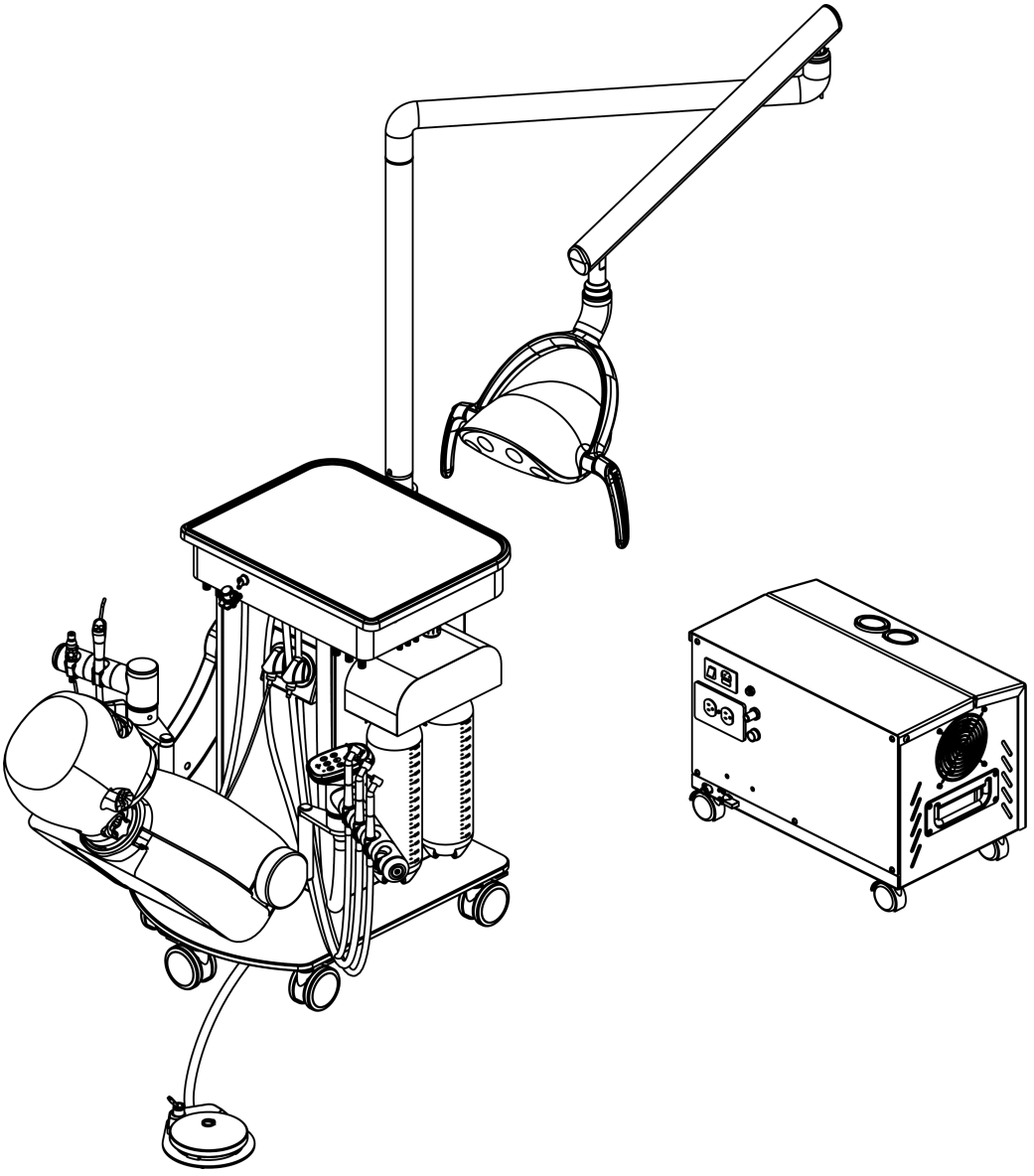
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Self-Contained Dental Simulation System User Manual



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1 Introduction

1.1 Scope of Application

Thank you for choosing Ajax dental simulation equipment! This equipment simplifies the complex structure of the general dental comprehensive treatment machine and retains the main operating functions of the general dental comprehensive treatment machine. The equipment is relatively small and does not occupy space for defecation. It is suitable for teaching.

1.2 Intended Use: For simulation teaching

1.3 Service Life: ten years.

1.4 Cautions

Please read this manual carefully before operation

- Ensure that the whole machine is well grounded;
- This equipment must be repaired by professionals;
- All the electrical parts and connections must be installed by an authorized technician;
- Only fuse and accessories recognized by Ajax can be used;
- Do not use this equipment in high-temperature, high-humidity, vibratile, flammable, or dusty environment;
- This equipment should not come into contact with any object in its operational range of movement;
- Do not touch the bulb and the reflective sheeting of the dental light of the dental light while it is working;
- This device cannot be used in strong magnetic or electromagnetic environment;
- This device should not be used for purposes other than intended use;
- When replacing electrical components, the machine must be switched off;
- The machine must also be switched off before the machine is cleaned or maintained;
- If you need to add functional accessories to this machine, such as scaler, light curing, etc. The selected accessories or instruments must be quality products that have passed the safety certification;

- Transportation, storage environment requirements:

  a. Ambient temperature range: -20℃ ~ +55℃

  b. Relative humidity range: 10% ~ 93%, Including condensation

  c. Atmospheric pressure range: 700~1060hpa.
- Protect the dental unit from rain and large vibration during transportation and handle it with care;
- The packaged equipment must be stored in a well-ventilated room with a relative humidity not exceeding 80% and no corrosive gases;
- The disposal of wastewater and waste must comply with local environmental protection requirements;
- Equipment repair must be conducted by the company's authorized maintenance personnel, unauthorized disassembly and repair can cause fatal damage to the equipment and void the warranty service provided by the company.

1.5 Warnings

- Before operating the dental unit, read the manual carefully;
- All warnings and instructions on the dental unit must be followed during operation;
- The power outlet wiring should be configured according to the standard, and the grounding wire must be securely connected;
- The air pressure of the dental simulation equipment is set at the factory and must not be adjusted at will by non-professionals;
- The action limit of dental simulation equipment is locked and must not be adjusted at will by non-professionals;
- Turn off the main switch of water and air power supply after use;
- To activate the water coolant of handpieces, the Wet/Dry toggle of the foot control must be set to ON. (Valid only for 4-hole handpiece tubes);
- During maintenance and repair, the water and air must be drained before cutting off the water and electricity source, and the water and electricity source must be connected before use;
- Before sterilization, place the 3-way syringe handle and tip in a sterilization bag, then proceed with high-pressure steam sterilization at 134° C (pressure 205.8 kPa), with a sterilization time of no less than 3 minutes;
- Read the user's guide before cleaning and disinfecting high speed handpieces and low speed handpieces;
- When using the fiber optic curing light, be especially careful to avoid damaging the light-emitting end and ensure that the head does not touch the treatment waste, keep a certain distance, or cover the head with a clear barrier film for the first 5 seconds of treatment;
- Any mark left by the waste on the fiber optic curing light must be removed immediately: remove the fiber optic curing light and clean it with a cloth soaked in alcohol;

- Do not direct the light from the fiber optic curing light at the patient's eyes! The emitted light may cause harm to certain patients, such as those with cataracts. Generally, the fiber optic light will not cause lasting damage, but it may induce temporary blindness;
- If working with external equipment for implant procedures, always disconnect the power supply to the dental chair to avoid personal injury that could result from malfunctions or accidental pressing of control buttons;
- Only remove the bur after the high-speed handpiece and low-speed handpiece have completely stopped, otherwise it can cause damage to the chuck and the bur can fall out, leading to personal injury;
- Only use high-quality burs and bolts of the correct size;
- Every day, before starting work, check for damage to the chuck to ensure that the bur is securely held in the handpiece;
- After replacing the high-speed handpiece bur, pull outward on the bur to confirm that it is properly seated in the handpiece;
- The diameter of the bur is between 1.59-1.60 mm (as per ISO 1797, Class 3 standard), and the maximum length is 25 mm (as per ISO 6360-1 standard);
- The high-speed handpiece can only be used when a bur or repair tool is installed;
- Do not press the bur release button when the handpiece is in use, as the friction between the button and the pneumatic motor rotor can overheat the head, potentially causing damage;
- Do not touch the dental light bulb directly with hands. Wait for the bulb to cool down, then wear protective gloves before replacing it to avoid burns;
- Do not touch the PC board or electronic components of the manufacturer with your hands or metal tools;
- Regularly maintain and replace aging accessories, such as dental handpieces;
- Do not use the dental simulation equipment in environments where flammable anesthetics are mixed with air, oxygen, or nitrous oxide.

