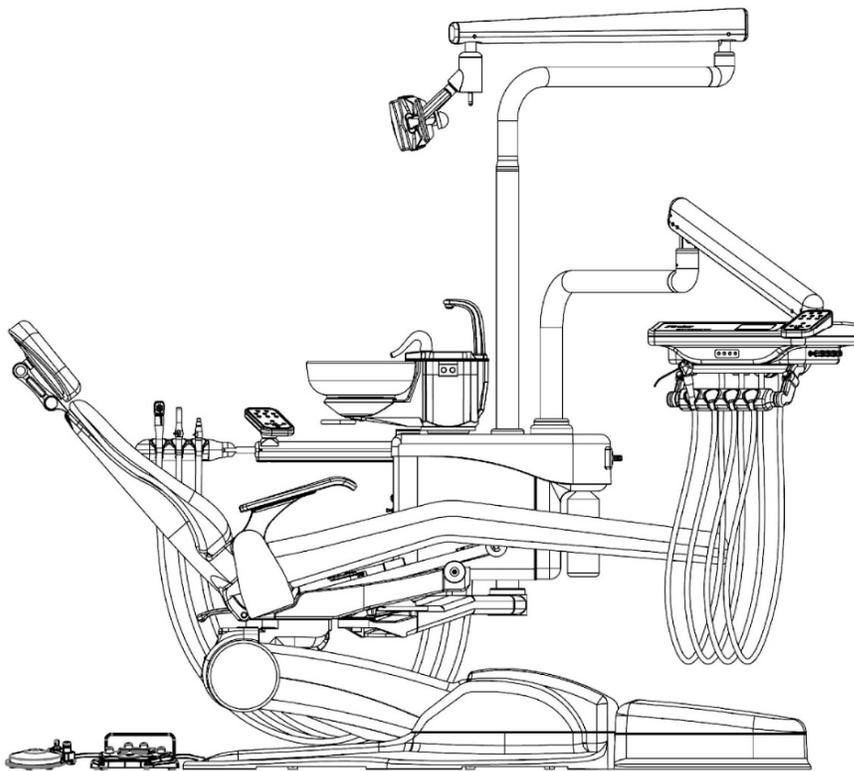


FDC Fixed Side Mount Chair Package

FDC – 38H

User Manual



Firststar Dental Company

18915 84th Ave. S. Kent, WA 98032

www.firstardental.com

E-mail: technical@firstardental.com

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Introduction

Thank you for choosing Firststar Dental products. This booklet contains detailed information about the operation instruction and maintenance information for the FDC-38H model.

To assure that services and operations are completed safely and correctly, please read this entire manual before performing any services or repairs on this unit. Please keep this booklet in a safe place for future reference.

Safety Precautions

- Equipment operating environment shall match with the specified requirements.
- Make sure the supply air and water qualities are satisfied with the industry standard.
- Make sure this equipment is connected to a supply mains with protective earth.
- DO NOT place any heavy objects on the delivery system tray, lighting flex arm and assistant’s elbow arms.
- DO NOT attempt to service or modify this unit without certified service technicians.
- Follow the maintenance schedule to properly service the unit.

Definition of Symbols

The following symbols may be used throughout the product manual:



Caution: Failure to carefully follow the described procedure may result in damage to the equipment.



Warning: Failure to carefully follow the described procedure may result in damage to the equipment and the operator.

IEC Symbols

The following symbols conform to IEC labeling standards and may be located throughout the product:



AC (Alternating Current)



Protective earth (Ground)



Protected against splashing



Attention: Consult accompanying documents



Type B equipment
(Protected against electrical shock)



Dangerous voltage



Refer to instruction manual / booklet



Manufacturer ID



Manufacturer Date



Waste Electrical and Electronic Equipment



Conforms with the Essential Requirements of the European Device Directive 93/42/EEC for Class I Devices



Indicates conformity to General Requirements for Safety is certified by Intertek testing services

Transportation and Storage Instructions

- Surrounding environment such as atmospheric pressure, temperature and relative humidity shall match with the manual specified requirements.
- Protect from moisture and rain during transportation and storage is required.



Electric Shock Risk: Risk of electrical shock present. Make sure power is disconnected before attempting this procedure.

- Protect against impact, vibration and falling is required during transportation and storage.
- Transport and store the boxes upright.
- Storage location shall be well ventilated. Storage environment shall not contain any corrosive gases.

Recommended Environment Conditions

Transportation and Storage Environment

- Ambient Temperature: -29°C to +74°C
- Relative Humidity: 0% to 95%
- Atmospheric Pressure: 50KPa to 106KPa

Operation Environment

- Ambient Temperature: +15°C to +27°C
- Relative Humidity: Conditioned Air
- Atmospheric Pressure: 50kPa to 105kPa

Specifications

Power Supply

- 115V, 50/60Hz, as applicable

Air Pressure

- -551.6kPa (-80PSI) (at regulator in USC)

Water Pressure

- -275.8kPa (-40PSI) (at regulator in USC)

Classifications

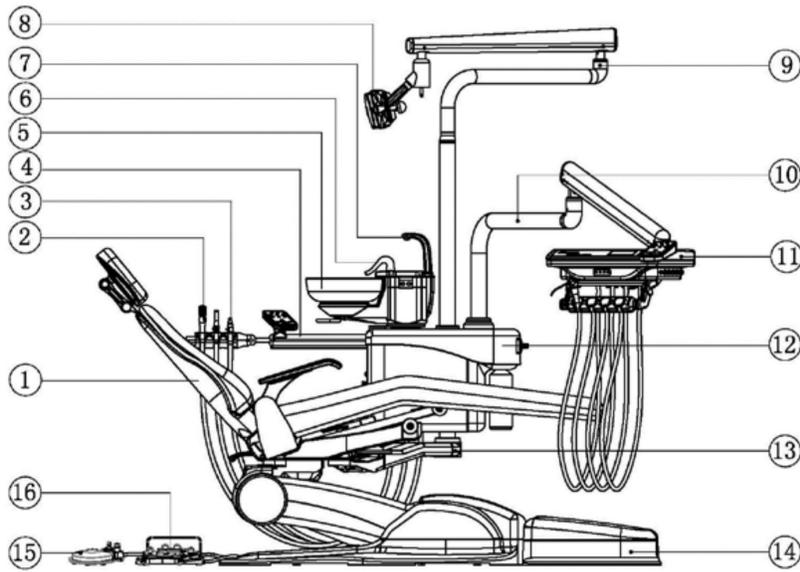


Medical – General medical Equipment Certified as to electrical shock, fire and mechanical hazards only in accordance with:
ANSI/AAMI ES 60601-1:2005 + C1;A2
CSA std.
C22.2#60601-1:2008 Ed.2+C2
IEC 80601-2-60:2012 Ed. 1
IEC 60601-1-2:2014



For the purposes of this manual, the ETL approval is for the unit, power supply and dental light. All other regulatory markings are provided on their respective manuals.

