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AMERICA

Ritter® Superior
Chair-mounted Dental Unit

Instruction Manual
User Manual
Service Manual

J1181, V03.00.02

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- **Thank you for choosing our product.**
- **It is designed for users to safely and effectively use this equipment. Please carefully read the product instruction manual before installation and debugging as well as operation and maintenance, and properly keep it for future use.**
- **Properly keep the product quality maintenance card, product instruction manual as well as installation and maintenance accessories provided with product.**
- **Please strictly follow the operation instruction when using and properly maintain it.**
- **Any problems arise during using, please contact with local distributor or our company, and we will provide you with excellent service and help.**
- **Commitment: when handling failure, if necessary, we commit to provide users with necessary and more specific technical data.**

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Number	Name	Order Number	Quantity	Unit	Remark
1	**Chair Unit Part**		**1**	**Sets**	
1.1	Dental Chair Part(main body)		1	Sets	
1.2	**Light Arm Part**		**1**	**Sets**	
1.2.1	Light Arm(main body)		1	Sets	
1.2.2	Bowl Rinse Spout		1	p.c.	
1.2.3	Cup Fill spout		1	p.c.	
1.2.4	Spittoon Cover		1	p.c.	
1.2.5	Protective cushion cover		1	p.c.	Spare Part
1.2.6	Water Bottle		1	p.c.	
1.2.7	Operation manual		1	p.c.	
1.2.8	Plastic Membrane		1	p.c.	
1.2.8.1	Saliva ejector tip		1	p.c.	Spare Part
1.2.8.2	Suction tip				Spare Part
1.2.8.3	Suction Fitter				Spare Part
1.2.8.4	Syringe tip		1	p.c.	Spare Part
1.2.8.5	Connector	JPC8-G1/2”	2	p.c.	Spare Part
1.2.8.6	Valve	G1/2”	1	p.c.	Spare Part
1.2.8.7	Fuse	RF1-20:(ø5X20, 0.2A 1A 2A 3.15A 5A 10A glass tube)	2	p.c.	Spare Part
1.2.8.8	Pipe	ø8X1(Blue Black),L=1.5m	1	p.c.	Spare Part
1.3	**Operation Light part**		**1**	**Sets**	
1.3.1	Operation Light (main body)		1	Sets	
1.3.2	Bulb	50W 12V halogen bulb	1	p.c.	
1.3.3	Tools		1	p.c.	
1.4	**Dentist Operating Stool**		**1**	**Sets**	
1.4.1	Seat Cushion		1	p.c.	
1.4.2	Backrest		1	p.c.	
1.4.3	Gas Spring		1	p.c.	
1.4.4	Furcation Truckle		1	p.c.	

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Contents

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I. General

The manual is divided two sections: the first one is addressed to the end-user, the second section one is addressed to the technicians.

The meaning of signs used in the instruction manual is as follows: Attention, Caution and Warning.

Attention: important content is included that deserves attention.

Caution: it comes before some particular operations. The equipment can be damaged once these provisions are violated.

Warning: it comes before some particular operations. The equipment can be damaged and operator can be injured once these provisions are violated.

Warning:

To guarantee the safe and normal operation, this machine shall not be placed in the environment of mixture of the inflammable anesthesia gas with air or oxygen or nitrous oxide.

This unit is IPX0, Class I, Type B APPLIED PART.

Operation method: Continuous operation with intermittent loading. Operation/ interval time: 2min/18min.

The equipment does not cause electromagnetic or other influences at other equipment. It is not susceptible of such influences by other equipment, as it complies with Electro-Magnetic Compatibility Directive 89/336/EEC, emended by 92/68/EEC and 93/68/EEC directives, and it satisfies the requirements of the EN60601-1-2 harmonized standard.

The units is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage supply network that supplies buildings used for domestic purposes.

Floors should be wood, concrete or ceramic tile. If floor are covered with synthetic material, the relative humidity should be at lease 30%.

Mains power quality should be that of a typical commercial or hospital environment.

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Guidance and manufacture's declaration – electromagnetic emission

The *Ritter Superior Chair-mounted Dental Unit* is intended for use in the electromagnetic environment specified below. The customer of the user of the *Ritter Superior Chair-mounted Dental Unit* should assure that it is used in such and environment.

Emission test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR 11	Group 1	The *Ritter Superior Chair-mounted Dental Unit* uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emission CISPR 11	Class A	The *Ritter Superior Chair-mounted Dental Unit* is suitable for use in all establishments, other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage fluctuations/ flicker emissions IEC 61000-3-3		

Guidance and manufacture's declaration – electromagnetic immunity

The *Ritter Superior Chair-mounted Dental Unit* is intended for use in the electromagnetic environment specified below. The customer or the user of *Ritter Superior Chair-mounted Dental Unit* should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floor are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines	±2kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the *Ritter Superior Chair-mounted Dental Unit* requires continued operation during power mains interruptions, it is recommended that the *Ritter Superior Chair-mounted Dental Unit* be powered from an uninterruptible power supply or a battery.

NOTE U_T is the a.c. mains voltage prior to application of the test level.

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Guidance and manufacture's declaration – electromagnetic immunity

The *Ritter Superior Chair-mounted Dental Unit* is intended for use in the electromagnetic environment specified below. The customer or the user of *Ritter Superior Chair-mounted Dental Unit* should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the *Ritter Superior Chair-mounted Dental Unit,* including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance**
Conducted RF IEC 61000-4-6	3 V_{rms} 150 kHz to 80 MHz	3 V_{rms}	$d = \left[\frac{3.5}{V_1}\right]\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = \left[\frac{3.5}{E_1}\right]\sqrt{P}$ 80 MHz to 800 MHz $d = \left[\frac{7}{E_1}\right]\sqrt{P}$ 800 MHz to 2.5 GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol: 

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

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

a) Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the *Ritter Superior Chair Mounted Dental Unit* is used exceeds the applicable RF compliance level above, the *Ritter Superior Chair Mounted Dental Unit* should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the *Ritter Superior Chair Mounted Dental Unit*.

b) Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

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Recommended separation distances between portable and mobile RF communications equipment and the *Ritter Superior Chair-mounted Dental Unit*

The *Ritter Superior Chair-mounted Dental Unit* is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the *Ritter Superior Chair-mounted Dental Unit* can help prevent electromagnetic interference bymaintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the *Ritter Superior Chair-mounted Dental Unit* 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 transmitter (m)**		
	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	**0.1167**	**0.1167**	**0.2334**
0.1	**0.3689**	**0.3689**	**0.7378**
1	**1.1667**	**1.1667**	**2.3334**
10	**3.6893**	**3.6893**	**7.3786**
100	**11.6667**	**11.6667**	**23.3334**

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

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Attention:

- **Air source provided by industrial compressor is strongly prohibited to use.**
- **No load running and over-pressure start of the handpiece is strongly forbidden.**
- **Clean or replace the core of the water filter timely.**
- **No touch of the reflecting mirror is allowed when the operating light is running, in case of the scald.**
- **The dental chair is the continuous running of interval loading, and its running/interval time is 2min/18min.**
- **The operation of heater under dry condition is strictly prohibited.**
- **Adjust the position of the head rest and make sure that it has been locked before using.**
- **Cut off the power before replacing the safety fuse.**
- **No tangible thing shall be placed within the operational stroke of this machine.**
- **The plastic membrane used for packing shall be disposed properly due to its harm to human body and environment.**

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II. Transportation and storage

The product can be transported or stored since it has been properly packed. Under the following ambient conditions; it can be placed fifteen weeks at most:

a) Environment temperature: - 40°C ~ +55°C.

b) Relative humidity: <= 93%

c) Range of the atmospheric pressure: 500 hPa ~ 1060 hPa

d) In well-ventilated room without erosive gasses.

III. Environmental safety

1. Disposal of packing material

All packing material does no harm to the environment and can be completely recycled.

- Wooden base plate

- Carton

- Polyethylene bag

The collection and recycling of packing material are good for saving raw material and disposing substantial waste. Please place the packing material in the specified deposit site of recycle material.

2. Disposal of equipment

The equipment mustn't be used if it reaches its operation life. In view of this, please cut off the power first.

The disposal of equipment won't cause any danger.

To protect the environment, please place the equipment that can't be used any more in the specified deposit site of recycle and non-recycle material.