1.6 Product Information

- **Product Name: Self-Contained Dental Simulation System**
- **Working Conditions:**

① Ambient temperature: 5 ℃ ~ 40 ℃;

② Relative humidity: ≤ 80%;

③ Atmospheric pressure: 86 kPa ~ 106 kPa;

④ Input voltage: AC110V;

⑤ Frequency: 60 Hz;

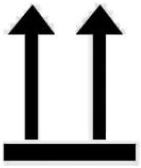
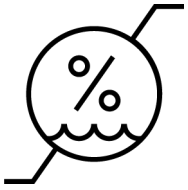
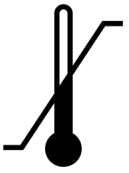
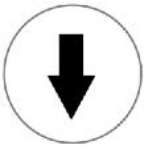
⑥ Water pressure: 200 kPa ~ 400 kPa;

⑦ The air pressure of the input air source shall not be less than 500 kPa, not more than 800 kPa, and the flow rate shall not be less than 50 l/min;

⑧ The ground of the fixed equipment shall be flat, and the deflection angle of the fuselage after installation shall not be greater than 0.5 ° ;

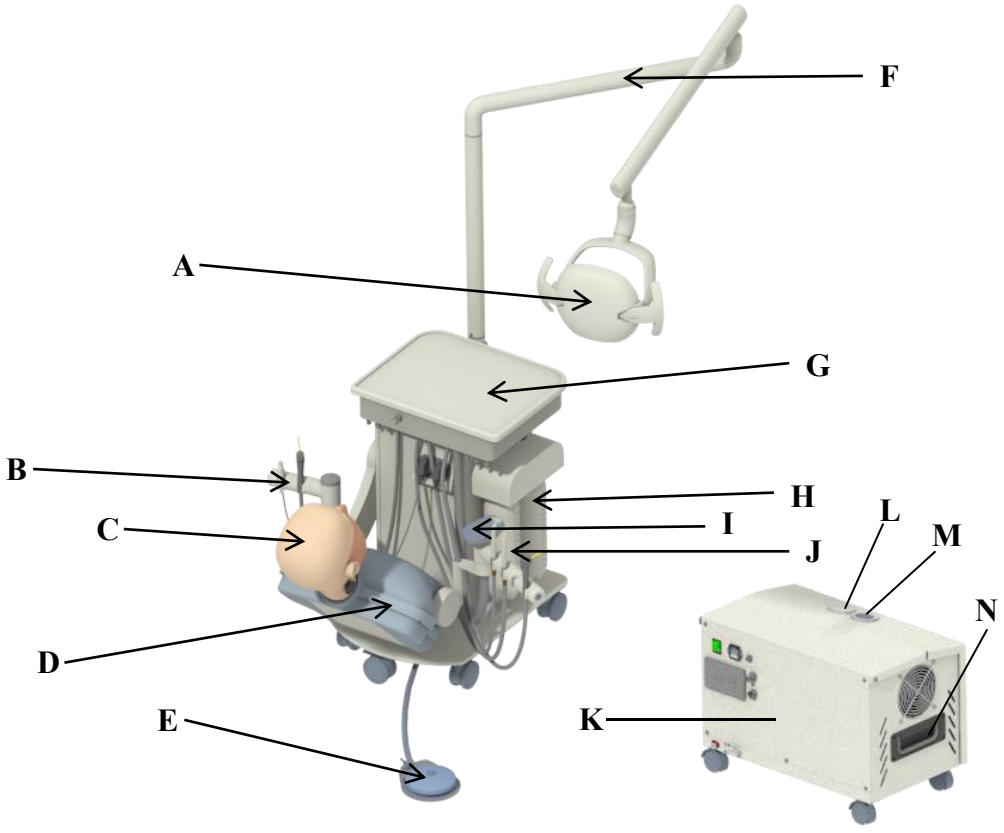
⑨ This equipment cannot be used in high temperature, high humidity, vibration, combustible, unbalanced or dust environment.

1.7 Explanation of Relevant Symbols

 Refer to instruction manual	 Note	 Careful placement
 Keep Dry	 Sun-proof	 Careful placement
 Ground protection	 Humidity limit	 Temperature limit
 Backrest down button	 Backrest up button	 Dental chair up button
 Dental chair down button		

2 Product Overview

The following modules are combined according to the needs of customers.



Schematic diagram of integrated oral simulation teaching equipment

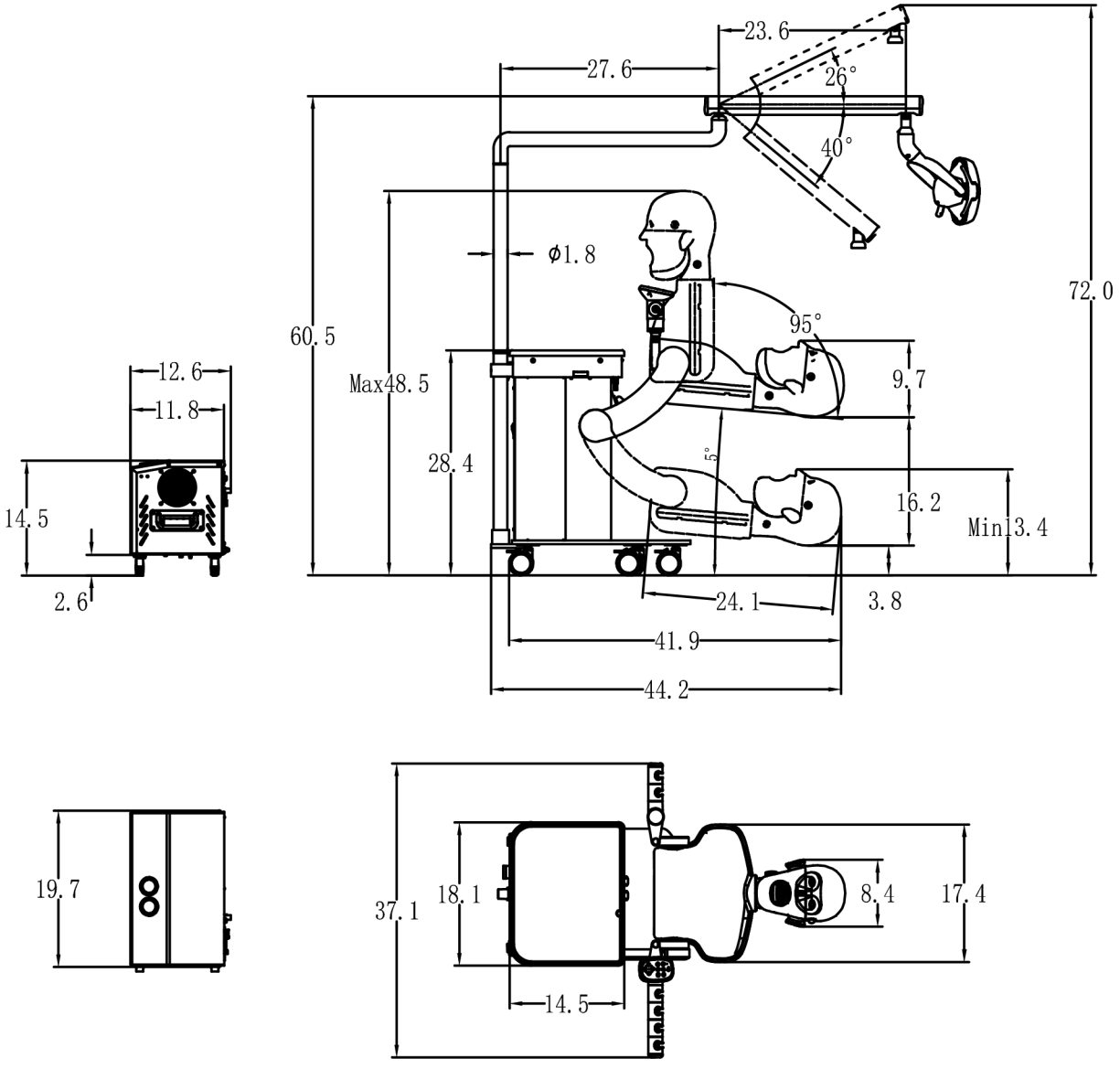
A	Dental Light	H	Recycling bottle
B	Assistant's Holder	I	Main control panel
C	Head mold	J	Water storage bottle
D	Shoulder body	K	Compressor/Vacuum Unit
E	Foot control	L	Negative Pressure Gauge
F	Integrated lamp arm	M	Positive Pressure Gauge
G	Control Head	N	Handle

3 Specifications

Power Input	AC 110 V, 60 Hz
Rated power	1300 VA
Illumination of dental lamp	8000-15000 Lux
Working pressure of high-speed air turbine handset	Pressure: 32 Psi
Working pressure of low-speed air turbine	Pressure: 44 Psi
Inlet water pressure	29-58 Psi
Power cord	3 x 16 AWG
Machine weight-Simulation System	198.4 LBS
Machine weight-Air Compressor	77 LBS

4 Dimensions

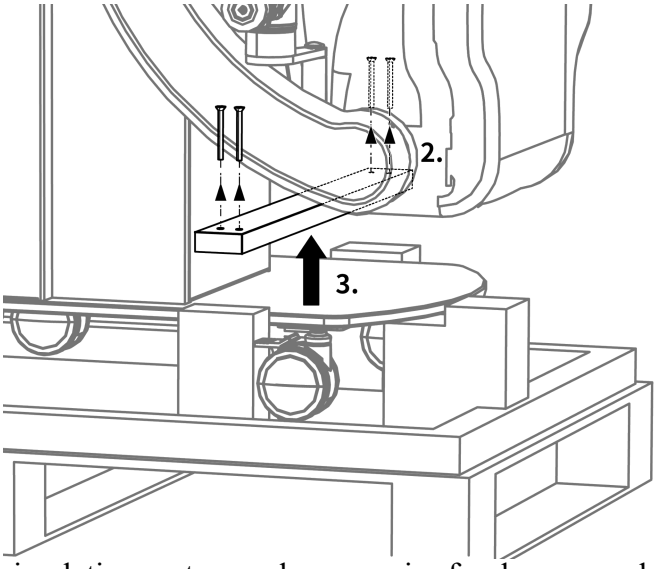
Unit: inch



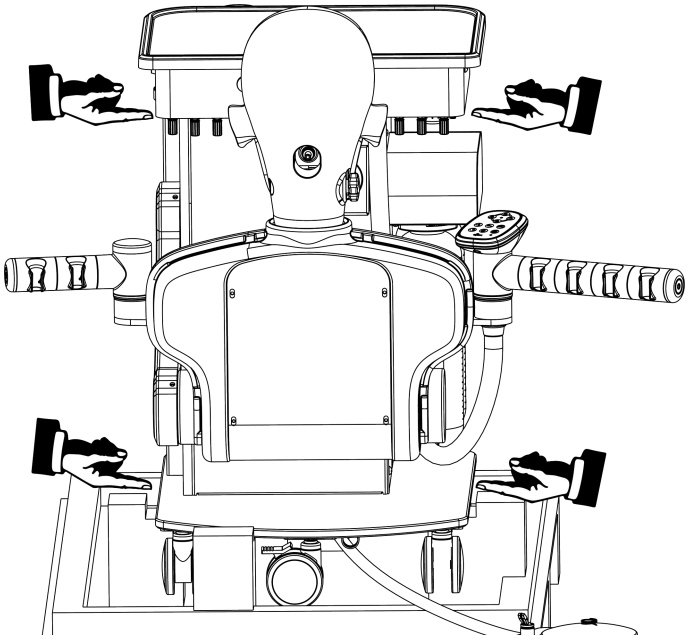
5 Installation

5.1 Unpacking the Self-Contained Dental Simulation System

1. Open the packing case and remove all objects and cardboard from around the self-contained dental simulation system.
2. Loosen the screws on the fixing plate.
3. Remove the fixing plate.