Package Components



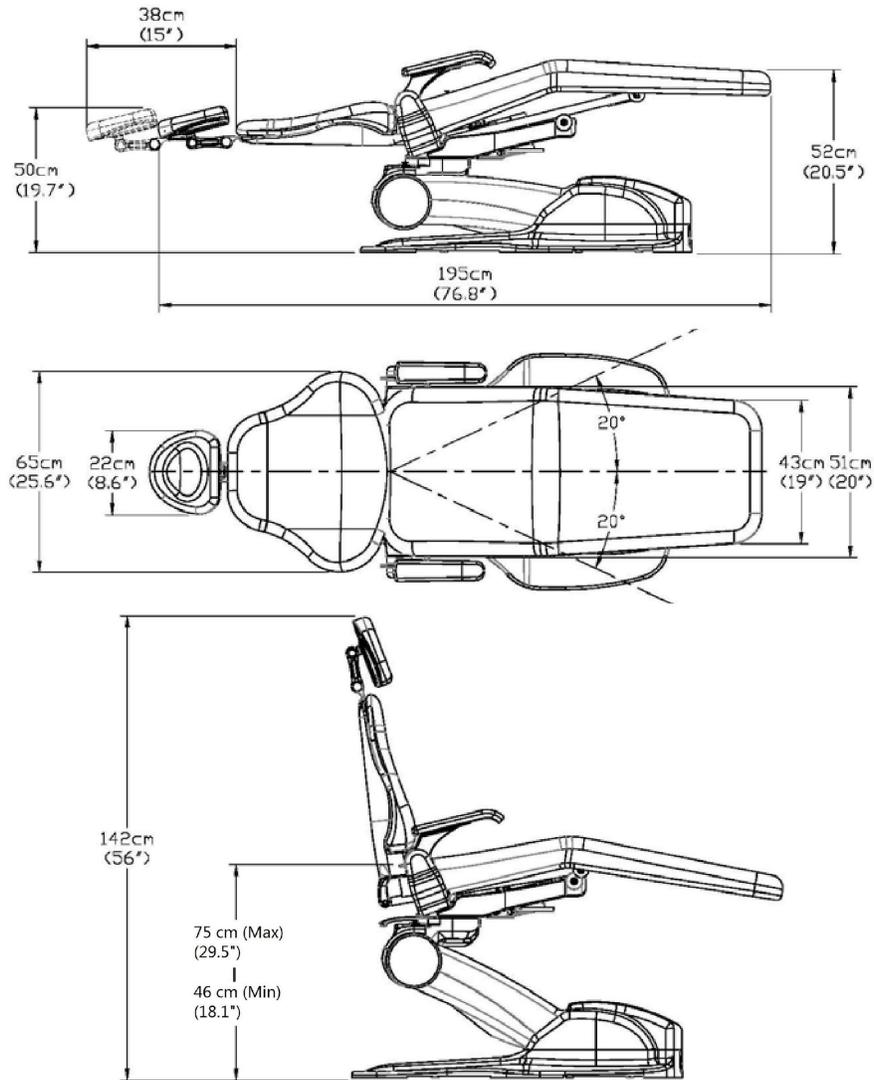
FDC-37HC Pivot Chair Mount Package

- | | | |
|-------------------------------|----------------------------|-------------------------------|
| ① Dental Chair | ② 3-Way Syringe | ③ HVE/SE |
| ④ Assistant's System Flex Arm | ⑤ Cuspidor | ⑥ Bowl Rinse Spout |
| ⑦ Cup Fill Spout | ⑧ Dental Light | ⑨ Dental Light Rotating Arm ⑩ |
| Delivery System Rotating Arm | ⑪ Delivery System Tray | ⑫ Side Box |
| ⑬ Side Box Support Arm | ⑭ Contoured Utility Center | ⑮ Delivery System Foot Switch |
| ⑯ Dental Chair Foot Switch | | |

Unit Dimensions and Technical Data

Dental Chair

A. Dimensions

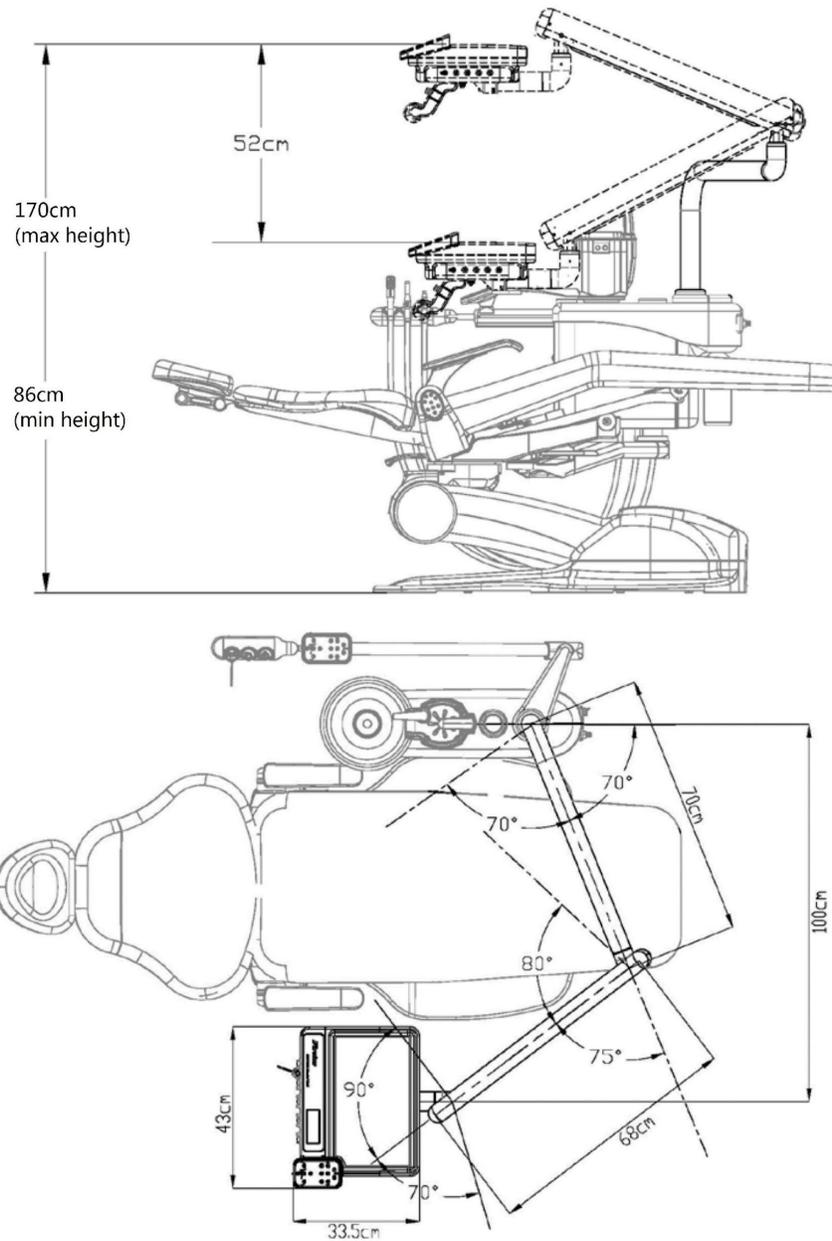


B. Technical Data

Hydraulic Liquid Pressure:	5.6MPa (55 kgf/cm ²)
Supply Power:	115 VAC, 60Hz / 230 VAC, 50Hz/60Hz, as applicable
Fuse Size:	F1/F2-10A, F3-100mA F1/F2-6.3A, F3-63mA
Maximum Load (including unit):	2450N (250kgf)
Control Voltage:	5VDC
Modes of Operation:	Intermittent: 25 sec ON – 300 sec OFF

Delivery System

A. Dimensions

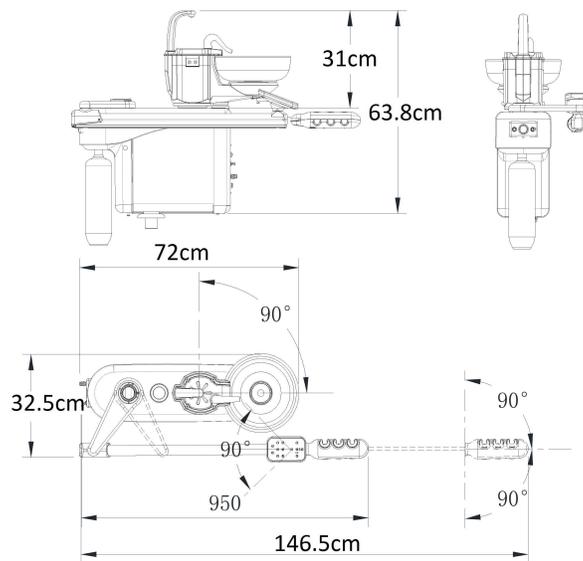


B. Technical Data

Air Pressure Requirements:	-551.6kPa (-80Psi)
Water Pressure Requirements:	-275.8kPa (-40Psi)
Maximum Load:	98N (10kgf)