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Warning: the manufacturer is responsible for the safety, reliability and performance of equipment only under the following circumstances:

- **The installation and any repair or modification is carried out by qualified technician.**
- **The electric wiring of operational site must meet all the effective provisions of installation.**
- **Operate according to operating instruction.**

Manufacturer:

Ritter® Concept GmbH

Distributor:

In case of a warranty request, please contact directly:

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Email: werner@ritteramerica.com

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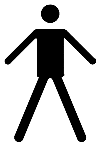
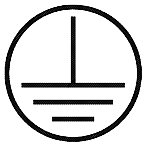
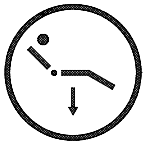
Section one (For end user)

IV. Illustrations

	B-type Equipment		Heating
	Attention! Read Attachment File		Bend Forward
	A/C		Bend Backward
	Protective Grounding		Chair Rising
	Spittoon		Chair Descending
	Mouth Rinsing		Reset
	Set	P1	Preset position 2
P2	Preset position 1	P3	Preset position 3

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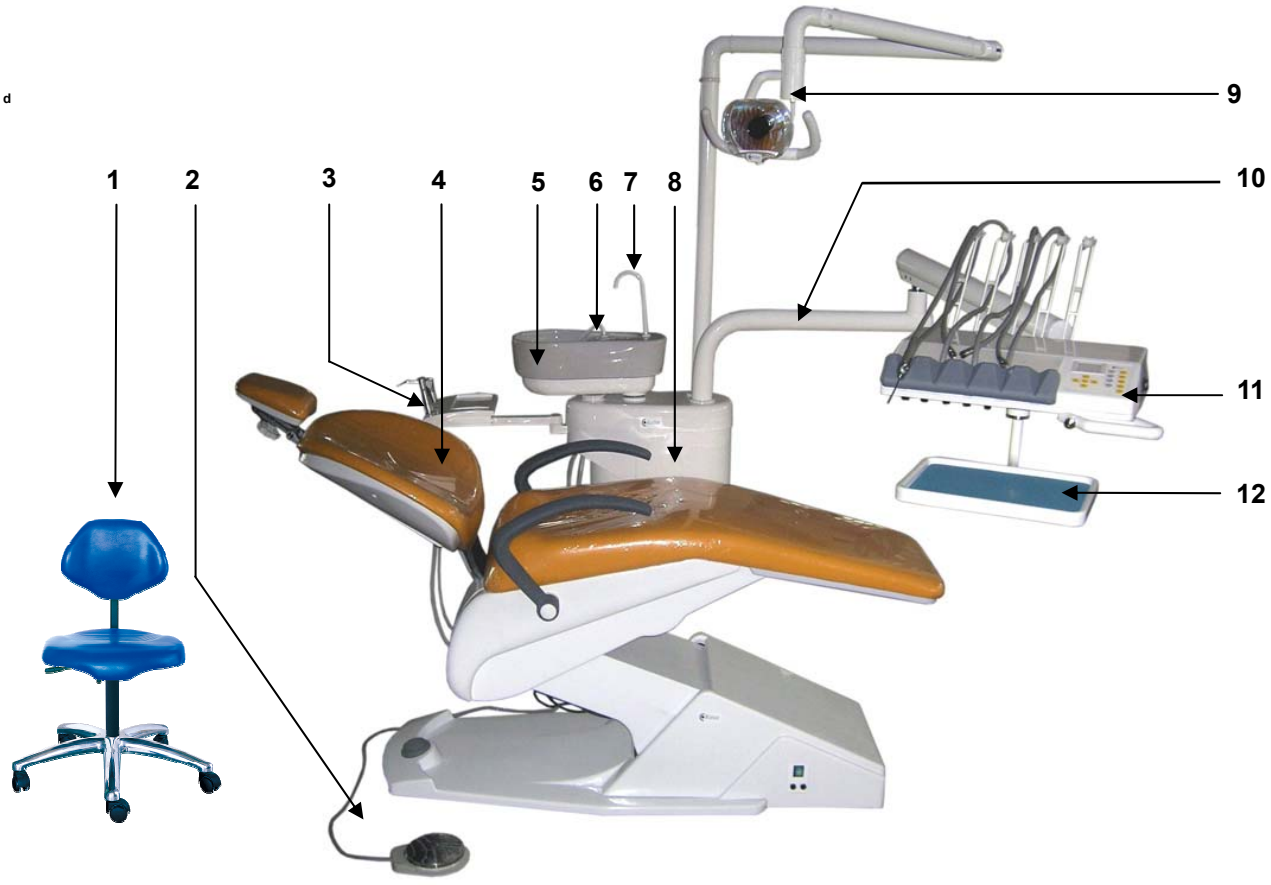
V. Profile

Ritter® Superior type chair-mounted dental unit is suitable for the treatment and operation on oral disease. Ritter® Superior is a fully computer controlled system treatment equipment designed by our company according to ergonomics principle with complete function. As for its operation of complete machine, its fully automatic operation is all controlled by the function key of microcomputer. It is composed of multifunction dental complex treatment unit, electric dental chair and dentist chair. It adopts low voltage DC motor and features with simple structure and convenient operation.

- It is suitable for the treatment and operation of oral disease.
- It is class I and B-type ordinary equipment.
- It is fixed mount equipment.

VI. Structure of complete machine

d



1. Dentist chair	2. Air-controlled feet switch	3.Assistant control assembly	4.Electric dental patient chair
5.Spittoon assembly	6. Bowl rinse	7. Cup fill	8. Dental complex treatment unit
9. Instrument arm assembly	10. Operating light	11. Tray assembly	12. Instrument tray

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VII. Working Conditions

To ensure its normal use, the technical requirements on air, water, electricity and environment are as follows:

- Power supply: voltage ~230V±10% frequency 50Hz±2%, rated power: 600VA
- Air source: without oil, water and impurity
- Air pressure: 0.55~0.80Mpa flow≥50L/min
- Water source: hydraulic pressure 0.2 ~ 0.4MPa flow≥10L/min
- Environment: temperature 5 ~ 40°C relative humidity ≤ 80%
- Atmospheric pressure range:860 hPa ~ 1060 hPa
- Color of water pipe used in the product: blue
- Color of air pipe: Black

VIII. Main technical parameters

Dental chair	Minimum height between seat cushion and floor	≤480mm
	Maximum height between seat cushion and floor	≥780mm
	Backward angle of backrest	≥65°
	Up and down sliding stroke of head rest	120mm
	Maximum load	135kg
Treatment unit	High torque turbine Rotation speed(standard type) Torque(standard type)	 ≥300000 r/min ≥0.06 N·cm
Treatment unit	Air motor handpiece Rotation speed Torque	≥14000 r/min ≥1 N·cm
	Operating light Illumination Color temperature	8000Lux ~ 15000Lux 3000K ~ 6500K
	Negative pressure of Saliva ejector	≥27kPa
	Negative pressure of high vacuum aspirator	≥20kPa

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IX. External dimension of equipment

To ensure its normal operation, please refer to Fig. 2 and keep enough space for clinical use within its safe movement stroke.