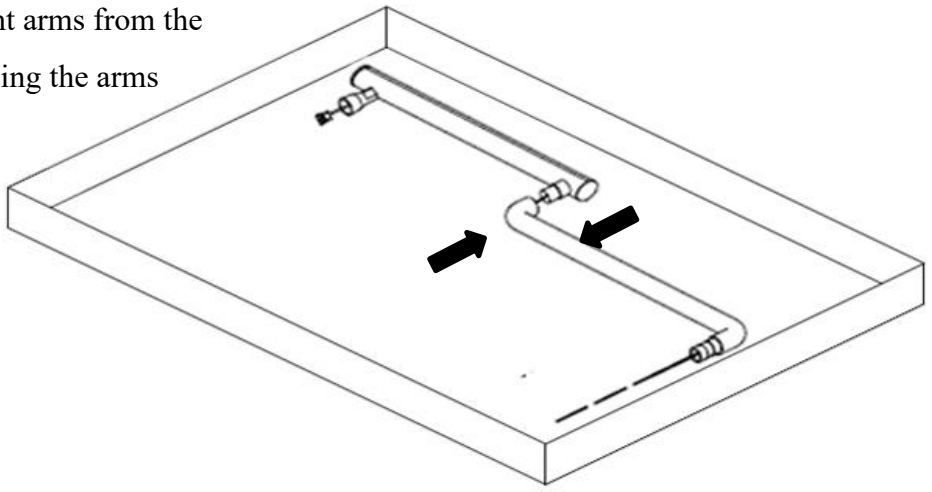


4. Inspect the dental simulation system and accessories for damage and check that all accessories are complete according to the list of accessories.
5. Hold the grab points indicated in the figure.
6. Lift the dental simulation system from the pallet.
7. Move and place the dental simulation system to the expected position.



5.2 Installing the Dental Light

1. Remove the light arms from the box after installing the arms together.

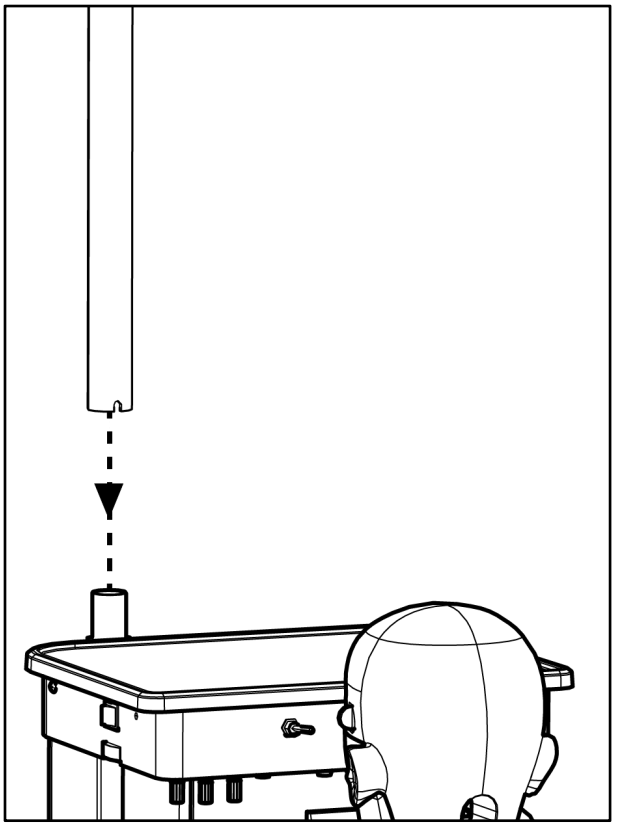


2. Install the notched end of the intermediate post into the post hole of the water unit:

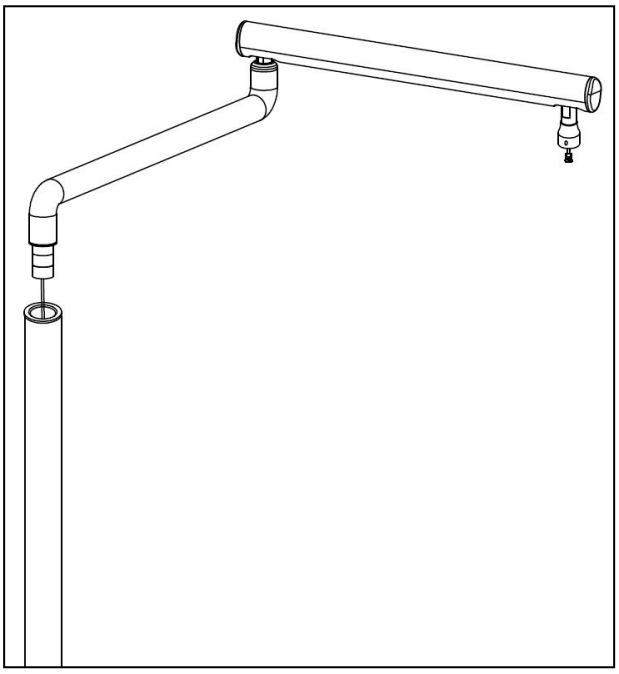
a. Place a trim ring over the intermediate post.

b. Align the notch with the screw head inside the post hole.

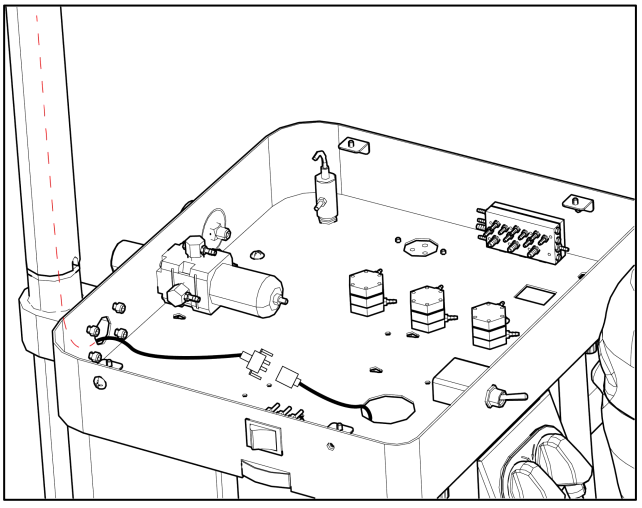
c. Insert the post into post hole until fully seated.



3. Route the light cable from the light post into the intermediate post, with the result that the light cable comes out from the hole of the control head.

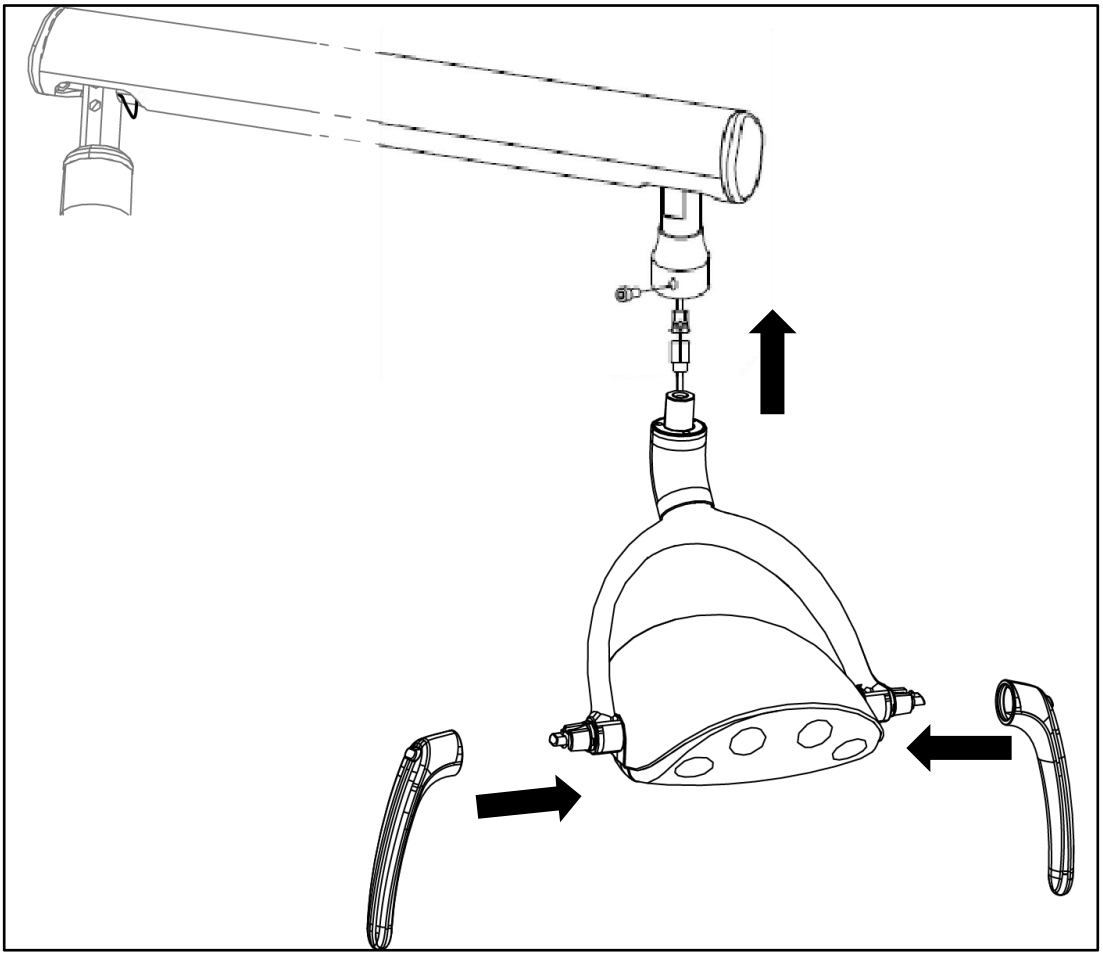


4. Open and remove the control head cover.
5. Connect the light cable terminal to the cable terminal from the control head.
6. Insert the light post into the intermediate post.
7. Install the control head cover back.