Side Box, Cuspidor and Assistant's System

A. Dimensions



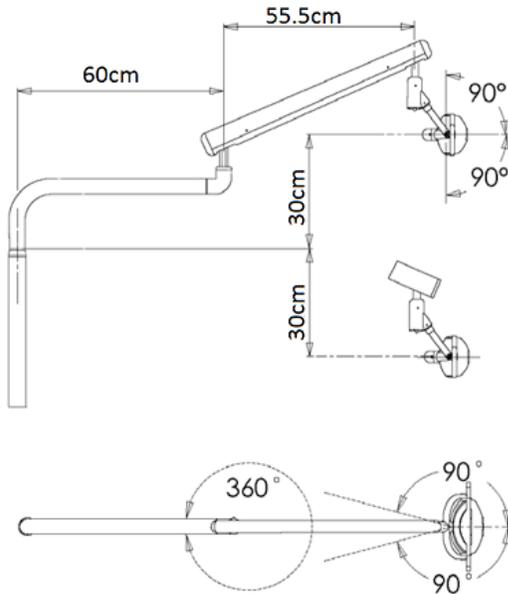
B. Technical Data

Bowl Rinse Water Flow:	4L/min (with water pressure at 220KPa)
Cup Fill Water Flow:	3L/min (with water pressure at 220KPa)
Brightness Level:	8000Lx – ~ 30000 Lx
Color Temperature:	5,000 – 5,700K

Dental Light System

A. Dimensions

B. Technical Data



Supply Power: AC 12V, 50/60 Hz

Power Consumption: 15 VA

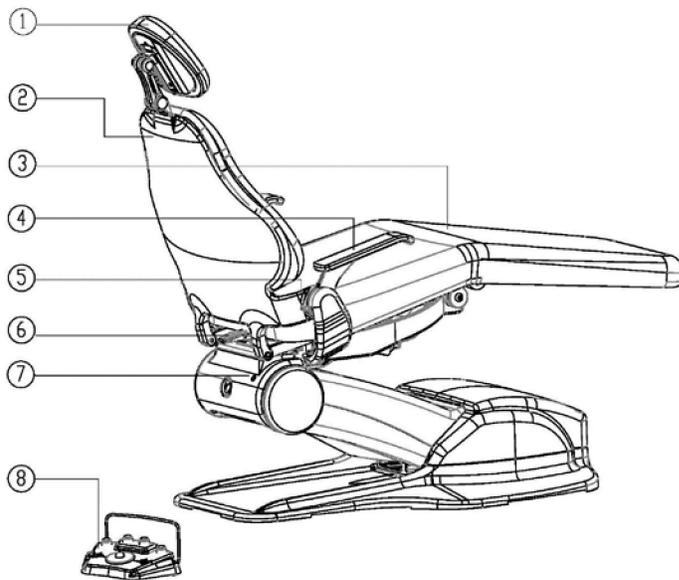
Brightness Level: 8000Lx – ~ 30000 Lx

Color Temperature: 5,000 – 5,700K

Operation Instruction

Dental Chair

Dental Chair Components



① Adjustable Headrest Cushion

② Back Support

③ Seat

④ Armrest

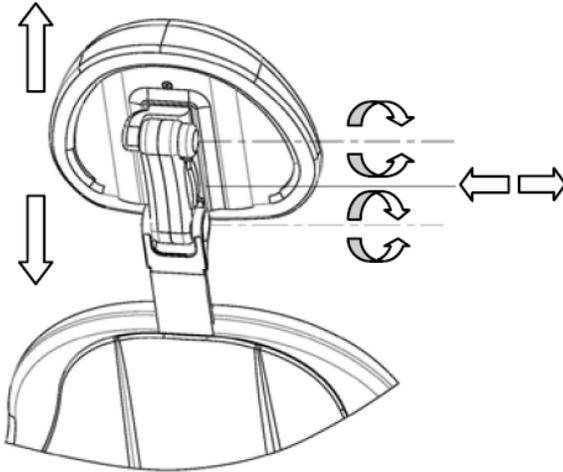
⑤ Armrest Lock

⑥ Chair Rotation Hand Lock

⑦ “Program” Button

⑧ Foot Switch

Headrest Position Adjustment



Double Articulating Headrest

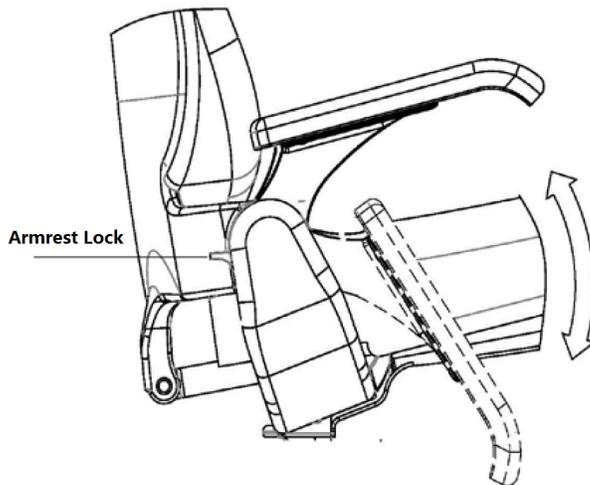
Height Adjustment

Push down or pull up the blade from the chair back to change the headrest to the desired height.

Angle Adjustment

Angle of headrest can be changed by grasping the headrest release lever on headrest release mechanism. Release the mechanism to lock the headrest at the desired position.

Armrest Adjustment

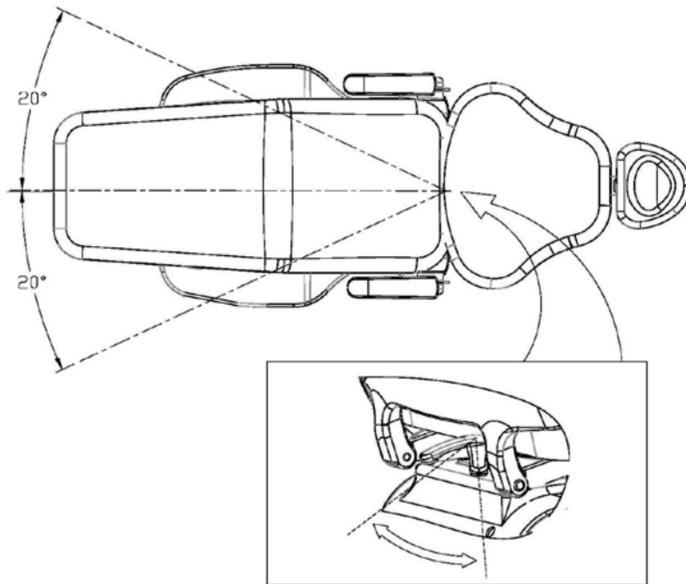


The chair's armrest can be lowered allowing patient to enter or exit from either side of the chair.

To lower or raise the armrest:

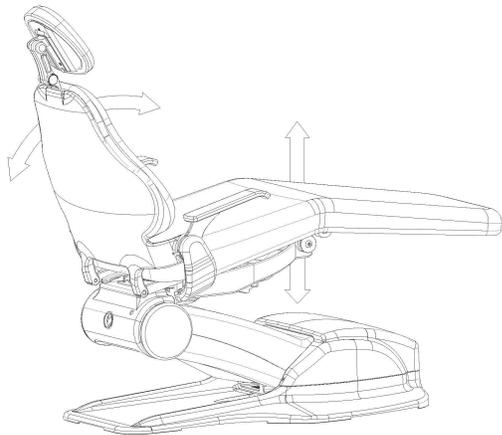
- Pull up the armrest lock trigger, push the end of the armrest to lower it.
- Lift up the arm till you hear a click sound, which secures the arm in its original up position.

Chair Rotation Adjustment (Optional Upgraded Feature)



Release the chair rotation lock by turning the hand lock to the right. The chair could manually rotate approximately 20° to either side of its center position. To secure the final position, simply turn the hand lock to the left.