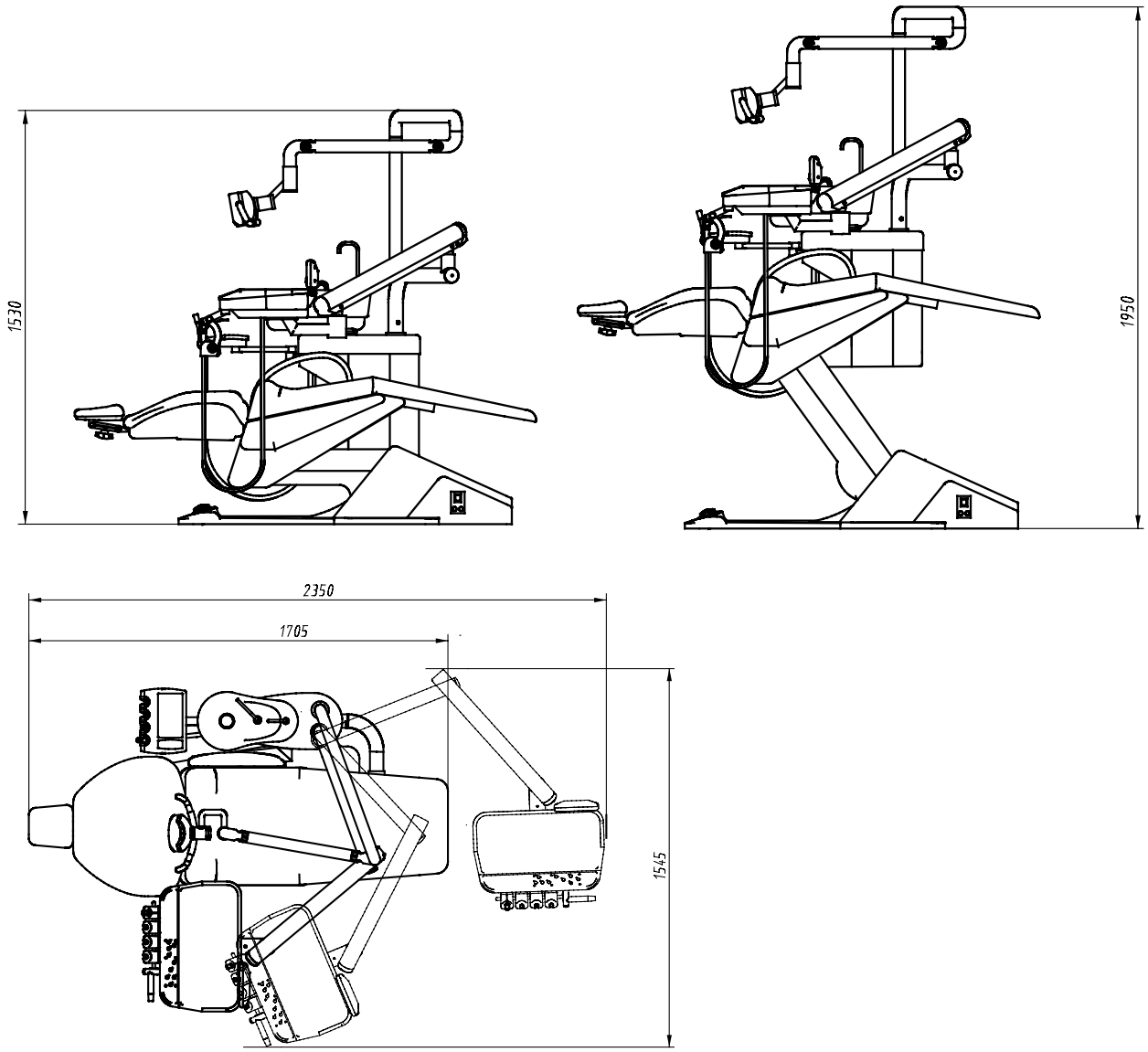

Fig.2 Movement range diagram of the unit

Attention: it will generate a weight of 450 kg in its fixed mount position (Include the load limit).

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X. Operation

XI. Invocate power switch

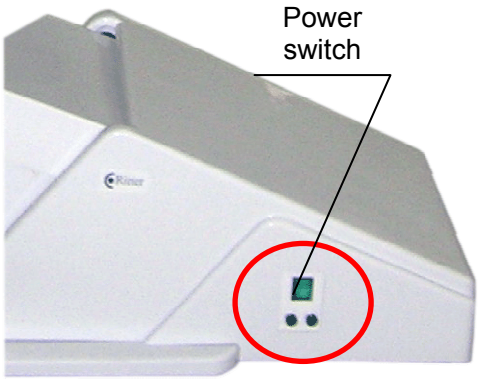

Fig.3 Power switch

XII. Heating of rinsing water

The unit has the automatic isothermal water heater. Please operate as the following to get hot water.

Press the heating button of water heater, the indicating light beside button will be on, and then the water heater will heat automatically till the isothermal state. To close this system, please press this button again, and the indicating light beside button will be off.

Attention: it is heating if indicating light flickers; it has reached preset water temperature if indicating light is on without flicker.

XIII. Water supply of rinsing

Press rinsing water supply button to supply water and it will be closed automatically when it reaches preset water amount.

Attention: during automatic water supply, press this button again will stop water supply.

XIV. Water supply of spittoon washing

Press water supply button of spittoon washing to supply water automatically and it will be closed automatically when it reaches preset time of water supply.

Attention: during automatic water supply, press this button again will stop water supply.

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XV. Installation of handpiece

- Align four holes of joint core with relevant connection pipe of handpiece.
- Align adaptor sleeve with screw mouth of handpiece, gently screw it in, moderately screw it tight until it won't leak.

Fig.4 Installation of handpiece

Attention: No load running or over-pressure start of the handpiece is strongly forbidden.

XVI. Handpiece operation

Take up turbine handpiece from rack and stamp on air control feet switch to start it when the turbine handpiece rotates.

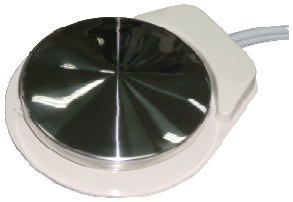

Fig.5 Feet switch

XVII. Air and water pressure adjustment of handpiece

There are air and water regulating valves (Fig. 6) used for adjusting the water vapor of

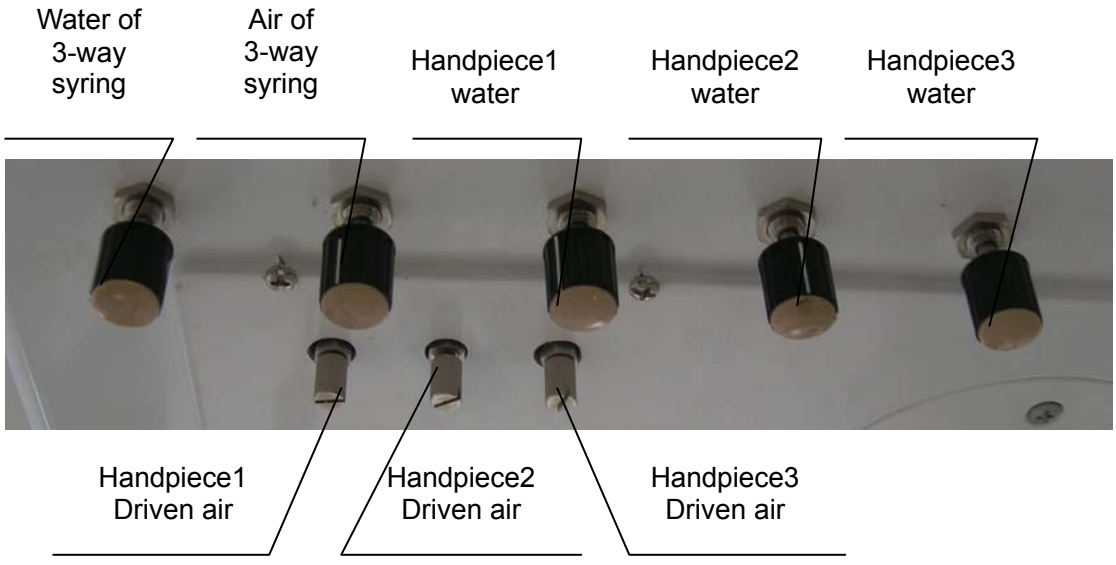

Fig.6 Pressure adjustment of water and air

three-way syringe, driven air, cooling air and cooling water of handpiece on the reverse of instrument tray bottom.

If the adjustment of air and water pressure of handpiece is needed, relevant air and water regulating valves can be adjusted. Rotate clockwise to adjust down the pressure and counter clockwise to adjust up the pressure. Careful and slow adjustment is needed during adjustment.

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XVIII. Installation of three-way syringe

Fig.7 Installation of three-way syringe

- Abut three-way syringe barrel with joint below instrument tray, and screw it tightly.

- Press down spigot ring, then insert nozzle, the nozzle will be locked when the spigot ring resets. (Fig. 7)

Attention: distinguish waterway and airway (the left one is waterway and right one is airway), check if the water and air injected by three-way syringe match with the pattern on the button of three-way syringe.

XIX. Three-way syringe operation

Press down air-out button and water-out button respectively, mist will be sprayed out if these two buttons are pressed at the same time. Check if the spayed water, vapor and mist are suitable. If adjustment is needed, the air and water regulating knob on the bottom reverse of instrument tray can be adjusted (Fig. 6) with the same method as above.

XX. Saliva ejector and high vacuum suction

The unit has two aspirators including saliva ejector and strong aspirator. Take up saliva ejector or strong aspirator from rack to operate aspirator.

After using strong aspirator, impurities will leave inside filter screen cover; therefore the impurities should be taken out and cleared to prevent the obstruction of strong sucker.

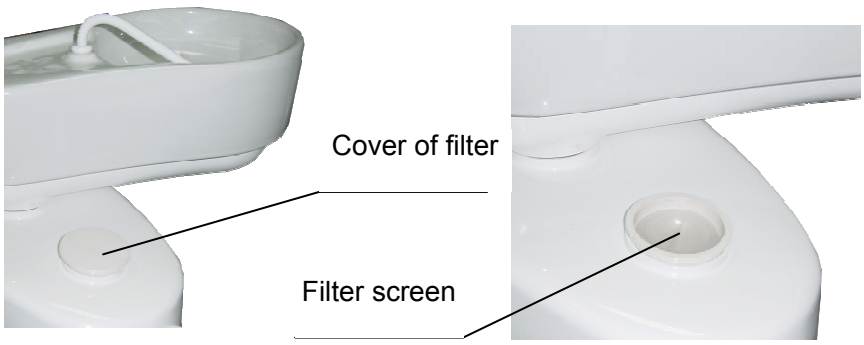

Fig.8 High vacuum filter

The method of taking out the screen cover is as follows:

- Rotate spittoon in 90 degree to see filter.