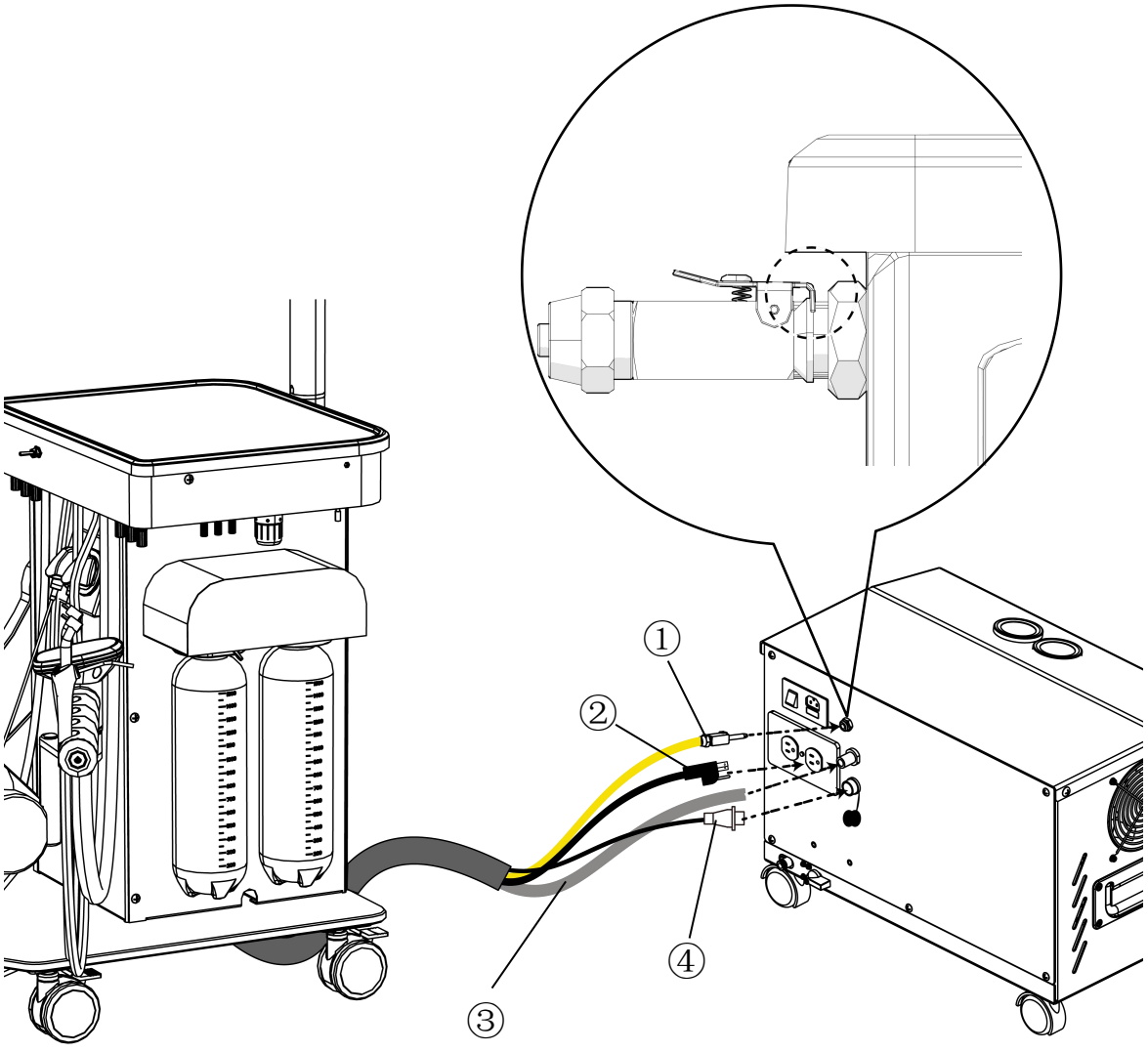
8. Connect the light head cable terminal to the light arm cable terminal.
9. Pull out the light cable between the intermediate post and light post, with the result that the cable terminal enters the intermediate post.
10. Insert the light head into the light flexarm.
11. Securely tighten the screw.
12. Slide the trim ring down into place.
13. Install the light handle.

    Note: Before securing the screws, do not let the light cable bear the weight of the light head to prevent it from falling.



5.3 Connecting to the Portable Compressor/Vacuum Unit

1. Remove the cap of the power receptacle by turning it counterclockwise.
2. Connect the tubings and cables from the convolute to the compressor/vacuum unit as shown in following figure.
   Note: The tab on the quick disconnect need to be tightened against the connector on the air outlet.

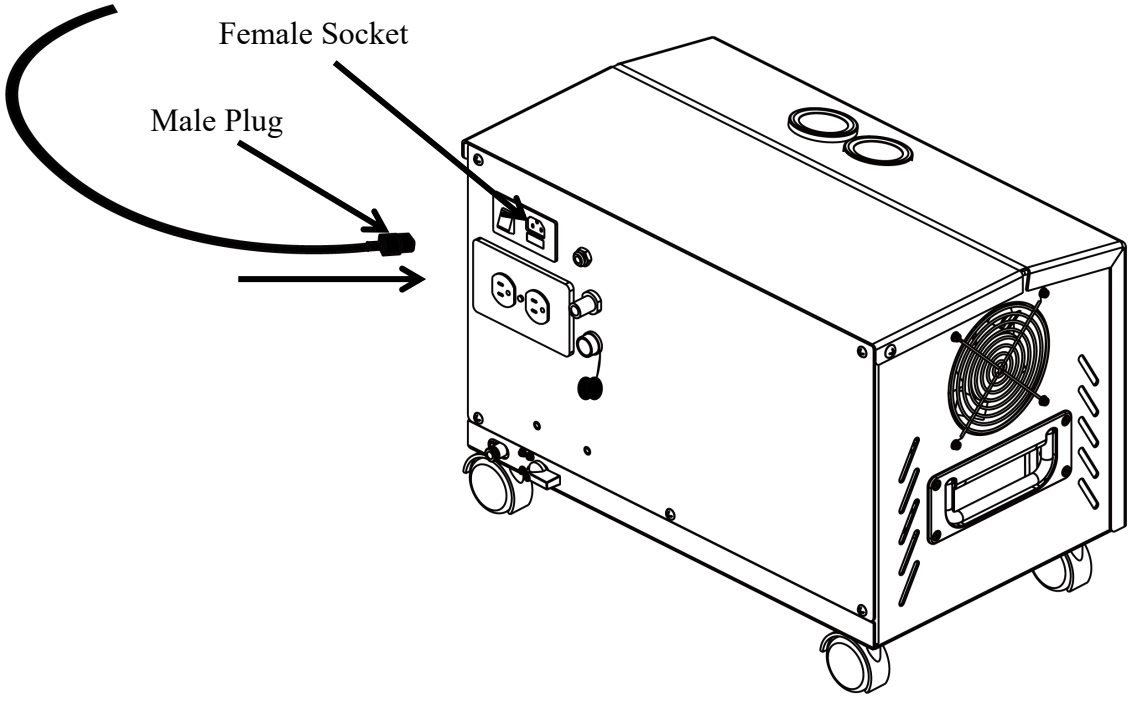


①---------To Air Outlet
②---------To Accessary Outlet
③---------To Suction Inlet
④---------To Power Receptacle

6 Operations

6.1 Turning On or Off the Portable Compressor/Vacuum Unit

1. Insert male plug of the power cord to the female socket of the compressor/vacuum unit.
2. Connect the power plug of the power cord to the power receptacle of the power supply.
3. Press the switch to the **I** or **O** position to turn on or off the compressor/vacuum unit.



6.2 Turning On or Off the Unit

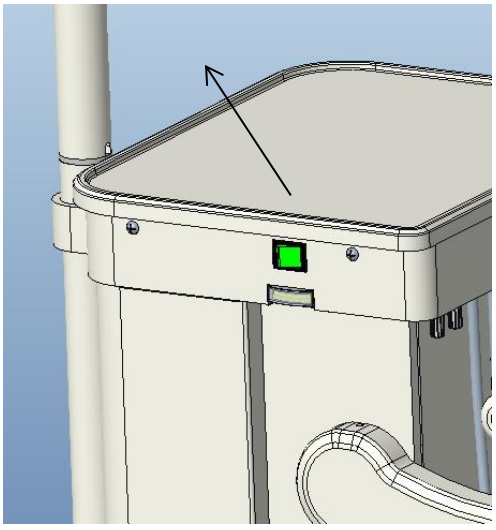
Prerequisite:

The compressor/vacuum unit is powered on. For details, see Section 6.1.

Procedure:

Press the switch to the **I** or **O** position to turn on or off the whole system.