Dental Chair Foot Switch Settings



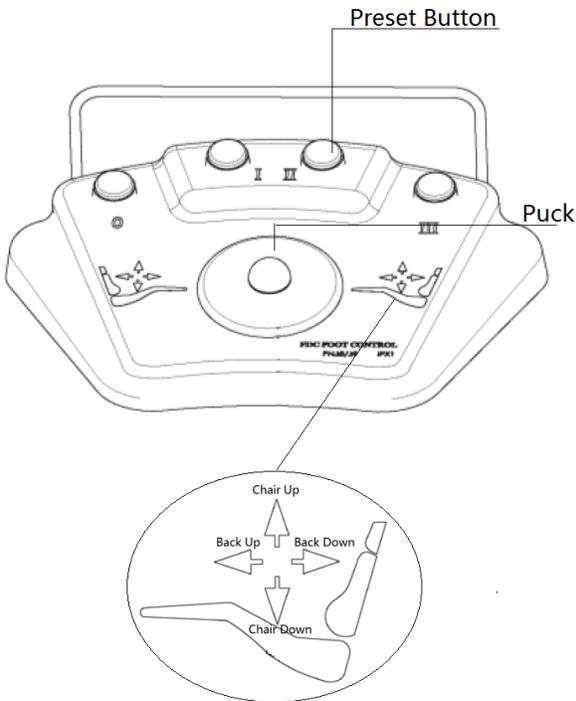
Manual positioning of the chair can be done by operating the footswitch or by the touchpad control located at the delivery system tray.

Chair & Back Up or Down Operation

- To move the chair up or down, push and hold the puck on the foot control (Up and down buttons)
- To move the chair back up and down, push and hold the puck on the foot control (Left and right buttons)

Programming the Position Preset Buttons

1. Using the menu control puck, follow the direction of the arrow to control the chair.
2. Push and hold the “Program” button located at the back of the chair until a beeping sound is heard.



3. Push any preset button to assign it to this position. The chair will beep three times to indicate the program is accepted.
4. Program failure is indicated by more than three beeps.

Activating Auto Positions

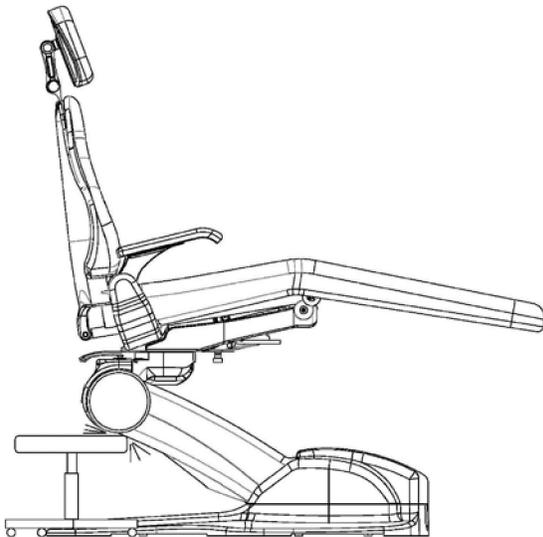
1. Push any preset buttons on the footswitch or touchpad.
2. A beep sound will be heard.
3. The chair will automatically move to the preset position.

Hints: Any preset button can only be assigned with one position. Reprogramming a new auto position will erase the old position.



Before operating the chair, observe and confirm safety for the patient and the operator.

Dental Chair Collision Protection System



To prevent damage to the chair or other equipment, all FDC dental chairs are equipped with a Collision Protection System.

The safety switch located at the bottom of the chair senses the chair contacts an object when the chair is moving down; the *Chair Down* function will be disabled and motion of the base stops immediately. The chair will automatically run up a little before it stops.

Move the object away and move the base up will deactivate the safety switch and the chair can operate normally again.

Note:

When the safety switch is activated, the *Chair Down* function is disabled. The chair down button and the auto position buttons will no longer work.



Extensive long use of the chair movement will result in overheating the hydraulic motor and shorten its life span. Make sure that you follow the dental chair duty cycle: 25 sec ON – 300 sec OFF



Even with collision protection, the chair can be damaged with continuous contact. Keep objects away from chair to ensure proper unit operation.



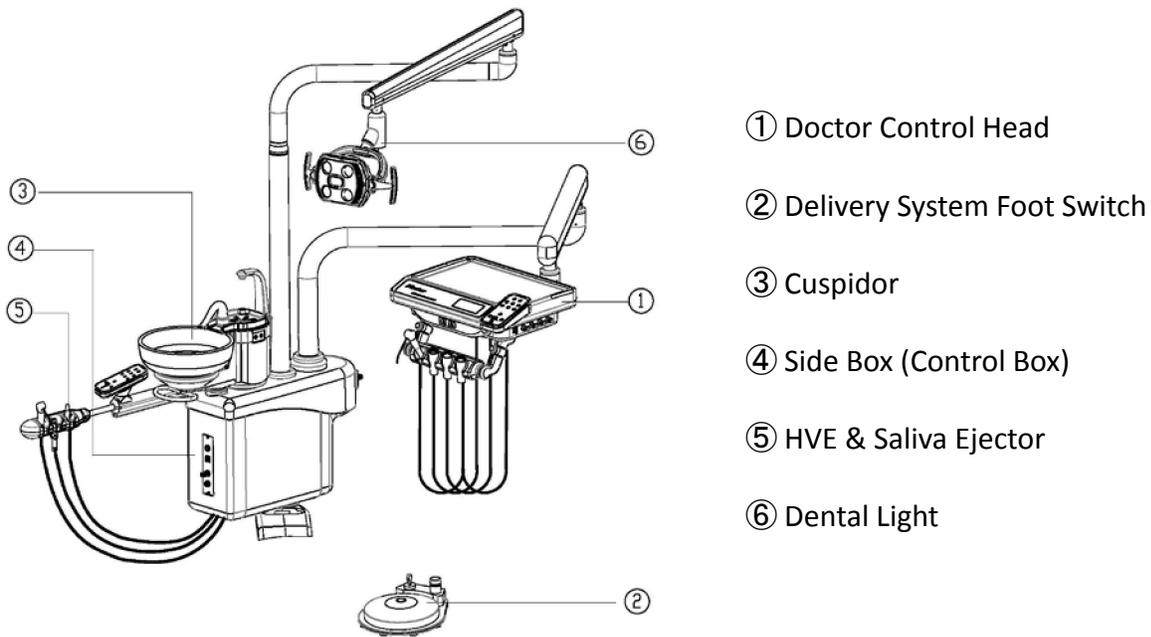
Do not energize the unit until all secured shipping materials have been properly removed.

Dental Unit



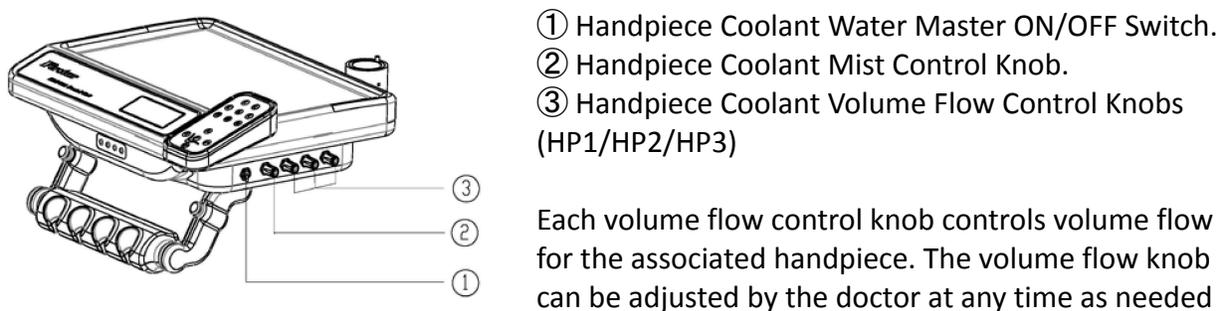
Please read through the following sections carefully. Make sure that you understood the operation of the dental unit thoroughly in order to avoid unit operation mistakes during patient treatment operations.

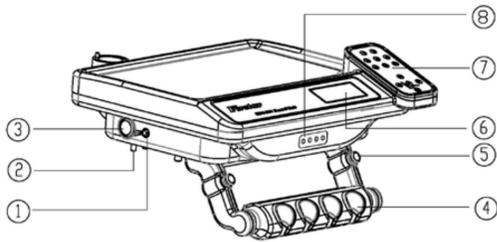
The dental unit mainly consist of delivery system, cuspidor, assistant's system, dental light, side box and the contoured utility center.