- Pull out filter screen after rotating filter cover, throw away the impurities and put it back after remounting. Make sure to plug it into the bottom to prevent air leaking, and then mount the filter cover.

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XXI. Water bottle system

The water bottle system consists of water bottle, inlet switch and air/water pipeline system. Uncontaminated water or medical distilled water is put in the purified water bottle for use by high-speed/low-speed handpieces and three-way syringe.

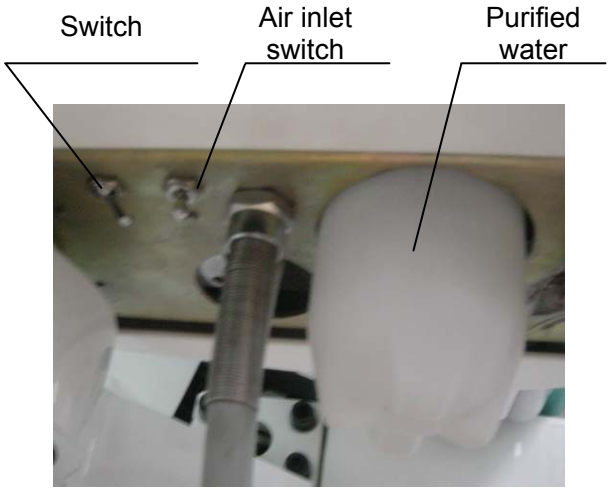

Fig.9 Water purifying device

Method of adding water to purified water bottle:

1) Shut off the inlet switch (at bottom of the box)

2) When the blowing sound cannot be heard at the inlet switch, screw off the purified water bottle counterclockwise.

3) After filling up, clockwise screw the purified water bottle and open the inlet switch. It is now ready for use.

Attention: The water outlet pressure of purified water bottle depends on the pressure of air inlet. Open the ground box cover, check the pressure gauge on the dedicated relief valve, and the reading should be 0.2MPa. If there is any discrepancy, adjust it with the same method as used for the filter relief valve.

XXII. Operation of electric chair

There is spherical feet switch on the base plate of chair. Press the switch according to the direction of arrow to complete movements such as rising, descending, backrest forward and backward, and stop the movement of dental chair by resetting to middle position. Shift it to right, the backrest will bend forward; shift it to left, the backrest will bend backward; shift it forward, the chair will rise; shift it backward, the chair will descend. Simplex function isn't related to the preset position of computer casing originally set and each movement will stop automatically when it comes to extreme position. See Fig.10.

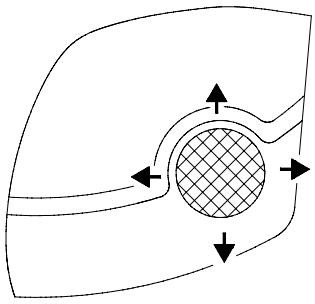

Fig.10 Spherical feet switch

Main control operation board and auxiliary control operation board also have function key of simplex movement of chair. Press the key to start and undo to stop.

XXII.**Operation of preset position of electric chair**

Press P1. No matter where the seat board and backrest of dental chair are, they will surely move to the appropriate memory position of dental chair. When they come to the preset position of chair, the indicating light is off and the chair stop moving.

Repeat the above operation to get into another preset position.

XXIII. Reset button

After patient sitting on the electric chair or after consulting, doctor could press reset button to lower the seat to minimum position and enable the backrest to bend forward to extreme position so that patient can move freely. The specific operation is as follows:

Press auto button once, indicating light will be on and press.  The indicating light will be off and the chair will stop operating when it comes to this position.

Attention: during operation process, no tangible thing shall be placed within the operational stroke of the unit.

XXIV. Head rest

Headrest adjusting knob: the headrest can be adjusted to required position by screwing the knob counterclockwise. Screw the knob clockwise, the headrest will be locked. (Fig.11)

Headstock adjusting button: press the button, the stop plank of headstock can be moved to required position easily. Let go the button, it will be locked automatically. (Fig.11)

Attention: it is not supposed to be used before the confirmation of locking of head holder after adjusting to prevent accident.

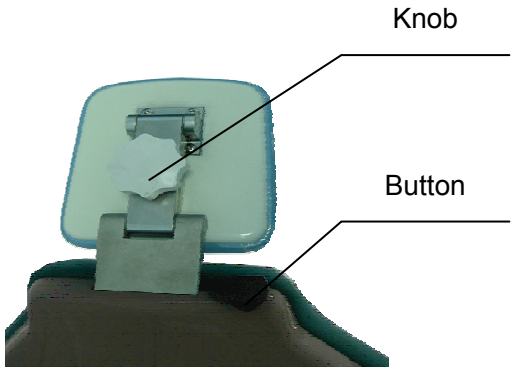

Fig.11 Head rest

XXV. Hand rest

Pull right hand rest about 10mm, then push it down, and then the patient can take his place. Lift it up to reset it to the original place.

Attention: when taking seat, the patient shall sit in the seat frame first, and shall not sit on the foot plate in case of damage on the chair.

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XXVI. Dentist Stool

If it is necessary to lift the seat, the seat can be lifted to appropriate height through up-lifting of air-driven-spring operation handle by the physician with feet support the ground and slight moving-off the seat cushion, and loose the handle to automatically lock the air-driven-spring.

If it is necessary to descend the seat, the physician lifts the operating handle upwards and had better slightly raise feet, and then the seat cushion will immediately descend. Loose the handle until it descend to appropriate position and it will be locked automatically.

XXVII. Cleaning and sterilization

After a period of using, it is necessary to clean and sterilize the equipment regularly.

1. Handpiece

Please refer to the enclosed instruction manual of handpiece for its sterilization.

a) Clean the surface of dental drill with alcohol cotton.

b) Blow it with clean lubricating oil for 2-3s.

c) Wrap it with sterilization package.

d) High-temperature steam sterilization (135°C, 15min, 220KPa).

2. Other instruments

a) High-temperature steam sterilization (135°C, 15min, 220KPa) should be used for three-way syringe.

b) Disposable suction nozzle should be equipped with saliva ejector. Throw away the suction nozzle after treating each patient and replace with a new one before the treatment of next patient.

c) Put the high vacuum suction nozzle in high temperature sterilization box of 134°C to sterilize it for four minutes.

3. Exterior accessories

a) Spittoon: wash it with clear water first, then sterilize it with alcohol.

b) Instrument tray: wash it with clear water first, then sterilize it with alcohol.

c) Dental chair: clean and sterilize it with leather detergent and medical alcohol.

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Section Two (for technicians)

XXVIII. Equipment installation

1. Preparation before installation

According to the layout of consulting room, the lighting conditions and the convenience for use, confirm the position of the ground box and the position of the whole equipment in accordance with Fig. 12 and the form of ground box.