Integrated lamp



6.3 Enabling or Disabling Suction

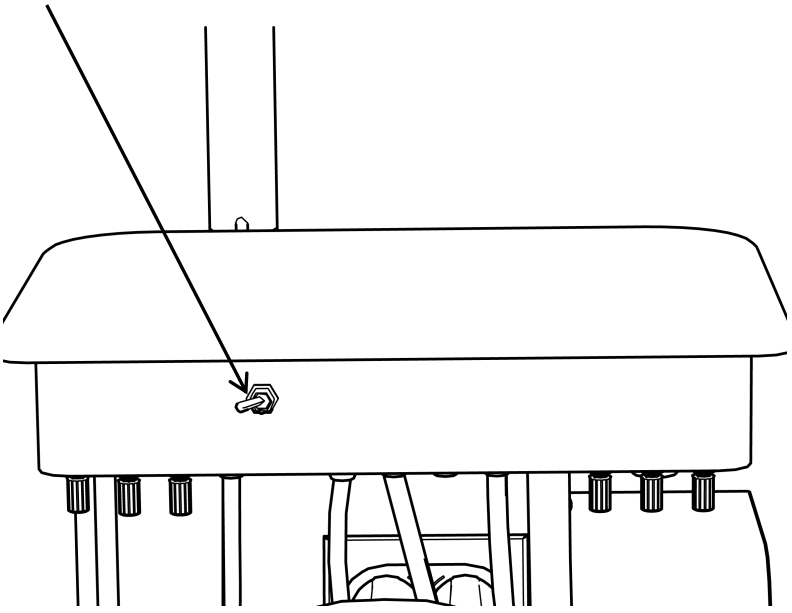
Before turning on the HVE and SE, ensure that the suction function is enabled.

Prerequisite

Portable Compressor/Vacuum Unit is powered on. For more details . see Section 6.1.

Procedure

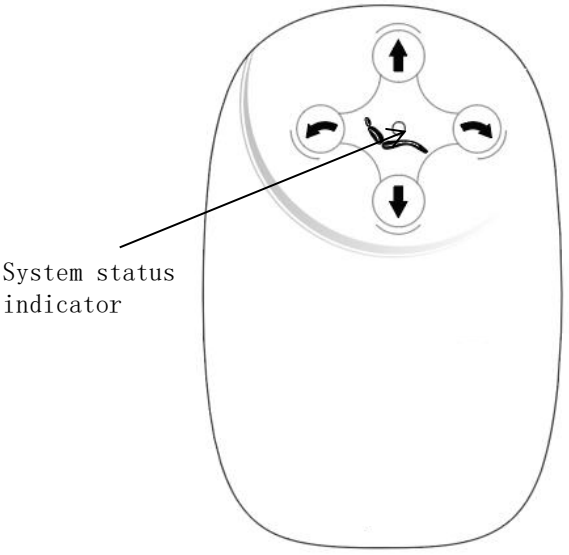
To enable (disable) the suction, flip the toggle switch to the right (left).



6.4 Shoulder Movement

6.4.1 Control Panel

Control panel your dental simulation equipment can choose the following two control panels: standard control panel and luxury control panel.
If the indicator light on the control panel is bright, it means that the system is in normal working state and you can operate normally.
Using the direction arrow on the control panel, you can manually operate the lifting / lowering of the shoulder and the pitching of the shoulder.



Standard control panel

Item	Function
	Backrest up
	Backrest down
	Chair down
	Chair up

6.4.2 Shoulder Position Description

a.Backrest up



Press and hold this button and the backrest will move upwards. When the backrest reach the position you want, you should stop pressing the button, the backrest will stop immediately

Note: If you press the button continuously, when the backrest reach the limit position, it will automatically stop the movement.

b. Backrest down



Press and hold this button and the backrest will move downwards. When the backrest reach the position you want, you should stop pressing the button, the backrest will stop immediately

Note: If you press the button continuously, when the backrest reach the limit position, it will automatically stop the movement

c. Chair up



Press and hold this button and the chair will move upwards. When the chair reach the position you want, you should stop pressing the button, the chair will stop immediately

Note: If you press the button continuously, when the chair reach the limit position, it will automatically stop the movement.

d. Chair down

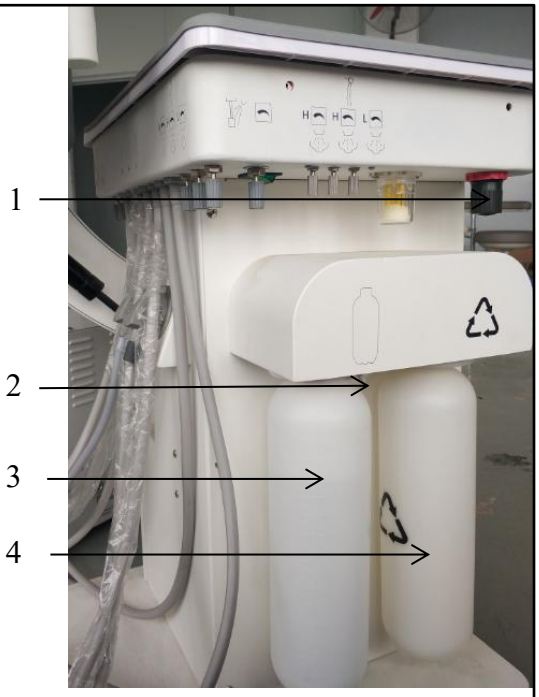


Press and hold this button and the chair will move downwards. When the chair reach the position you want, you should stop pressing the button, the chair will stop immediately.

Note: If you press the button continuously, when the chair reach the limit position, it will automatically stop the movement

6.5 Using the Water Bottle

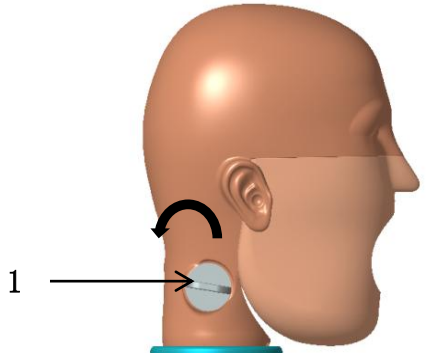
1. Flip the water supply toggle to the **ON** position.
2. If the air pressure of the water bottle is too high or low, which affects the water outlet, the regulating pressure valve should be adjusted.
   (Note: the water volume of the water bottle shall not exceed 1200ml)



1. Regulating valve of water bottle
2. Water supply toggle
3. Water bottle
4. Waste bottle

6.6 Adjusting the Head Mold

Rotate the head mold adjusting knob counterclockwise to loosen the head mold and adjust it to a proper angle, and rotate the head mold adjusting knob clockwise to fix the head mold.



1. Head mold adjusting knob

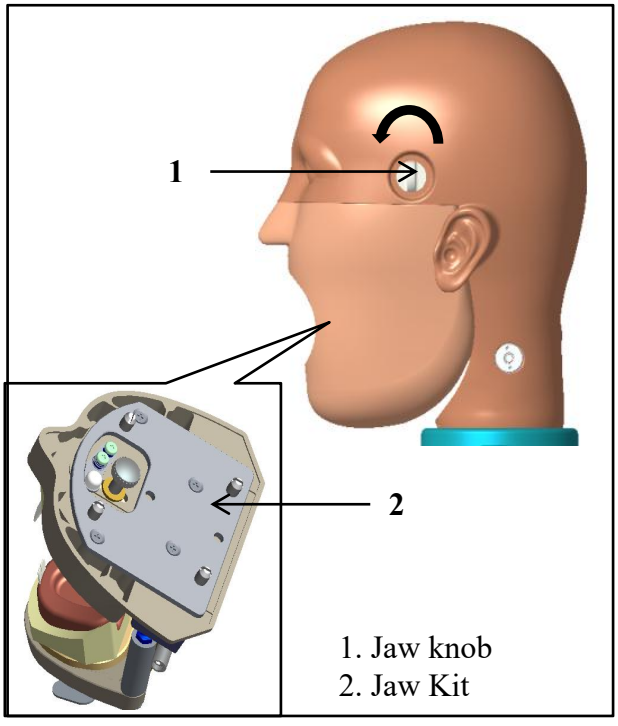
6.7 Closing the Jaw

Press the jaw closing switch to close the jaw.



6.8 Disassembling the Jaw Kit

1. Rotate the jaw knob on the head mold counterclockwise to remove the jaw kit and the mask from the head mold.
2. After installing the jaw set, rotate the jaw knob clockwise to lock the jaw set.

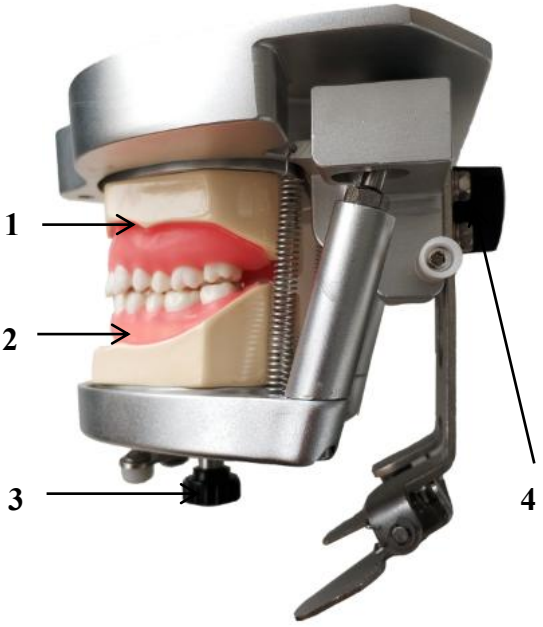


6.9 Disassembling the Upper / Lower Jaw

1. Open the jaw and rotate the lower jaw knob counterclockwise to remove the lower jaw;

2. Open the jaw and rotate the upper jaw knob counterclockwise to remove the upper jaw;

3. After replacing the upper and lower jaws, lock the upper and lower jaw knobs and close the upper and lower jaws; Unscrew the jaw adjustment knob counterclockwise, and adjust the occlusion of the upper and lower jaw with the upper and lower jaw knobs; After adjustment, lock the jaw adjustment knob and the upper and lower jaw knobs clockwise.





