse with hypochlorous acid water for 3-5 minutes.

15.2.7 Disinfection of the oral cavity and pharynx: gargle repeatedly with hypochlorous acid water 3-5 times.

15.2.8 Disinfection of tableware and food processing utensils: Thoroughly clean the surface stains with alkaline reducing potential water or detergent. After rinsing with tap water, rinse with hypochlorous acid water and soak for 10 minutes.

15.2.9 Disinfection of fruits and vegetables: After cleaning with tap water, soak them in hypochlorous acid water for 3-5 minutes.

15.2.10 Disinfection of general object surfaces: after cleaning, rinse and soak with hypochlorous acid water for 3-5 minutes, or repeatedly scrub for 5 minutes.

15.2.11 Disinfection of sanitary ware: After cleaning, repeatedly scrub with hypochlorous acid water or flow rinse and soak for 5 minutes.

15.2.12 Disinfection of the ground: After cleaning the ground, wipe the ground with a mop sterilized with hypochlorous acid water 1-2 times (should be wiped in the same direction).

15.2.13 Disinfection of general fabrics: After cleaning, soak in hypochlorous acid water for 3-5 minutes.

15.2.14 Disinfection of mops and rags: After rinsing, soak them in slightly acidic hypochlorous acid water for 10 minutes.

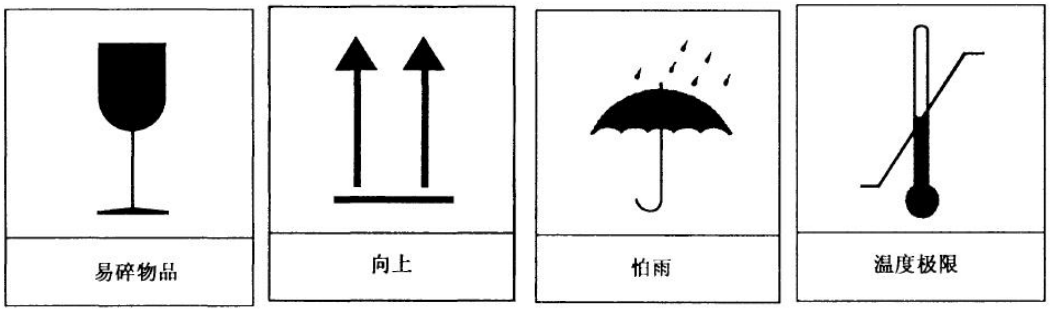
16 Symbol Interpretation

～: AC N: Neutral line

L: The Wire : Protective Grounding

ON: Power On OFF: Power Off

: Be Careful; Danger



Fragile items　　Up　　Fear of rain　　Temperature extremes