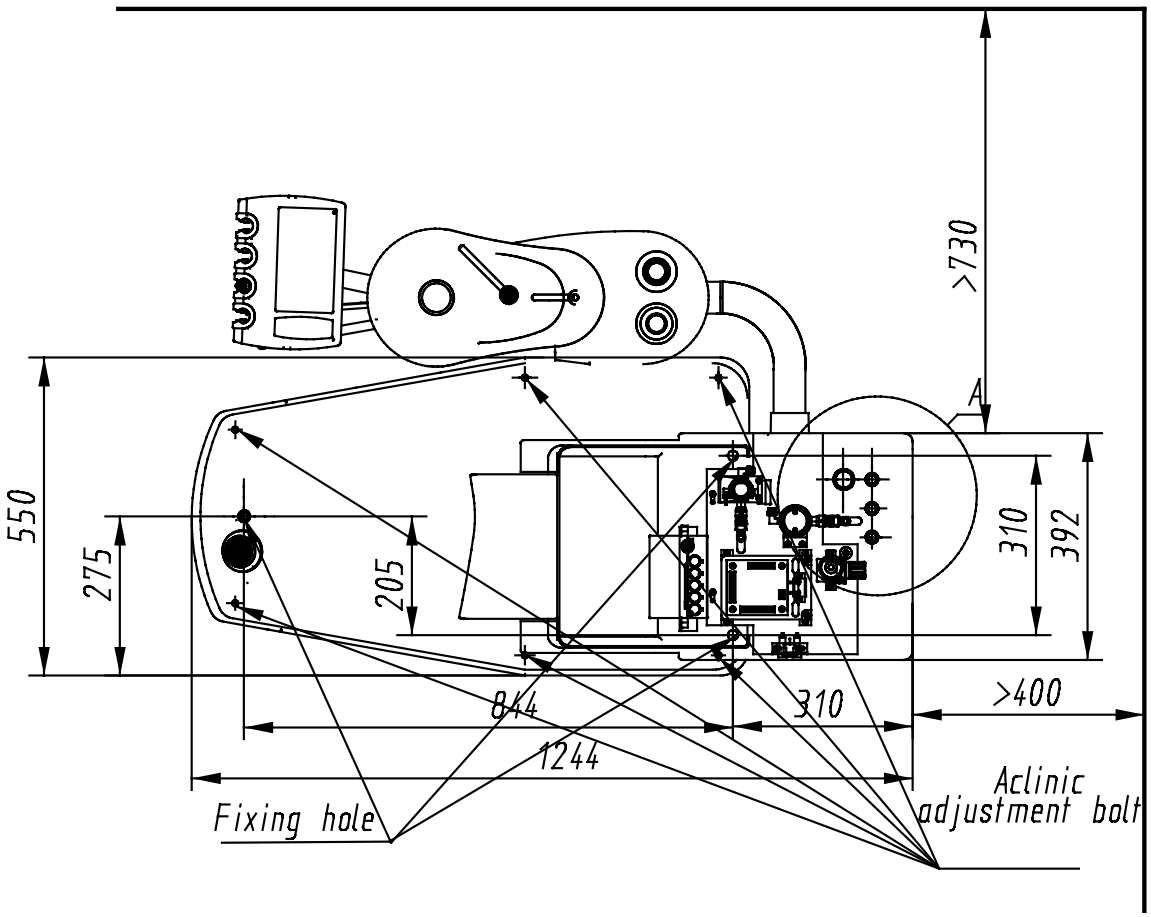

Fig.12 Layout of whole unit

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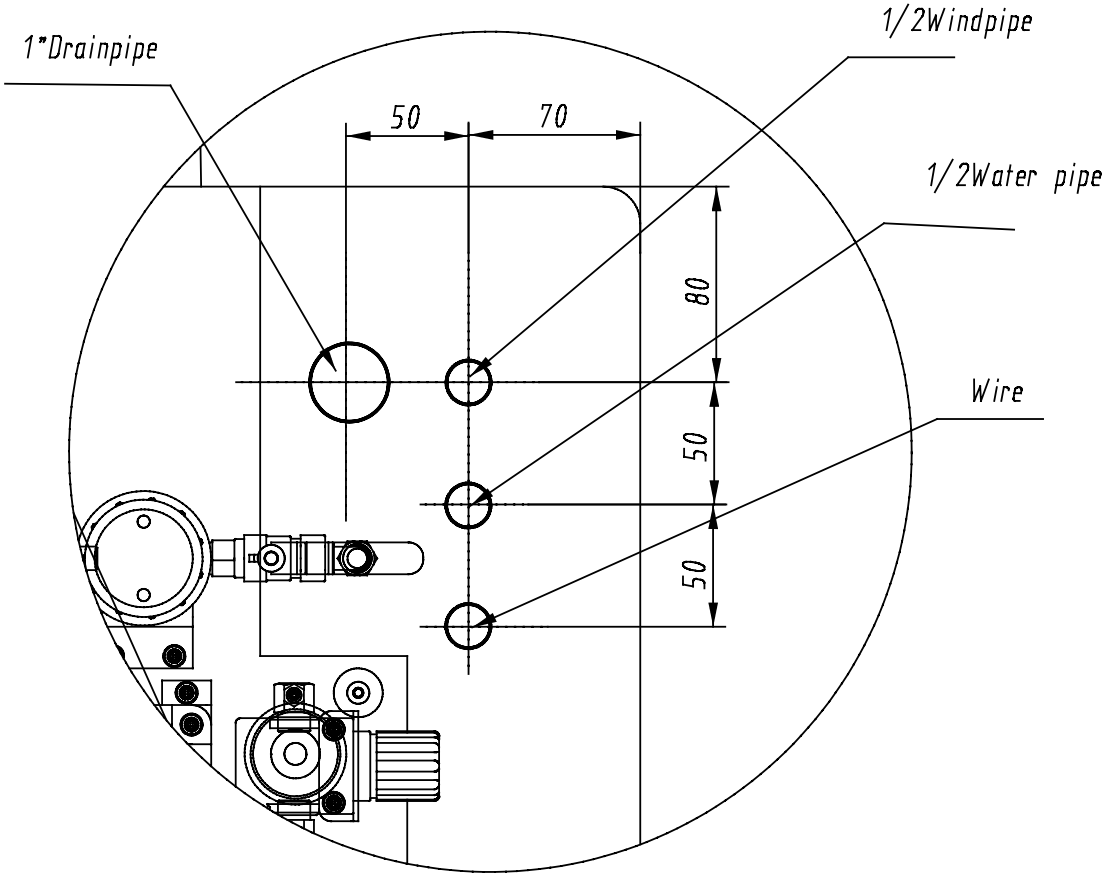

Attention: the following items should be noted during equipment installation.

- **If there is interference between equipment motion part and environment arrangement (other equipments).**
- **The impact on structure and use caused by direct sunshine should be prevented.**
- **The placement of equipment should take the rationality of pipeline layout and personnel passing into consideration.**
- **The placement of equipment should meet the environmental requirements on cleaning, dryness and ventilation.**
- **The ground that the equipment contacts during installation should be flattened, smooth and firm.**

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2. Pipeline layout

The pipeline layout can be started after the determination of equipment placement position. Generally speaking, one-piece dental treatment equipment usually adopts the installation mode of geosynclines type that could conceal pipeline at present. According to different floors, the construction of pipeline could adopt floor laying (pay attention to the sealing with peripheral floor), preformed geosynclines and lower isolated layer piping.

Within 200×200mm around the position of the ground box, preset the gas inlet pipe, the water inlet pipe and 1.5mm² 3-core shielded wires, and connect the ground protection. See Fig.13.

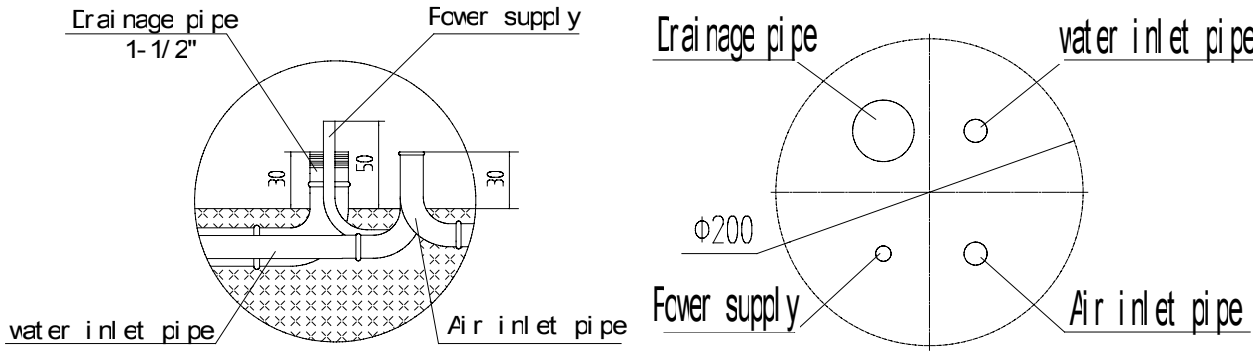

Fig.13 Reference diagram of pipeline

Specification and above ground level of water pipe, air pipe and power cord pipe:

Name	Specification	Above ground level	Remark
Water inlet pipe	ø 15mm($^1/_2$ ")PPR pipe	30mm	Orifice screw-threadG$^1/_2$ "
Air inlet pipe	ø 15mm($^1/_2$ ") aluminum plastic pipe	30mm	Orifice screw-threadG$^1/_2$ "
Drainpipe	ø 40mm(1$^1/_2$ ")PPR pipe	50mm	
Power cord pipe	ø 15mm($^1/_2$ ")PPR pipe	50mm	

The power cord should be 3-core shield patchcord of 2mm^2 and the length of bare power cord pipe should be 400mm.

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3. Installation step

• Uncase examination

Before opening the box, please examine the upper and lower side as well as the surrounding of box-plate to see if there is damage due to collision and drench due to rain, then open the box and check parts and accessories by referring to "packing list" to see if it is in good condition. Any queries, please contact with the distribution unit immediately or enquire with our company.

Caution: The opening process of external packing should be properly and orderly to avoid injury to equipment and personnel.

• Placement of dental chair

Properly place dental chair according to the preset position. (The ground used for placing dental chair should be smooth, firm and neat, because its design doesn't adopt foundation setscrew in view of the stability of complete machine. If the ground isn't smooth, the usability will be affected or even cause accident.)