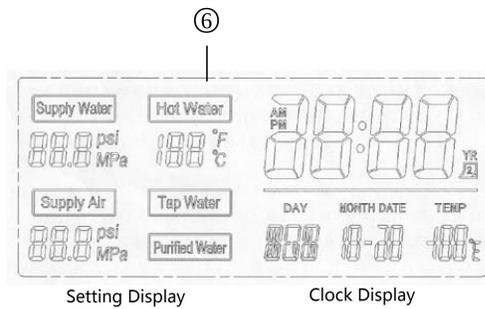
Doctor Control Head

The control head allows operators to put surgical equipment on top of the tray and it provides controls for water pressure, air pressure and electrical power.



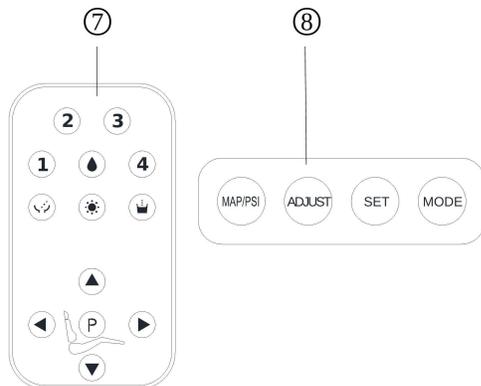


1 Master ON/OFF Switch. It controls the air and water supply to the delivery system. Whenever the unit is not in operation, it is recommended to turn the switch to the OFF position to ensure better operation of the air and water control circuit in a long run.



② Air Pressure Setting (Hp1/Hp2/Hp3). This setting provides air pressure adjustment for each handpiece. The pressure setting dials are labeled as HP1, HP2 and HP3. The pressure setting adjustment shall only be done during the startup process. Once the pressure is adjusted to the correct setting, there is no need to adjust it in the future unless the air compressor machine is replaced with different pressure settings.

③ Air Pressure Gauge. It provides an accurate reading of the required air pressure for the handpieces.



④ Automatic Handpiece Holder. Whenever a handpiece is taken out of the Automatic Handpiece Holder, the water and air pressure systems will automatically turn ON for the handpiece.

⑤ Delivery System - Tray Position Lock Switch. This switch is normally in the closed position, which locks out the tray angle and height adjustment. Whenever this switch is in the opened position, the tray is then be able to relocate to a different position. DO NOT try to relocate the tray position without first turn on the lock switch to allow auto-locking feature to function properly.

⑦ Touchpad Operation.

Preset buttons ① ~ ④ are for chair auto-positions.

Buttons ▲ ▼ ◀ ▶ are for Chair Up, Chair Down, Back Up, Back Down.

“Program” button to assign positions to any of the preset buttons.

- Water source selection button.
- ☼ Bowl rinse water flush button.
- ☼ Cup fill water injection button.

⑥ LCD display. This LCD screen indicates current settings and time.

⑧ Setting Buttons.

- “MPA/PSI”: pressure, temperature units switch
- “ADJUST”: adjust the calendar, date and time
- “SET”: confirm key for calendar adjustment
- “Mode”: change to different modes

 Light adjustment button.

Doctor Control Head Touchpad Features

After connecting power to the dental unit, the LED light on the touchpad will be on. The LCD display screen will indicate the current selection setting.

Bowl Rinse Button: 

Initial Startup Process

After connecting power to the dental unit, push the  button for initial startup. The factory setting delay time for the bowl rinse is 26 seconds.

Bowl Rinse Operation

Push the  button to open the water flush valve for bowl rinse. Push the  button again to stop or wait for the bowl rinse delay time to end.

Bowl Rinse Delay Time Memory Setting

To reset the bowl rinse delay time, push the button 3 times and hold it to start the time delay counting. The water flush valve will open and the system will beep twice for confirmation. Keep holding the  button until the desired time delay is reached. Release the  button to finish the bowl rinse delay time reset. The water flush valve will close and the system will beep three times for confirmation on the completion of the new delay time setting. The maximum delay time setting is 26 seconds.

Cup Fill Button: 

Initial Startup Process

After connecting power to the dental unit, push the  button for initial startup. The factory setting delay time for the bowl rinse is 26 seconds.

Cup Fill Operation

Push the  button to open the water injection valve for cup fill. Push the  button again to stop or wait for the cup fill delay time to end.

Cup Fill Delay Time Memory Setting

To reset the cup fill delay time, push the  button 3 times and hold it to start the time delay counting. The water injection valve will open and the system will beep twice for confirmation. Keep holding the  button until the desired time delay is reached. Release the  button to

finish the cup fill delay time reset. The water injection valve will close and the system will beep three times for confirmation on the completion of the new delay time setting. The maximum delay time setting is 26 seconds.

Dental Light Button: 

Push the  button to turn on the dental light. Push it again to turn it off.

Water Source Selection Button: 

Push the  button to switch the selection between Tap Water and Purified Water. When tap water is selected, the LCD screen will have “Tap Water” light on. When purified water is selected, the LCD screen will have “Purified Water” light on.

Chair Movement Buttons: 

Push and hold the  button to move the chair up. Release the button to stop.

Push and hold the  button to move the chair down. Release the button to stop.

Push and hold the  button to move the back up. Release the button to stop.

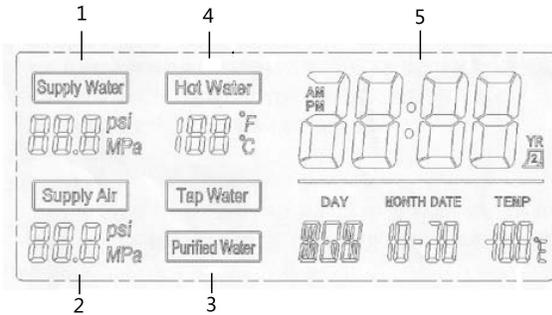
Push and hold the  button to move the back down. Release the button to stop.

Chair Movement Preset Buttons and Programmed Button: 

There are 4 preset buttons for auto-positioning. Use the chair movement buttons to move the chair to the ideal position, then push the  button. The system will beep twice. Push any of the 4 preset buttons to assign the current position to that button. After the system records the position to its memory, the system will beep three times for confirmation.

Push any preset buttons to auto-position the chair to its corresponding preset position. Any other operation on the chair movement buttons will stop the chair auto-position movement.

LCD Display Screen



1. Supply water pressure measurement
2. Supply air pressure measurement
3. Water source selection (Tap/Purified)
4. Hot water temperature measurement
5. Current time and calendar

Supply Water Pressure Measurement Display

When Tap Water is selected to be the water source, the LCD screen will display the supply water pressure reading. Water pressure range is 0 – 0.7 MPa (0 – 100 psi). When the supply pressure exceeds 0.7 MPa (100 psi), the LCD screen will display “EEE”.

To change the pressure unit, refer to the setting buttons tutorial on the next page.

Supply Air Pressure Measurement Display

When the air pressure system is enabled, the LCD screen will display the supply air pressure reading. Air pressure range is 0 – 0.7 MPa (0 – 100 psi). When the supply pressure exceeds 0.7 MPa (100 psi), the LCD screen will display “EEE”.

To change the pressure unit, refer to the setting buttons tutorial on the next page.

Water Source Selection

When Tap Water is selected to be the water source, the LCD screen will display “Tap Water”. When Purified Water is selected to be the water source, the LCD screen will display “Purified Water”.

Hot Water Temperature Measurement Display

When hot water system is enabled, the LCD screen will display the hot water temperature reading. Hot water temperature range is 0 - 101°C (212°F). The LCD screen minimum water temperature reading is 0°C, and the maximum water temperature reading is 101°C. When the hot temperature sensor failed, the LCD screen will display “EE”.

To change the temperature unit, refer to the setting buttons tutorial on the next page.

Current Time and Calendar Display

The LCD Display has a clock, a calendar and the ambient temperature read out. Once the date and time is updated, the system will be automatically updating the date and time. The clock display can be switched to either 12 or 24 hour modes. The calendar has been pre-programmed from year 1900 to year 2099. The temperature display shows a temperature range from -50°C to 70°C. The temperature reading units can be switched from °C to °F.