1. Maxillary
2 Inferior dentate jaw
3. Lower jaw knob
4. Jaw adjustment knob
5. Maxillary knob

6.10 Disassembling the Teeth

After removing the jaw, screw out the broken tooth with a cross screwdriver, and then lock it after replacement.



6.11 Adjusting the Handpiece

1. Cooling Water Adjustment

① Remove the dental handpiece from the hanger.

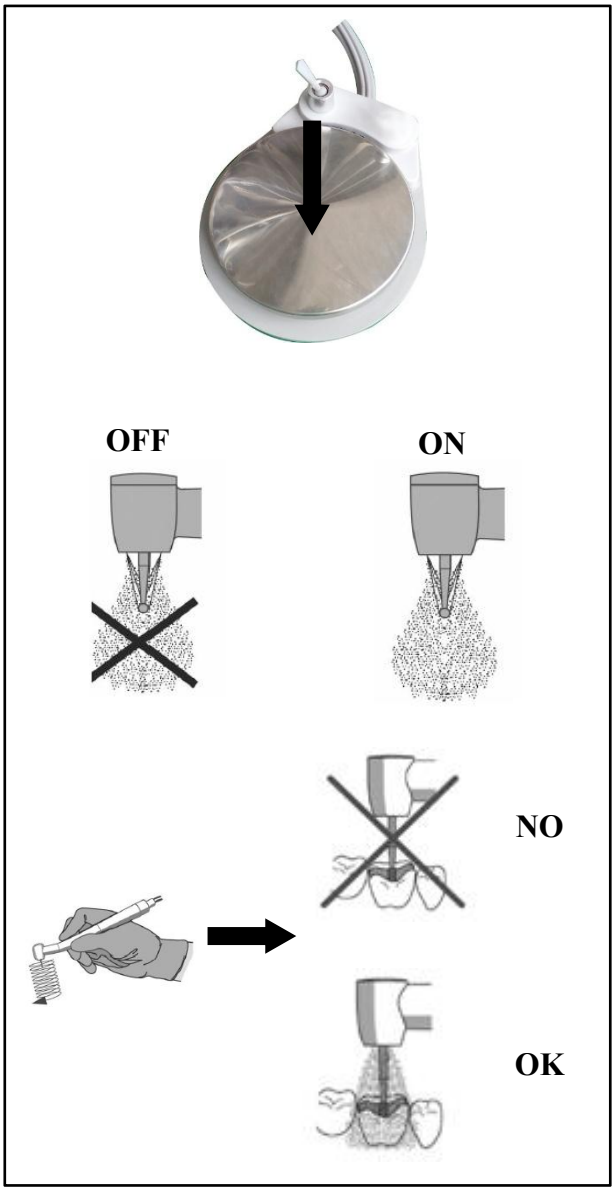
② Turn on the cooling water.

- To turn off the cooling water, please turn the status valve to the position shown in the figure.
- To open the cooling water, please pull the status valve away from the position shown in the figure.

③ Press the foot control to activate the dental handset.

④ Adjust the cooling water flow:

- Turn the controller clockwise to reduce the flow.
- Turn the controller counterclockwise to increase the flow.



2. Drive Air Adjustment of Handpiece

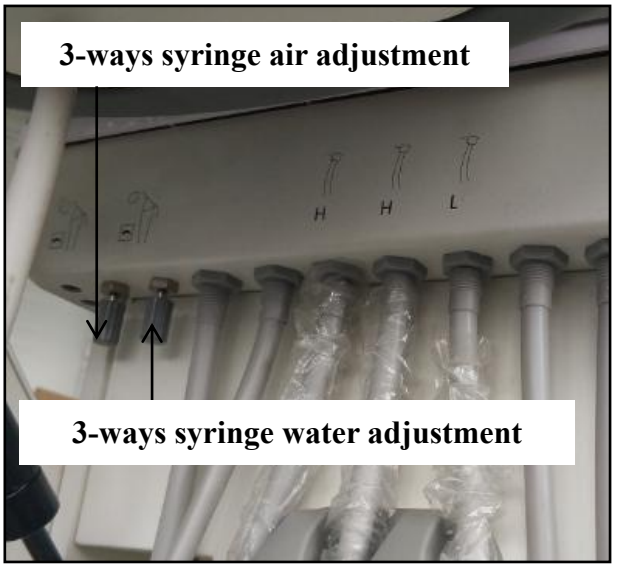
① Remove the dental handpiece from the hanger.
② Find the air controller of the handpiece.
③ Press the foot pedal to activate the dental handpiece.
④ Adjust the drive air of the handpiece to take the ideal atomization effect as the standard.

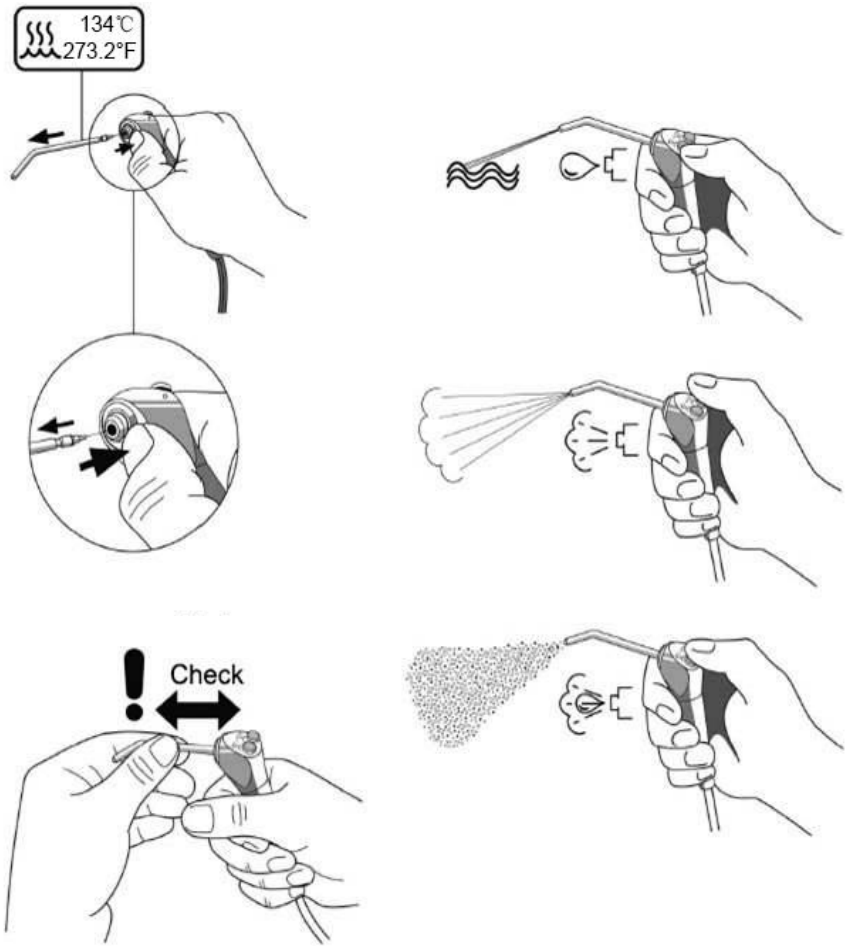
- Turn the controller clockwise to reduce the flow.
- Turn the controller counterclockwise to increase the flow.





6.12 Adjusting the 3-ways Syringe





3-ways Syringe Adjustment

7 Cleaning

7.1 Cleaning the Surface of Dental Simulation Equipment



Equipment surface cleaning

The surface of dental simulation equipment needs regular cleaning and maintenance. During the frequent use of dental simulation equipment: clean the outer surface of oral lamp at least once a week; Clean the assistant unit and handpiece at least once a week; Clean the head form and shoulder at least once a day.

7.2 Cleaning up HVE and SE

Maintain once a week in normal use, and increase the maintenance times in frequent use. The specific maintenance methods are as follows:

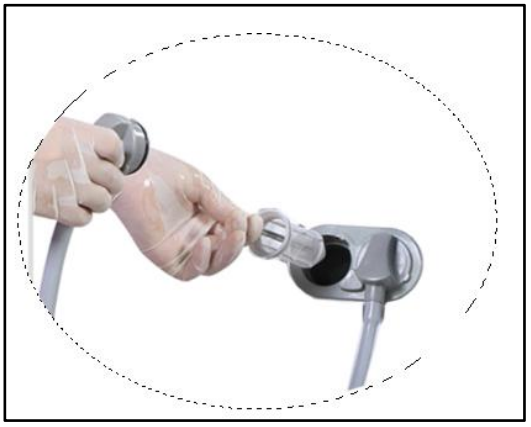
During each cleaning and maintenance, suck 1 liter of water and wash it.

7.3 Cleaning Solids Collectors

HVE and SE solids collectors help in preventing solid substances from entering the suction system. To ensure the normal operation of the suction system, the solids collector must be cleaned at least once a week.

To clean the solids collectors:

1. Turn off the suction system.
2. Pull out and clean the solids collectors.
3. Reinstall the solids collectors.



7.4 Cleaning the Oil Collector

It should be maintained once a week during normal use. If it is used frequently, it should be repaired if the maintenance times are increased.

To clean the oil collector:

1. Unscrew the oil collector cup counterclockwise.
2. Discard the old gauze pad.
3. Place the new gauze pad inside the oil trap cup.
4. Screw the oil collector cup back clockwise.

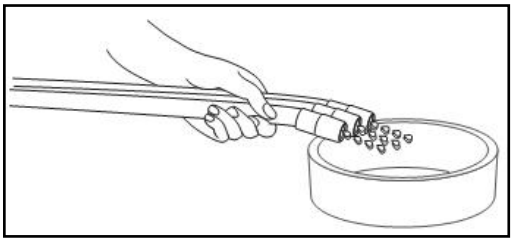


7.5 Handpiece Tubing Clean and Care

Flush Tubing's Independently or together

Use the handpiece tubing flush system can move more water through the tubing's in less time than using the foot control. After each patient:

1. Disconnect the handpieces before flushing the tubing.
2. Gather handpiece tubing that use water coolant and hold them over a sink, cuspidor bowl, or basin.
3. Hold the tubing so that the water is directed away from you and into the receptacle .(picture 21.)
4. Flush the tubing continuously about 20~30min.