If the ground isn't sooth, adjust six screws on the base plate of chair to make the equipment in proper condition.

• Connection of pipeline and circuit

• Connection of air pipe and water pipe (Fig.14)

Properly connect valve, straight-through joint and (ø 8×1) PU pipe with water (air) inlet pipeline. (Pay attention to sealing and strictly prevent leaking.)

• Circuit connection

As showed in "electric wiring diagram", properly connect power cord and protective ground. Properly connect the power connector and control line connector between treatment unit pipe and dental chair, which must be tight and firm.

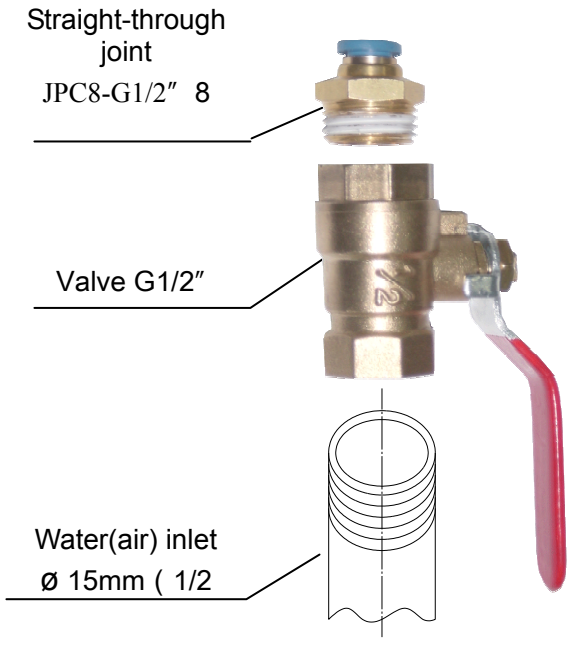

Fig 14

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• Seat cushion installation

⇒ Switch on the power and open the backrest of dental chair to backward position.

⇒ Align two screws on the front lower part of seat cushion with two holes on the chair before inserting.

⇒ Use the screw on the back lower part of seat cushion to fix with dental chair.

• Installation of operating light

⇒ Insert the wire on the lamp arm into lamp post first and then properly connect them.

⇒ Abut the wire connector on lamp arm with the connector inside the post of treatment unit body, and put it into the post.

⇒ Thrust lamp post into post and properly install lamp arm. Don't damage wire.

⇒ Dismount screw on cold light operating light and abut the wire connector on lamp arm with the connector inside cold light operating light (connect firmly).

Fig.15 Installation of operating light

⇒ Insert operating light into lamp arm and fix with screw.

• Installation of cup fill spout and bowl rinse spout

Insert the cup fill spout and bowl rinse spout into the relevant holes. shown as the picture.(Fig 16)

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XXIX. Function debugging

1. Adjustment of filter relief valve

Check the inlet pressure gauge inside the front ground box of dental chair and its value should be 0.5MPa. The pressure has been properly adjusted before release and the following methods can be used to tune it into 0.5MPa if any discrepancy arises.

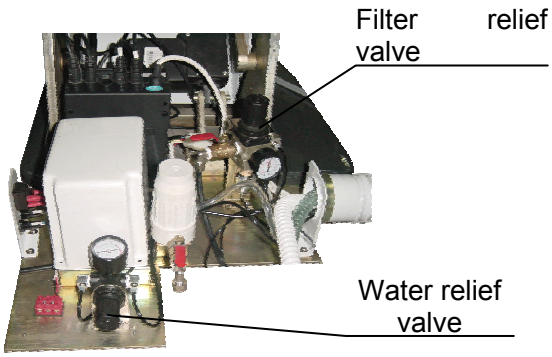

Fig.17 Filter relief valve

Open the cover of ground box first, pull up the spindle on top of filter relief valve about 10mm (Fig.17), then rotate the spindle. Rotate clockwise to adjust the pressure upwards and counter clockwise to adjust the pressure downwards. After adjustment, press down spindle.

2. Main controlling board

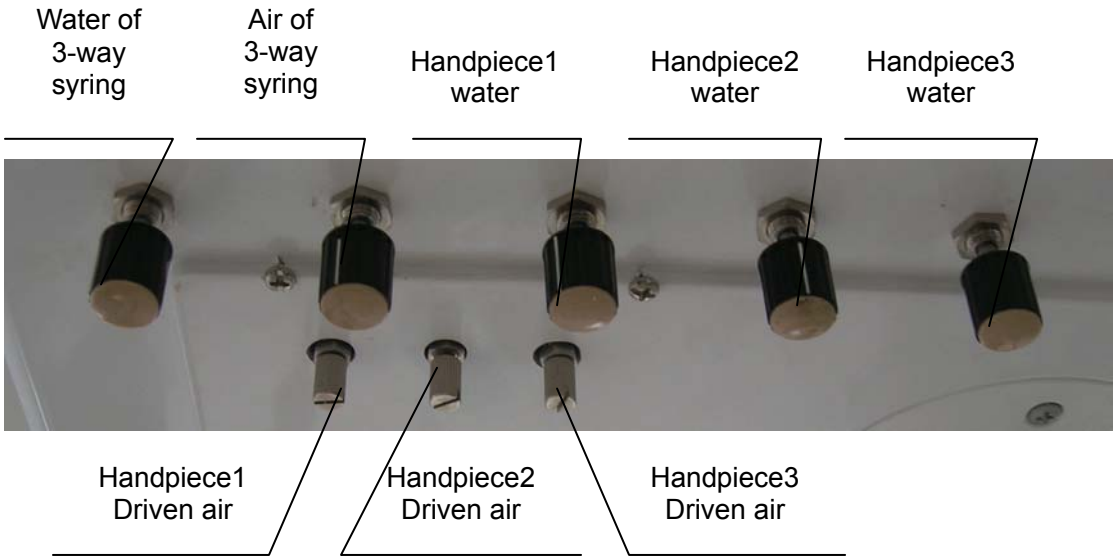

Fig.18 Pressure adjustment of water and air

Debug low speed air motor and high speed air turbine handpiece in turn.

Attention:

Before debugging handpiece, read instruction manual of handpiece first and understand operation air pressure of each handpiece. (Refer to the following enclosed list)

Dental bur or test bar must be inserted during debugging. No load running or over pressure start-up is strictly prohibited.

Fill clean lubricant into handpiece before debugging.

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Before using, the handpiece must be adjusted within specified air pressure range. Otherwise, over-low pressure will cause invalid operation and over-high pressure will damage handpiece.

Our ordinary products adopt underneath type instrument tray with rectangle pressure gauge on it. Owing to the pressure loss during transport process of compressed air, indicated value on the gauge is supposed to be higher than the value on the instruction manual of handpiece.

	Pressure range of rectangle gauge	
Handpiece name	High speed air turbine handpiece	Low speed air motor handpiece
Japanese NSK four holes	0.23MPa ~ 0.26MPa	0.30MPa ~ 0.32MPa

Air and water pressure adjustment of handpiece

There are air and water regulating valves (Fig. 18) used for adjusting the water vapor of three-way syringe, driven air, cooling air and cooling water of handpiece on the reverse of instrument tray bottom.

If the adjustment of air and water pressure of handpiece is needed, relevant air and water regulating valves can be adjusted. Rotate clockwise to adjust down the pressure and counter clockwise to adjust up the pressure. Careful and slow adjustment is needed during adjustment.

Three-way syringe

Press down air-out button  and water-out button  respectively, mist will be sprayed out if these two buttons are pressed at the same time. Check if the spayed water, vapor and mist are suitable. If adjustment is needed, the air and water regulating knob on the bottom reverse of instrument tray can be adjusted (Fig. 18) with the same method as above.

Operation of assistant work frame

Place the strong aspirator and the saliva ejector from left to right in turns.

(1) Insert saliva ejector head reliably on saliva ejector, get moderate clear water and observe if the water suction is smooth (abstraction rate should be≥400ml/min when hydraulic pressure is 200kPa).

(2) Refer to saliva ejector for high vacuum suction aspirator.

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3. Setup of the automatic control

There are different automatic set-up function keys on main controlling board, please refer to Illustration to set the following operations.

1) Water supply setting of rinsing water

a) Press rinsing water button  , the indicating light is on and starts to supply water, when press the botton more than about 3s ,the cue tone is “Beep”,and the rinsing water setting is start .Stop pressing when the water in measuring cup reaches anticipated water level, then the indicating light if off and stops supplying water. Setting is over.

b) After setting, computer will memorize and store, therefore, once press the rinsing water button, it will automatically supply water with such amount when it is used in the future.