To change the time and calendar settings, refer to the setting buttons tutorial on the next page.

Setting Buttons:    

Units Adjustment

1. The pressure unit can be switched between “MPa” and “psi”. The system defaults the current unit to the last used unit setting. To switch to another unit, push the  button.
2. The hot water temperature can be switched between “°C” and “°F”. The system defaults the current unit to the last used unit setting. To switch to another unit, push the  button.
3. The ambient temperature unit can be switched between “°C” and “°F”. The system defaults the current unit to the last used unit setting. To switch to another unit, push the  button.

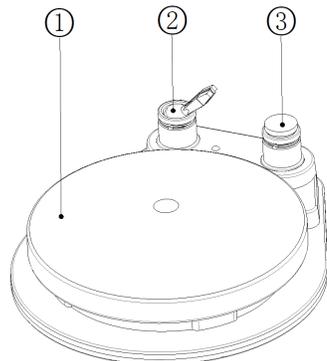
Clock Adjustment

1. Push and hold the  button for 2 seconds to get into 12h/24h selection setting. Push the  button to switch the selection from 12h mode to 24h mode for time display.
2. Push the  button to do the hour setting. Push the  button to increase the hour reading. Push and hold the  button to increase the hour reading rapidly.
3. Push the  button again to do the minute setting. Push the  button to increase the minute reading. Push and hold the  button to increase the minute reading rapidly.
4. Push the  button to finish the clock adjustment.
5. The system will exit the setting adjustment mode if there is no adjustment after 12 seconds.

Calendar Adjustment

1. Push and hold the  button for 2 seconds to get into the year setting. Push the  button to increase the year reading. Push and hold the  button to increase the year reading rapidly.
2. Push the  button again to do the month setting. Push the  button to increase the month reading. Push and hold the  button to increase the month reading rapidly.
3. Push the  button again to do the day setting. Push the  button to increase the day reading. Push and hold the  button to increase the day reading rapidly.
4. Push the  button to finish the calendar adjustment.
5. The system will exit the setting adjustment mode if there is no adjustment after 12 seconds.

Delivery System Foot Control



1 Speed Control Disc

The speed for the handpiece is controlled by the speed control disc. A light pressure on the disc provides slow speed, and a full pressure on the disc provides full speed for the handpiece.

2 Wet/Dry Toggle Switch (optional feature)

The optional Wet/Dry toggle switch allows air and coolant selection via foot control.

3 Chip blower (optional feature)

The optional chip blower provides an air blast to blow the debris away without causing the bur to rotate.



Supply water must be processed with filtration and purification. Also, make sure the interior tubing is clear from any blockages to allow proper unit operation.



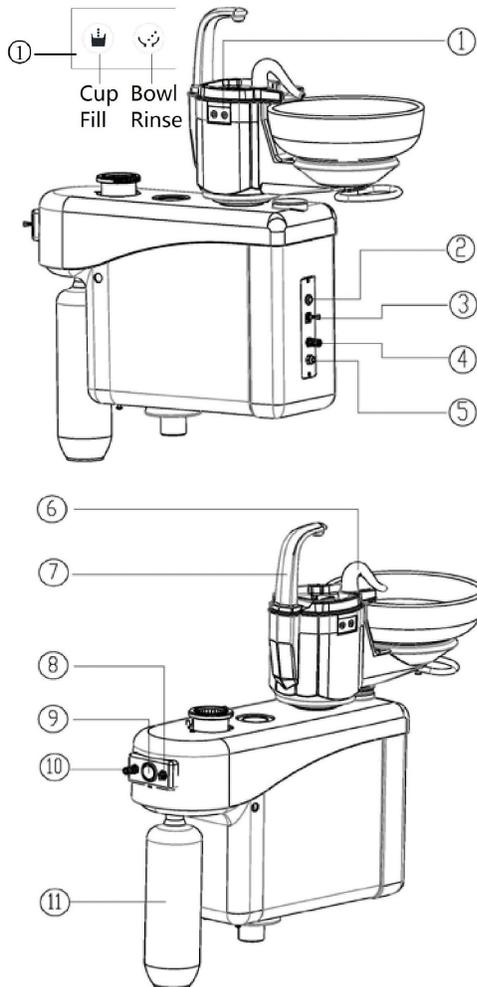
Supply air must be processed with filtration and purification to satisfy with dental standards. Failure of keeping the supply air clean might affect patient's health and the quality of the dental treatment. Also, it might affect the life cycle of the unit.



Make sure that you turn off the master ON/OFF switch after daily operation. Turning off the master switch will disable the water and air supplies, and preventing the potential unnecessary damages of the system.

Cuspidor and Side Box (Control Box)

The cuspidor bowl allows 90 degrees angle rotation that provides easy collection of patient's saliva during dental treatment. The side box provides the controls of cup fill, bowl rinse, water heater, water volume flow and pressure.



- ① Cup Fill Button: push to turn on cup fill valve.
Bowl Rinse Button: push to turn on bowl rinse valve.
- ② Water Heater Indicator: indicates the ON/OFF status of the water heater.
- ③ Water Heater ON/OFF Toggle Switch: turns on water heater to get warm water from cup fill spout or turns off water heater to get cold water from cup fill spout.
- ④ Water Volume Control Valve: turning it clockwise to decrease the water volume flow, turning it counterclockwise to increase the water volume flow.
- ⑤ Scaler Supply Water Outlet: it is the supply water outlet for the scaler.
- ⑥ Bowl Rinse Spout: water comes out to rinse the cuspidor bowl.
- ⑦ Cup Fill Spout: water comes out to fill the cup for patients.
- ⑧ Water Bottle Air Pressure ON/OFF Switch
- ⑨ Water Bottle Air Pressure Gauge
- ⑩ Water Bottle Air Pressure Adjustment Valve: Turn the dial clockwise to release pressure. Turn the dial counterclockwise to add pressure.
- ⑪ Purified Water Bottle



Make sure that the supply air pressure does not exceed the maximum operating pressure of 40 psi.

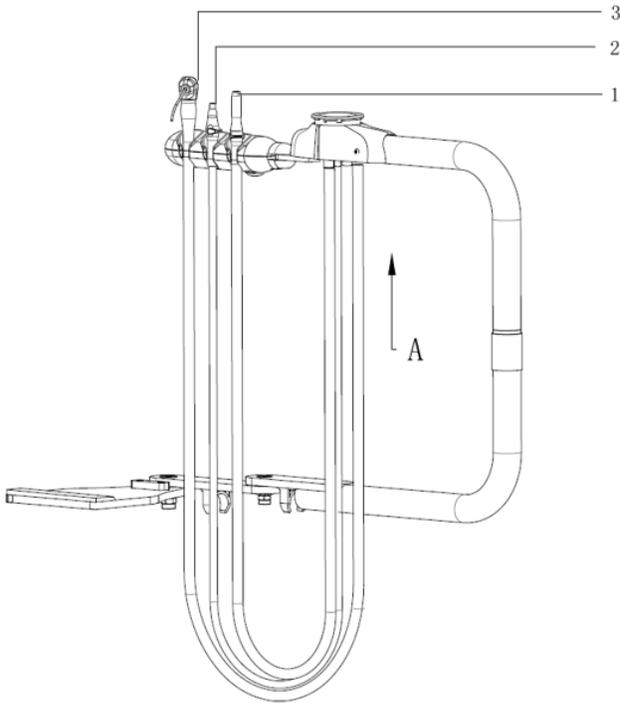


Make sure that the water bottle air pressure ON/OFF switch is put to the OFF position before you remove the water bottle.



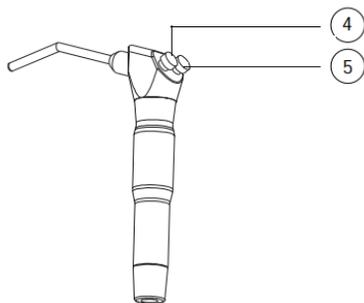
Make sure that the cuspidor bowl strainer must be used all the time. Failure to use the bowl strainer might cause clogging in the drainage pipe.