7.6 Draining the Compressor/Vacuum Unit

After daily use, drain the compressor / vacuum unit.

Prerequisite

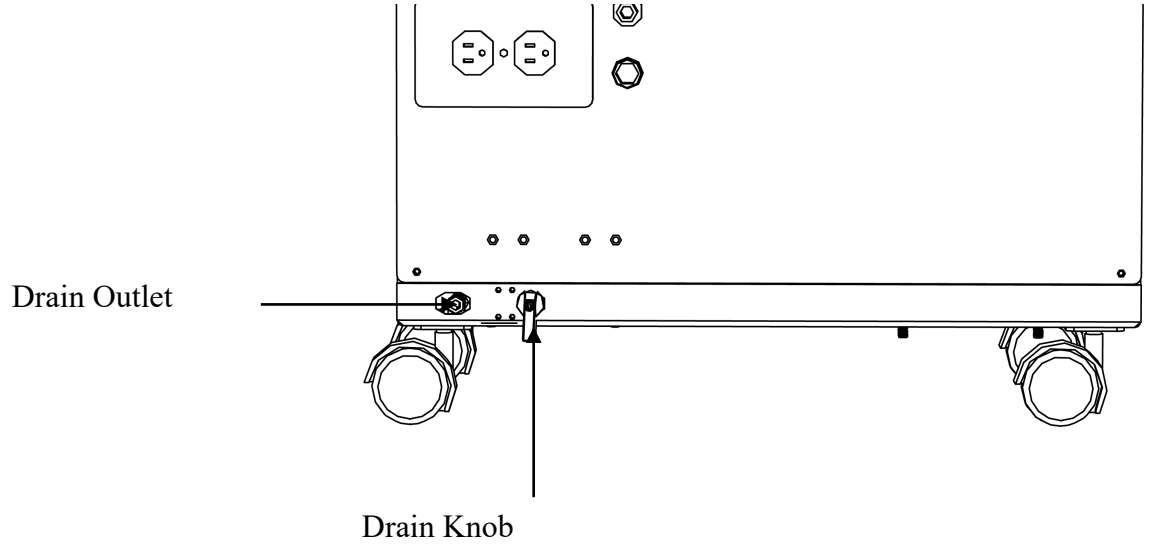
The included drain tube is connected to the drain outlet.

A container is placed under the opening of the drain tube.

Procedure

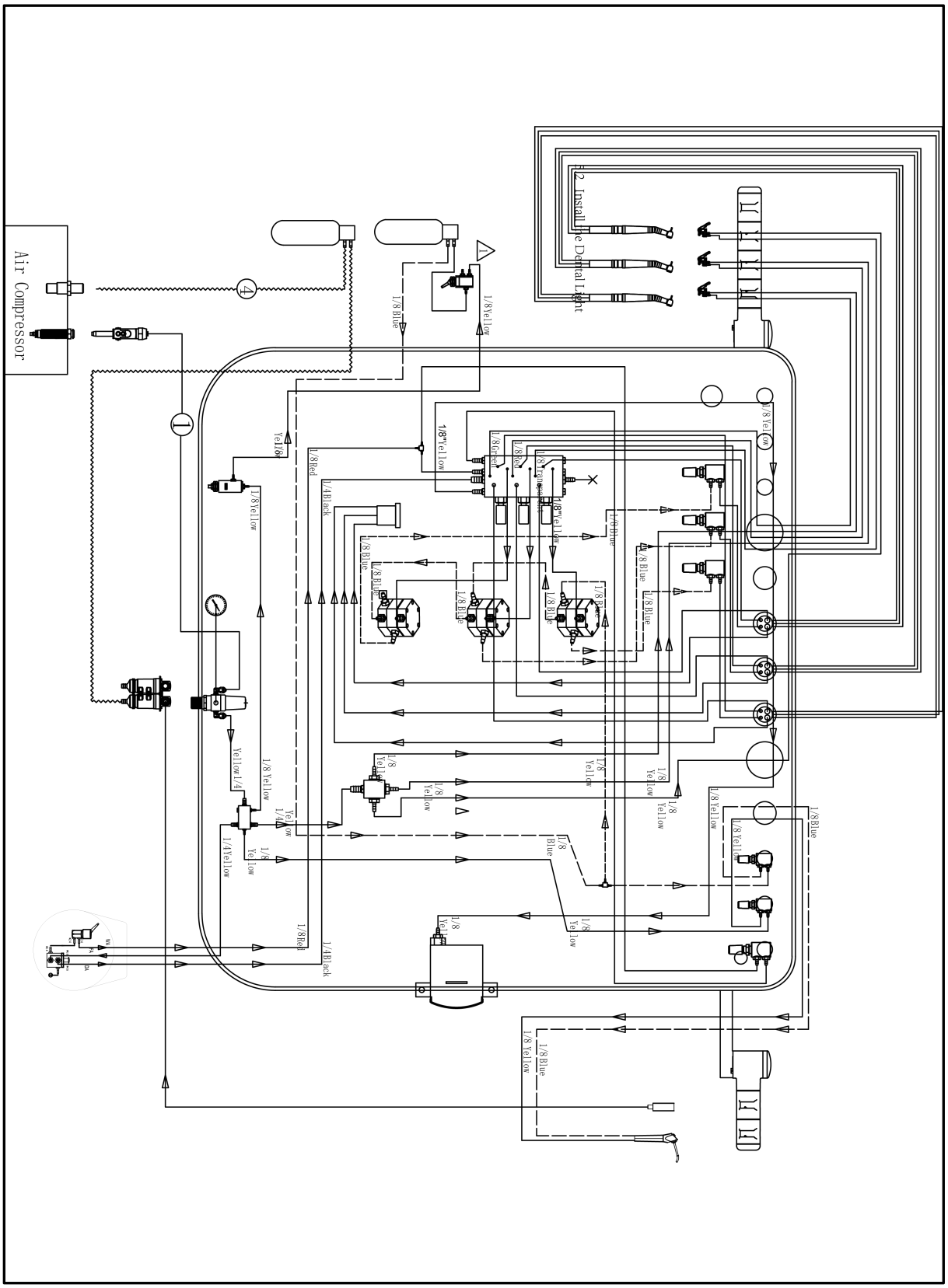
To drain the unit:

1. Rotate the drain knob to the **ON** position.
2. Wait until all water flow out of the unit.
3. Rotate the knob to the **OFF** position.