Attention: if the tap water pressure changes suddenly and greatly or the dimension of cup changes, please readjust the water supply according to the above steps.

2) Setting of in commonly used chair position

Three (P1, P2, P3) memory positions have been set before release. If three (P1, P2, P3) memory positions need to be set individually, please operate as the following steps:

a) Move the seat board and backrest of dental chair to the desired position (a memory position).

b) Press set button  first, indicating light will be on and setting state will start.

c) Press P1 again, then press button  , indicating light will be off and a desired position will be set in the memory position of P1.

d) Repeat the step of a) and b), press P2 again, then press button  , indicating light will be off and a desired position will be set in the memory position of P2.

e) Repeat the step of a) and b), press P3 again, then press button  , indicating light will be off and a desired position will be set in the memory position of P3.

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Attention:

During automatic operation of electric chair, press any function key to stop operating immediately.

All the set parameters could automatically store when the power is off.

If the EPS is power off and then resumed, no danger on safety will be caused except the preset function stops. If you want to continue to operate, please restart the machine.

4. Setting of instrument arm

The instrument arm have been set befor release. If there are too many things upon the instrument tray to make the instrument arm could not be balanced by itself, or after a long time the spring was letdown. It is necessary to set the spring in the instrument arm. please operate as the following steps:

a) Open the cover in the back of the instrument arm

b) Setting the spring with the relevant inner six angle spanner, contrarotate make it strong, contrarily make it decrease.

Fig.19 Setting of instrument arm

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XXX. Maintenance

1. Handpiece

Handpiece is a delicate device, so it shall not be pounded or dropped. It shall be cleaned and lubricated with special detergent and lubricant every day. As for the specific method, refer to the instruction manual of handpiece.

The cleaning and sterilization methods shall be based on the recommended methods by manufacturer of handpiece. Oil spray lubrication shall be conducted before high temperature sterilization.

2. Water filter

The unit has water filter to ensure its normal use. After serving a certain time, the dirt will block the filter core and affect the water flow, therefore, it is necessary to clean and replace the filter core. The filter core shall be cleaned and replaced under any of the following conditions:

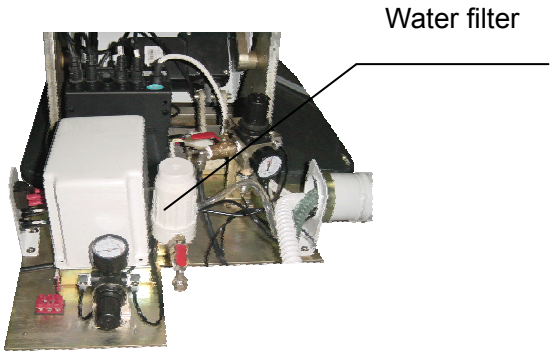

Fig.20 Water filter

- It has been used for over half a year. (Depend on the local water quality)
- The hydraulic pressure loss after filtering is above 0.1MPa.
- Filter core is contaminated.
- The extracted water becomes turbid suddenly.

The specific cleaning method is as follows: open the ground box cover first, counterclockwise rotate and dismount water filter cover to remove filter core. Clean it with the ultrasonic or neutral detergent, wash it with tap water thoroughly after cleaning and then mount water filter cover.

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3. Relief valve of air filtration

After the filtration through the air-filtration relief valve, moisture content and impurity will be reserved in the filter cup, which must be removed; otherwise, they will seriously affect the curative effect. Usually, it is necessary to discharge filtration relief valve under any of the following conditions:

- It has been used over one week.
- The water in filter cup accounts for three-quarter of volume.
- The color of water in filter cup changes (it isn't transparent).

The specific method of discharging filtration relief valve is as follows: unscrew drainage valve.

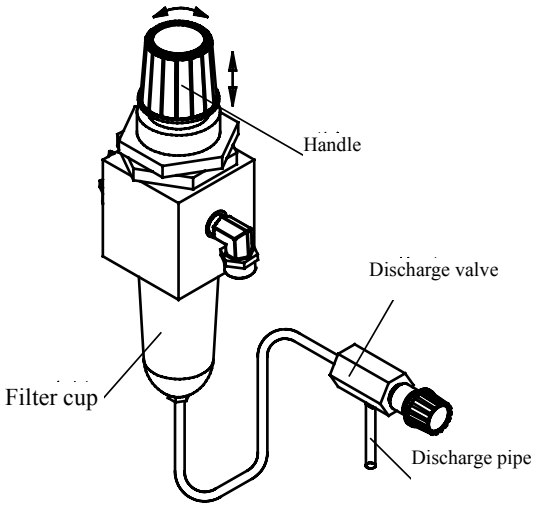

Fig.21 Relieve valve assembly of air filtration

4. Saliva ejector and suction

Besides the maintenance of their exterior cleanness, the cleanness of interior pipeline system of saliva ejector and suction still need to be maintained. The method of cleaning pipe system is as follows: regularly pump clear water or special sterilized water about 30s with recommended 1 or 2 times every day.

5. High vacuum filter screen

Regularly clean the sediment in the filter screen of high vacuum filter. As showed in Fig. 14, when cleaning, take out filter screen, clean it with small brush, rinse it out and then mount it in turn according to the diagram.

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6. Filter screen of saliva ejector

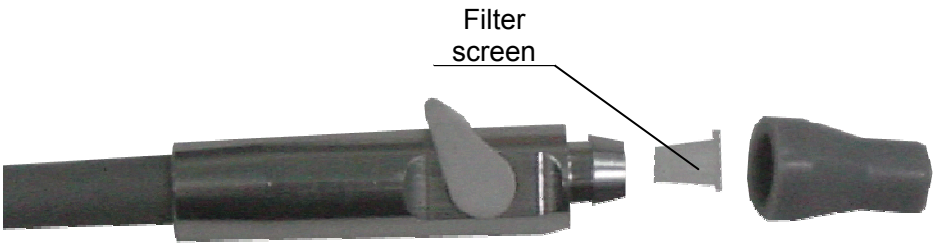

Fig.22 Filter screen of saliva ejector

Regularly clean the sediment in the filter screen of saliva ejector. When cleaning, remove the rubber head, take out the filter screen and wash it with clean water and then mount it in turn according to the diagram. (Fig. 22)

7. Operating light

The operating light needs to be maintained regularly. The light housing and mirror surface need to be cleaned.

a) Light housing: unscrew the setscrew of light housing and take it down to clean it thoroughly.

b) Mirror surface: dip a little anhydrous alcohol with soft absorbent gauze, slightly wipe and clean interior paraboloid; blow way the dust on exterior paraboloid with compressed air.

c) Replacement of bulb: close operating light, take down the light housing and heat shield after the lamp is fully cold, then replace with a new bulb; reverse the above order, mount the heat shield and light housing reliably.

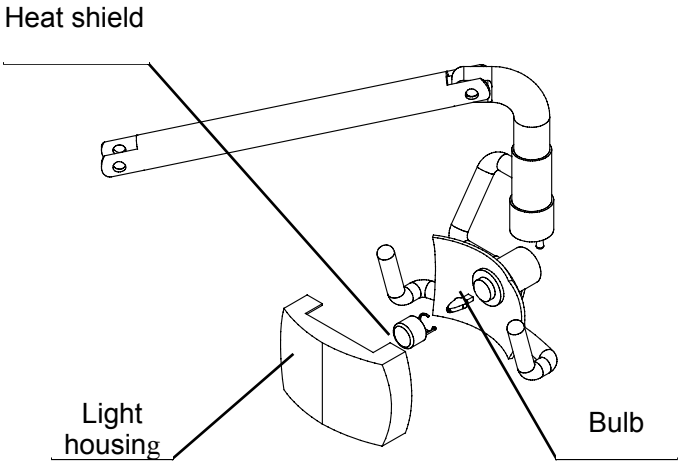

Fig.23 Operating light

8. Fuse

The fuse is in the ground box of dental chair. The method of replacing fuse is as follows: cut off the power, counterclockwise screw off the fuse holder to take out the fuse and replace with a new one, then clockwise screw it up.