Assistant's Instrumentation

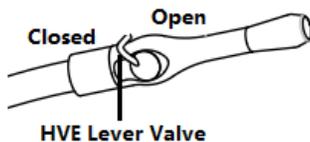


- ① High-Volume Evacuator (Hve)
- ② Saliva Ejector (Se)
- ③ 3-Way Air/Water Syringe

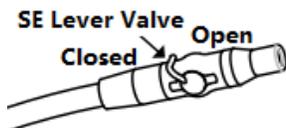
The standard assistant's instruments includes one HVE, one SE and a three-way air/water syringe.



- ④ 3-Way Syringe Air Button
Air comes out when the air button is pressed
 - ⑤ 3-Way Syringe Water Button
Water comes out when the water button is pressed
- Mist comes out when both the air and water buttons are pressed at the same time.



Both HVE and SE have lever valves to control the ON/OFF operation.

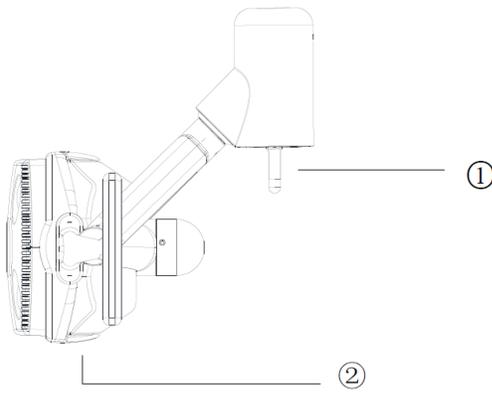


Do not place any other object besides the standard assistant's instrumentation on the assistant's arm.



Make sure that you clean or replace the solid collector periodically. Refer to the recommended maintenance schedule for more information.

Dental Light System



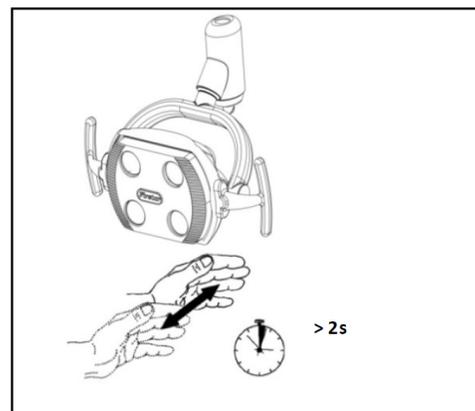
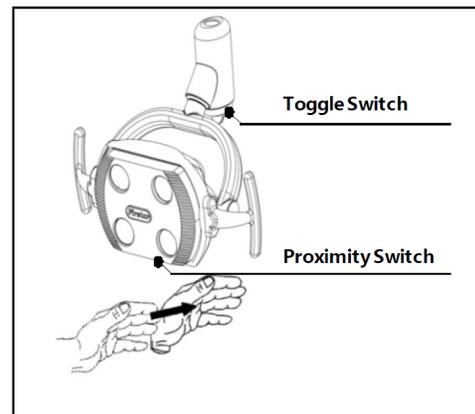
There are two joint connections to allow better angle/location adjustments of the dental light. The dental light can be adjusted to the ideal location during operation. The dental light is equipped with a proximity switch for ON/OFF control and brightness level adjustment.

① Dental Light Master Electrical Power Switch.

② Proximity Switch.

Operations

1. Switching the operating light to ON with the current light status OFF
 - Move your hand underneath and past the proximity switch.
2. Switching the operating light to OFF with the current light status ON
 - Move your hand underneath and past the proximity switch.
3. Adjusting the brightness
 - Hold your hand underneath the proximity switch for at least 2 seconds, the light should not flash.
 - When the brightness reaches its maximum or minimum level, the light will briefly flash once.
 - As soon as the desired brightness has been reached, the light will flash once again. This indicates that the desired



brightness has been set and the programming mode is off.



Due to the extreme brightness of the LED technology employed, directing the light beam into the patient's or user's eyes should be avoided! Briefly looking into the light beam is also not recommended.

Equipment Maintenance Schedule

Before Each Patient

1. Check dental chair movement, make sure that the control features function normally.
2. Check water and air for leakage.
3. Check for proper water flow, air flow, air turbine rotation, micro-motor rotation and scalar vibration.

After Each Patient

1. Clean, lubricate and sterilize the handpieces.
2. Clean and sterilize the syringe tips.
3. Wipe down and flush the handpiece tubing.
4. Flush the suction vacuum line and filter.
5. Clean the vacuum or saliva ejector handpiece.
6. Clean out the solid collection inside the vacuum canister.
7. Flush the vacuum lines.
8. Clean or disinfect all touch and transfer surfaces.
9. Turn off the product main switch and close the water and air main valves.

Daily

1. Flush the vacuum lines with at least two cups of water to eliminate the blockage inside the lines.
2. Refill the purified water bottle as needed.
3. Clean the cuspidor bowl and the bowl screen.

Weekly

1. Clean the chair upholstery by following the cleaning instructions.
2. Clean the HVE and saliva ejector valves
3. Clean the dental light shield with a soft towel and clean water. The light shield can be removed from the light assembly before cleaning. Make sure that the shield is clean and dry without any water marks.
4. Check for abnormal noise from the product's moving parts.



Disconnect electrical power before cleaning the dental light with wet towel. Failure to obey this warning may result in electric shock. Do not use wet towel on light bulb. Do not touch the light bulb with your bare hands as it might leave marks on the light bulb that will affect its brightness level.

Monthly

1. Inspect all handpieces' motor and O-rings. Replace the O-ring if worn or damaged.
2. Inspect HVE and saliva ejector O-rings. Replace the O-ring if worn or damaged.
3. Check the water and air pressures by reading their pressure gauges.
4. Check the Delivery system tray for balanced and level. Rebalance if necessary.

Yearly

1. Inspect the supply water filter in the Contoured Utility Center. Clean or replace the filter as necessary.
2. Inspect the supply air filter in the Contoured Utility Center. Clean or replace the filter as necessary.

Note: This is the manufacture recommended maintenance schedule. The actual maintenance schedule might be more frequent due to different operating conditions.



Whenever there is a part failure or observe any abnormal operational behavior from the unit, such as loose screws and abnormal noises, users should contact the certified service technician immediately for assistance in order to prevent any further problems.

Dental Chair Upholstery Cleaning Instructions

1. Create a cleaning solution by combining 10% of the household dish washing liquid with 90% of warm water.
2. Clean the surface gently with a sponge or soft damp cloth with the mixed solution.
3. Clean the surface with a soft wet cloth and clean water to remove the cleaning solution.
4. Remove the water from surface with a dry soft cloth.
5. Make sure that the dry surface does not have any soapy film.

Hints: For the extremely bad stains, it is acceptable to clean the surface with alcohol. Wet the soft towel with alcohol and gently clean the upholstery surface.

Note: The leather upholstery are made of stain resistant and anti-microbial materials. For deep cleaning and sterilization, it's acceptable to use household bleach or alcohol.



Be aware that Improper cleaning and disinfection methods could lead to cross-contamination. Therefore, it is important to follow all cleaning instructions before performing dental procedure on each patient.



It is very important to pay strict attention to the manufacturer's instructions for their cleaning products. Some cleaning products may contain harsh solvents or chemical that could damage the leather upholstery.

Electromagnetic Compatibility

All electrical medical devices are subject to special EMC safety measurements and as a result the equipment must be installed and operated according to the installation instruction manual and the user manual.

Portable and mobile RF communications equipment could affect the medical equipment.

ELECTROMAGNETIC COMPATIBILITY testing was conducted for this product. All test results are shown below.