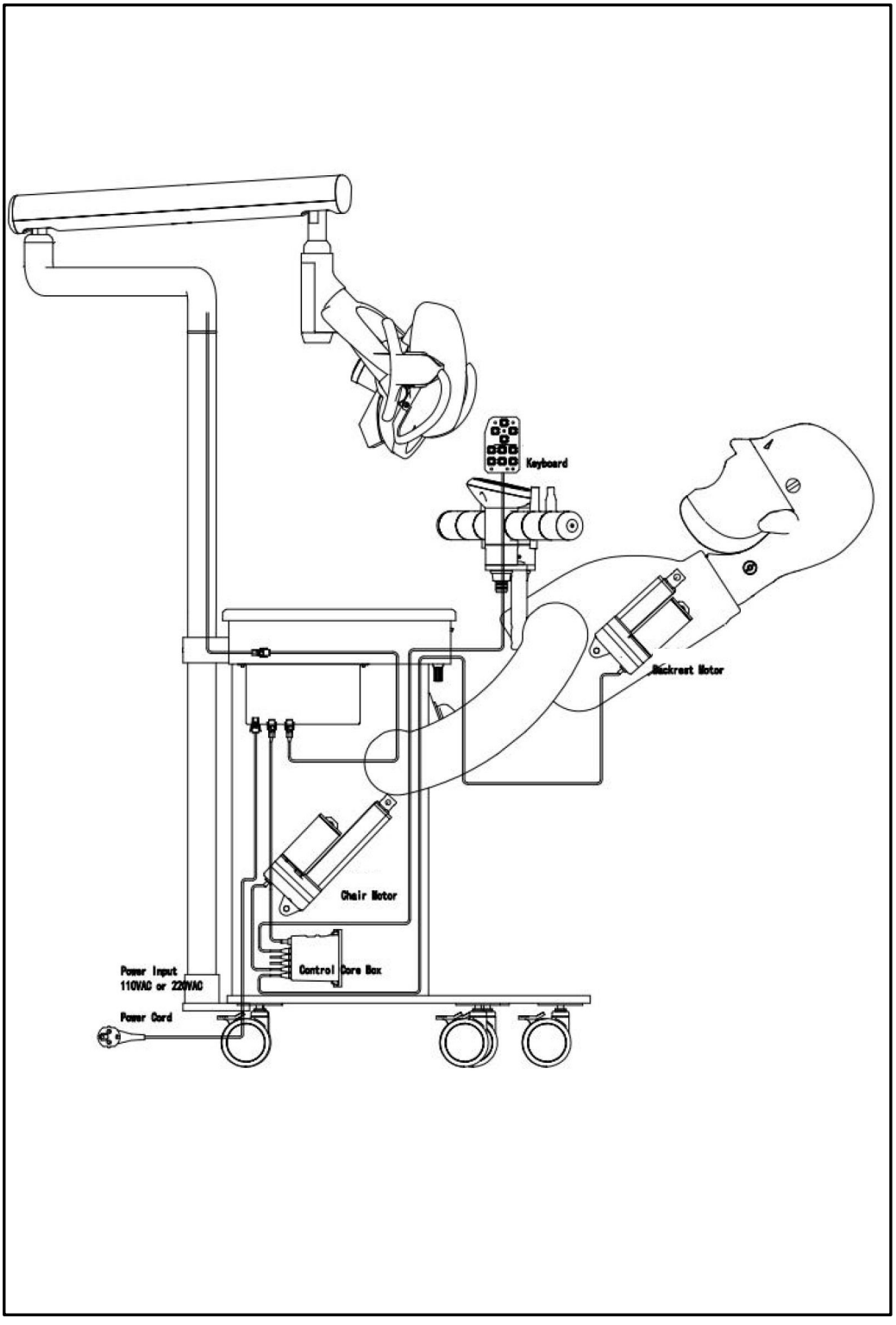


8. Appendix

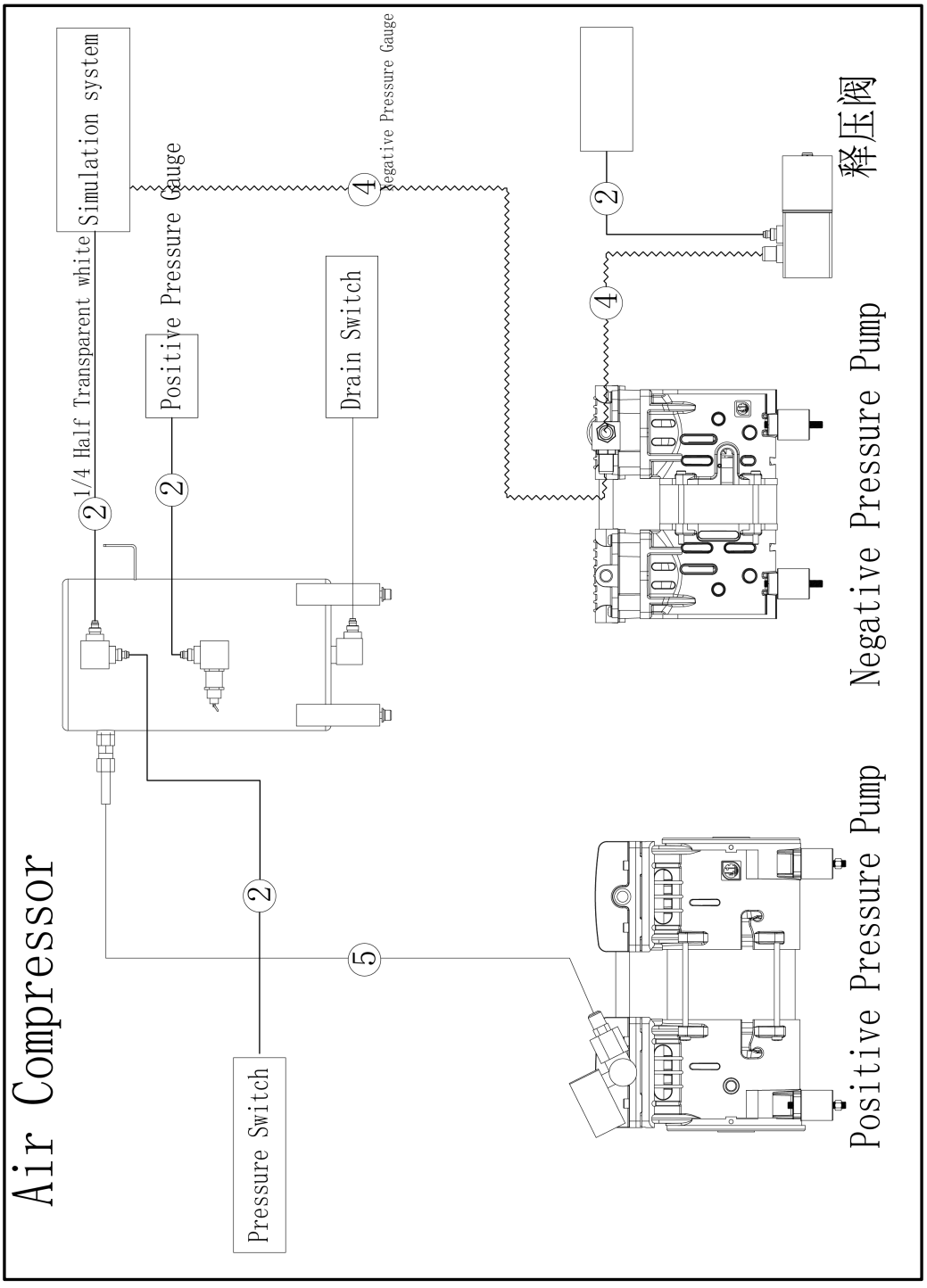
8.1 Water and Air Flow Diagram



8.2 Wiring Diagram



Wiring Diagram (continued)



EMC Statement

Statement of Manufacturer—Electromagnetic Launch		
The dental unit is designed for electro magnetic environment described below. Be sure to apply.		
Lauch Test	Comformance	Electromagnetic Environment
CISPR 11 RF Lauch	1 Group	The dental unit utilizes RF energy for its built-in functions only. Therefore, its RF transmit is very low. There is a low possibility that the equipment will affect other electronic devices in its vicinity.
CISPR 11 RF Lauch	B Class	The dental unit is suitable for all facilities, including household facilities, and can be directly connected to low-voltage public residential power supply.
IEC 61000-3-2 Harmonic Lauch	A Class	
Voltage Fluctuation /Scintillation Launch IEC 61000-3-3	Qualified	

Statement of Manufacturer— Electromagnetic Immunity			
The dental unit is designed for electromagnetic environment described below. Be sure to apply.			
Electromagnetic Immunity Test	**IEC6061 Test Level**	**Test Level Conformance**	**Electromagnetic Environment**
Electrostatic Launch (ESD) IEC 61000-3-3	±6 kV Contact Discharge±8 kV Air Discharge	±6 contact Discharge±8 kV Air Discharge	The floor should be of wood, concrete, or tile. If the floor is covered by synthetic materials, the relative humidity should be at least 30%.
Electrical Fast Transient Burst IEC 61000-4-4	±2 kV to power wire	±2 kV to power wire	The power supply should reach the standard of typical commercial or hospital power supply.
Surge IEC 61000-4-5	±1 kV wire to wire±2 kV ground to ground	±1 kV wire to wire±2 kV ground to ground	The power supply should reach the standard of typical commercial or hospital power supply.
Voltage sags, short interruptions and voltage changes in power input line IEC 61000-4-11	< 5% U_t，lasting 0.5 Cycle (At U_t>95% Sag)40 %U_t，lasting 5 Cycles (At U_t,60% Sag)70% U_t，lasting 25 Cycles (At U_t,30% Sag) < 5% U_t，lasting 5s (At U_t>95% Sag)	< 5% U_t,lasting 0.5 Cycle (At U_t>95% Sag)40 %U_t，lasting 5 cycles (At U_t,60% Sag)70% U_t，lasting 25 cycles (At U_t，30% Sag) < 5% U_t，lasting 5s (At U_t>95% Sag)	The power supply should reach the standard of typical commercial or hospital power supply.If required to use the equipment during power blackout, it is recommended to use battery or uninterruptible power supply.
Power Frequency Magnetic Field (50/60 Hz) IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic field should be at the same level with PFMF in typical commercial or hospital environment.
Note:U_t refers to the AC network voltage before the test.			

Statement of Manufacturer— Electromagnetic Immunity			
The dental unit is designed for electromagnetic environment described below. Be sure to apply.			
Electromagnetic Immunity Test	**IEC6061 Test Level**	**Test Level Conformance**	**Electromagnetic Environment**
Radio Frequency Conduction IEC 61000-4-6 Radio	3V(Effective Value) 150kHz～80MHz	3V (Effective Value) 3V/m	The isolation distance between portable and mobile RF communications devices and any part of the dental air compressor, including cables, should not be less than recommended isolation distance. The recommended isolation distance is calculated by a formula corresponding to the frequency of the transmitter. Recommended isolation distance formula: $d =$ $d =$ 80 MHz～800 MHz $d =$ 800 MHz～2.5 GHz
Frequency Radiation IEC 61000-4-3	3V/m80MHz～5GHz		P—based on the transmitter's maximum rated output power provided by transmitter manufacturer, in watts (W); d—Recommended isolation distance, in meters (m). The field strength of the fixed RF transmitter is determined by surveying the electromagnetic field a, and in each frequency range should be lower than the compliance level. Interference may occur near the equipment marked with the following symbol.
Note 1: At 80MHz and 800MHz frequencies, apply higher frequency band formula.Note 2: These guidelines may not be suitable for all situations. Electromagnetic propagation is affected by absorption and reflection from buildings objects and human bodies.			
The field strengths of fixed transmitters, such as: base stations for wireless (cellular/cordless) phones and terrestrial mobile radios, amateur radios, AM and FM radio broadcasts, and television broadcasts, cannot be accurately predicted theoretically. To assess the electromagnetic environment of fixed RF transmitters, surveys of electromagnetic sites should be considered. If the measured field strength of the dental air compressor is higher than the applicable RF compliance level above, the dental air compressor should be observed to verify that it can operate normally. If abnormal performance is observed, supplementary measures may be necessary, such as reorienting or repositioning the dental air compressor.I n the entire frequency range of 150kHz to 80MHz, the field strength should be lower than 3V/ m.			

Table 206

Recommended separation distance between portable and mobile RF communication equipment and the dental unit

The equipment is intended for use in an electromagnetic environment in which radiated RF disturbance are controlled. The customer or the user of the equipment can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the equipment as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter (W)	Separation distance according to frequency of transimitter		
	150 kHz to 80 MHz $d=\left[\frac{3.5}{V_1}\right]\sqrt{P}$	80 MHz to 800 MHz $d=\left[\frac{3.5}{E_1}\right]\sqrt{P}$	800 MHz to 2.5 GHz $d=\left[\frac{7}{E_1}\right]\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guideline may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

We reserve the right to make any alterations which may be due to technical improvements.



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