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XXXI. Failure diagnosis

No.	Symptom	Cause	Solution
	When it is used frequently, the dental chair doesn't operate suddenly, while the control system is under normal operation.	The motor is overheated and stops operating.	After stopping for a while, it could continue to operate properly.
2	The saliva ejector or high vacuum aspirator could operate only by opening general air valve.	The mounting position of rack valve changes.	Open the rear cover of rack, adjust the front and back mounting position of rack valve until it stops when putting down the instrument and operates when taking up the instrument.
3	The suction of saliva ejector and high vacuum aspirator is small or without suction.	1. The pressure of tap water is too low. 2. The water filter is blocked. 3. Pressure of supply gas is too low. 4. Negative pressure generator is blocked. 5. The pipeline and joint leak.	1. Install supercharge water pump if the water pressure is too low. 2. Clean the water filter and replace filter core. 3. Adjust supply gas pressure to 0.5MPa. 4. Dismount and wash negative pressure generator, remove the blocking. 5. Check the pipeline and joint.
4	No water in handpiece.	1. The jet hole of handpiece is blocked. 2. The water filling switch of foot control air switch isn't open. 3. The water regulating valve of handpiece isn't open.	1. Dredge the jet hole of handpiece. 2. Shift the water filling switch of foot control air switch to the right. 3. Open the water regulating valve of handpiece and adjust it properly.
5	The handpiece isn't powerful or doesn’t operate.	1. The operation air pressure of handpiece is too low. 2. The bearing of handpiece is damaged. 3. The dental bur is worn or isn't clamped tightly. 4. The pipeline of handpiece is blocked. 5. The air pipe inside handpiece leaks.	1. Adjust the operation air pressure of handpiece according to instruction manual. 2. Replace the bearing of handpiece. 3. Replace with a new dental bur and then clamp the dental bur tightly. 4. Dismount bearing assembly and dredge the pipeline of handpiece. 5. Replace the housing of handpiece.

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No.	Symptom	Cause	Solution
6	The button of three-way syringe leaks.	O-ring is worn or aging.	Replace O-ring and add silicon grease oil to lubricate.
7	The three-way syringe doesn't sufficiently spray vapor.	1. The water-pipe and air-pipe of three-way syringe is connected oppositely. 2. The water of three-way syringe is too strong or the air is too weak.	1. Exchange the water-pipe with the air-pipe of three-way syringe. 2. Adjust the water and air of three-way syringe.
8	Rinsing water and spittoon washing water are too few or without water.	1. The water pressure is too low. 2. The water filter is blocked. 3. Pressure of supply gas is too low. 4. Electromagnetic valve doesn't work. 5. The connecting wire and connector don't contact properly. 6. The circuit board breaks down. 7. The control keyboard doesn't contact properly.	1. Install supercharge water pump if the water pressure is too low. 2. Clean the water filter and replace filter core. 3. Adjust supply gas pressure to 0.5MPa. 4. Replace the damaged electromagnetic valve. 5. Find out the contact failure position of connecting wire and reconnect it. 6. Replace defective circuit board. 7. Replace control keyboard.
9	The treatment unit doesn't operate.	1. The power plug isn't properly plugged or doesn't properly contact. 2. The power fuse is blow-out. 3. The transformer of ground box is damaged. 4. The power switch is broken.	1. Replace power plug or outlet. 2. Find out the reason of blow-out first and replace power fuse. 3. Replace the transformer of ground box. 4. Replace power switch.
10	No water in treatment unit.	The water filter is blocked. Water pipe is pinched.	Clean filter core. Remove the pinching source.
11	There is water spraying out from the air.	1. The joint of handpiece isn't screwed tightly. 2. The filter relief valve is full of water.	1. Screw the joint of handpiece tightly. 2. Discharge the accumulated water inside filter relief valve.

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No.	Symptom	Cause	Solution
12	The operating light isn't on.	1. The bulb of operating light is broken. 2. The connecting wire of operating light doesn't properly contact. 3. The switch of operating light doesn't properly contact. 4. The lead wire of ground box transformer doesn't properly contact.	1. Replace a new bulb. 2. Find out the defective connection position. 3. Replace the switch of operating light. 4. Reconnect the lead wire of ground box transformer or replace the transformer of ground box.
13	The chair doesn't operate, while its sound indication is normal and other buttons are under normal operation.	1. The relay contact doesn't contact properly or the coil is broken. 2. The motor is broken or the connecting wire is disconnected.	1. Clean the relay contact or replace a new relay. 2. Find out the disconnection position, reconnect or replace the motor.
14	The x-ray viewer isn't on.	1. The fuse is blow-out. 2. The lamp is broken. 3. The amperite is broken. 4. The connecting wire doesn't contact properly.	1. Replace the fuse. 2. Replace the lamp. 3. Replace the amperite. 4. Repair the contact failure position of the connecting wire.

Attention: If it is necessary for the user to repair this unit, we could provide detailed information on the components.

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XXXII. Others

1. Warranty of this unit: under the premise of abiding by the regulations on transportation, storage and use, the user is entitled to one -year free after-sale service from the date of purchasing this unit.

2. Target users of the unit: the target users (patients) of the unit shall have basic behavior constraint and judgment ability.

3. The installation and use of the unit must be on the basis of relevant laws, regulations and ethics accepted by most people.

4. We reserve the final right to interpret on this product under the *Regulation on the Supervision and Administration of Medical Devices*.

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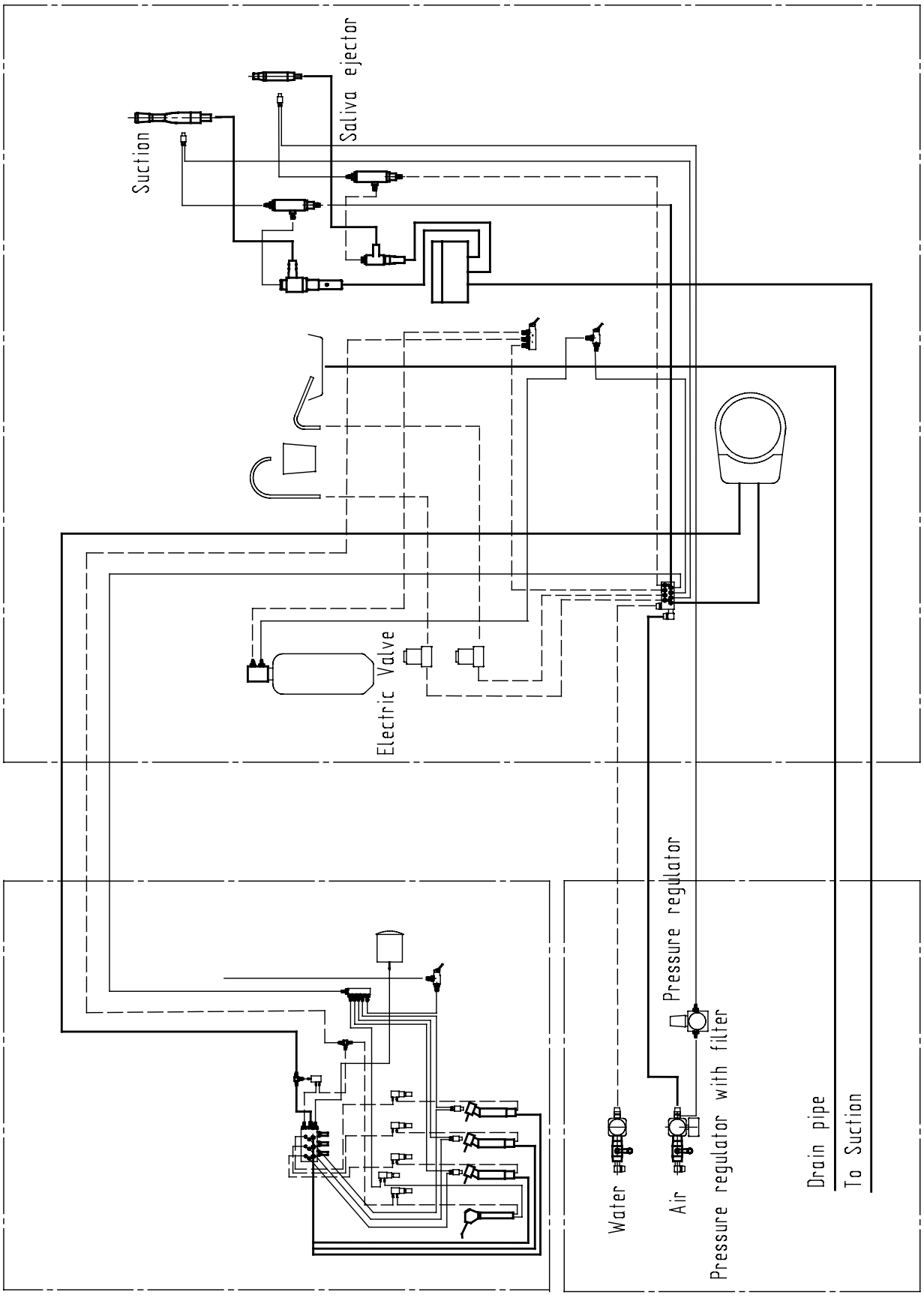
XXIV. Diagram of the air and water pipes of the system



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XXV. Electric wiring diagram