TEST RESULTS SUMMARY

Classification of EUT: Group 1, Class B

Test Item	Standard	Result
Mains terminal disturbance voltage	IEC 60601-1-2: 2007 Reference: CISPR 11:2009+A1:2010	Pass
Radiated emission	IEC 60601-1-2:2007 Reference: CISPR 11:2009+A1:2010	Pass
Harmonic of current	IEC 60601-1-2:2007 Reference: IEC 61000-3-2:2006+A1:2008+A2:2009	Pass
Flicker	IEC 60601-1-2:2007 Reference: IEC 61000-4-2:2008	Pass
ESD immunity	IEC 60601-1-2:2007 Reference: IEC 61000-4-2:2008	Pass
Radiated EM field immunity	IEC 60601-1-2:2007 Reference: IEC 61000-4-3:2006+A1:2007+A2:2010	Pass
EFT immunity	IEC 60601-1-2:2007 Reference: IEC 61000-4-4:2004+A1:2010	Pass
Surge immunity	IEC 60601-1-2:2007 Reference: IEC 61000-4-5:2005	Pass
Conducted disturbance immunity	IEC 60601-1-2:2007 Reference: IEC 61000-4-6:2008	Pass
Power frequency magnetic field immunity	IEC 60601-1-2:2007 Reference: IEC 61000-4-8:2009	Pass
Voltage dips and interruption immunity	IEC 60601-1-2:2007 Reference: IEC 61000-4-11:2004	Pass

TEST DATA AND ELECTROMAGNETIC ENVIRONMENT GUIDANCE

This product is intended for use in the following electromagnetic environment. Users should assure that the product is used in such an environment.

IMMUNITY TEST	IEC COMPLIANCE LEVEL	IEC60601 TEST DATA	ELECTROMAGNETIC ENVIRONMENT GUIDANCE
Electrostatic Discharge (ESD) immunity IEC 61000-4-2	$\pm 2, \pm 4, \pm 6$ kV direct contact discharge $\pm 2, \pm 4, \pm 8$ kV direct air discharge	$\pm 2, \pm 4, \pm 6$ kV direct contact discharge $\pm 2, \pm 4, \pm 8$ kV direct air discharge	Floors should be wood, concrete or ceramic tile. Maintain at least 30% room humidity if the floors are covered with synthetic material.
Electrical Fast Transient/Burst (EFT) immunity IEC 61000-4-4	± 2 kV for a.c. and d.c. power lines @ 5kHz repetition frequency	± 2 kV for a.c. and d.c. power lines @ 5kHz repetition frequency	Main supply power should be that of a typical commercial or hospital environment.
Surge immunity IEC 61000-4-5	± 0.5 kV, ± 1 kV a.c. power line to line ± 0.5 kV, ± 1 kV, ± 2 kV a.c. power line to earth	± 0.5 kV, ± 1 kV a.c. power line to line ± 0.5 kV, ± 1 kV, ± 2 kV a.c. power line to earth	Main supply power should be that of a typical commercial or hospital environment.
Conducted disturbance immunity IEC 61000-4-6	3V 0.15MHz-80MHz 6V in ISM and amateur radio bands between 0.15MHz and 80MHz 80% AM at 1kHz	3V 0.15MHz-80MHz 6V in ISM and amateur radio bands between 0.15MHz and 80MHz 80% AM at 1kHz	Main supply power should be that of a typical commercial or hospital environment.
Voltage dips and interruptions immunity IEC 61000-4-11	0% $U_T = 0.5$ cycle 40% $U_T = 5$ cycle 70% $U_T = 25$ cycle	0% $U_T = 0.5$ cycle 40% $U_T = 5$ cycle 70% $U_T = 25$ cycle	Main supply power should be that of a typical commercial or hospital environment. It is recommended to power the product by an uninterruptable power system (UPS).
Power frequency magnetic field immunity IEC 61000-4-8	50Hz X,Y,Z orientations of induction coil: 3A/m	50Hz X,Y,Z orientations of induction coil: 3A/m	Power frequency magnetic fields should be at levels characteristic of a typical

			commercial or hospital environment level.
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Note: a. U_T is the AC mains voltage prior to application of the test level.

IMMUNITY TEST	IEC 60601 TEST LEVEL	COMPLIANCE LEVEL	ELECTROMAGNETIC ENVIRONMENT GUIDANCE
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	$d = 1.2\sqrt{p}$
Radiated RF IEC 61000-4-3	3 V/m 80 kHz to 2.5 MHz	3 V/m	$d = 1.2\sqrt{p}$ 80MHz 800MHz $d = 2.3\sqrt{p}$ 800MHz 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 meters (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. 

Portable and mobile RF communications equipment should be used no closer to any part of this unit, including cables, than the recommended separation distance calculated from the equation applications to the frequency of the transmitter.

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

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

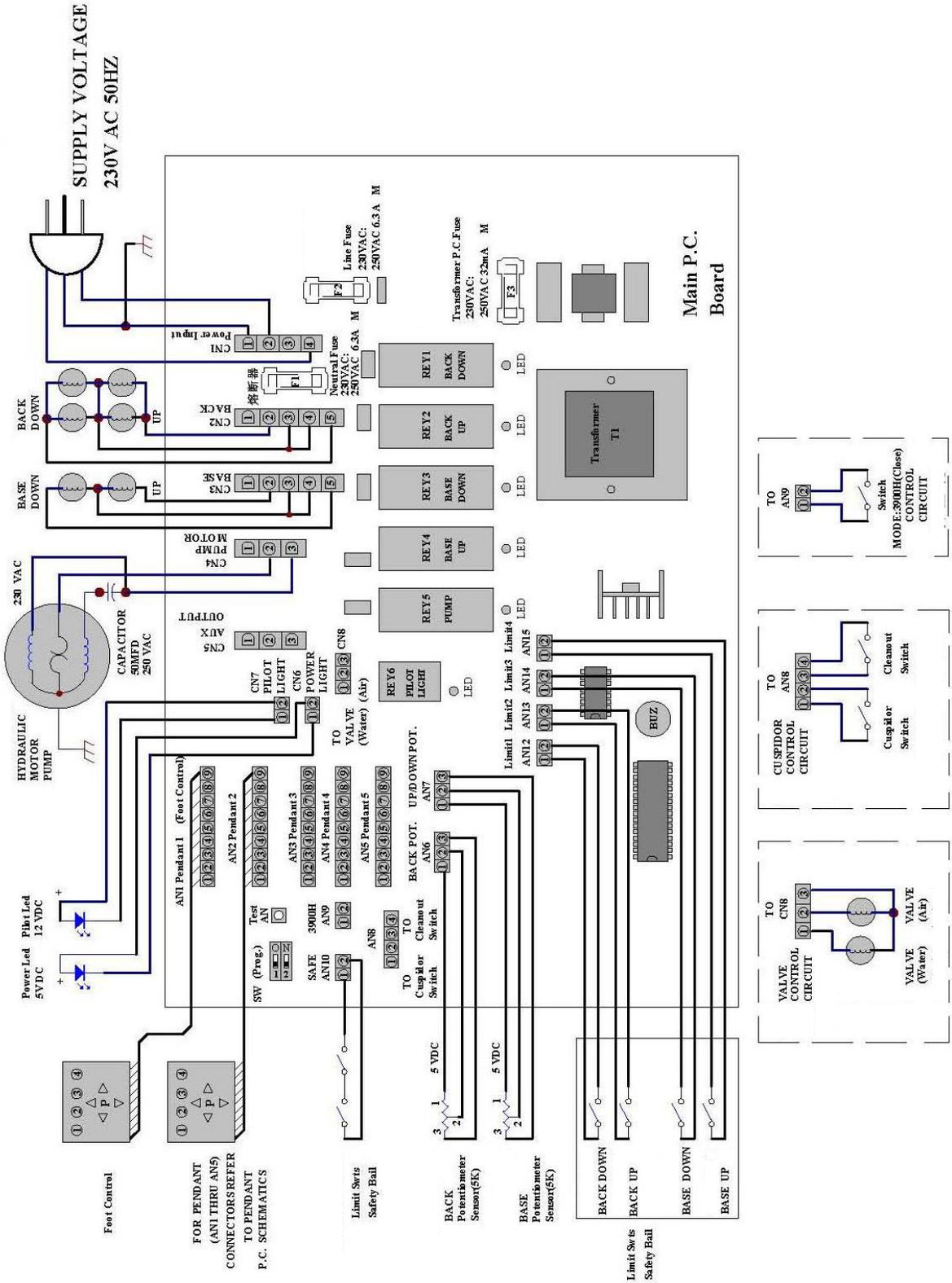
- a. Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which this unit is used exceeds the applicable RF compliance level above, this unit should be observed to verify normal

operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating this unit.

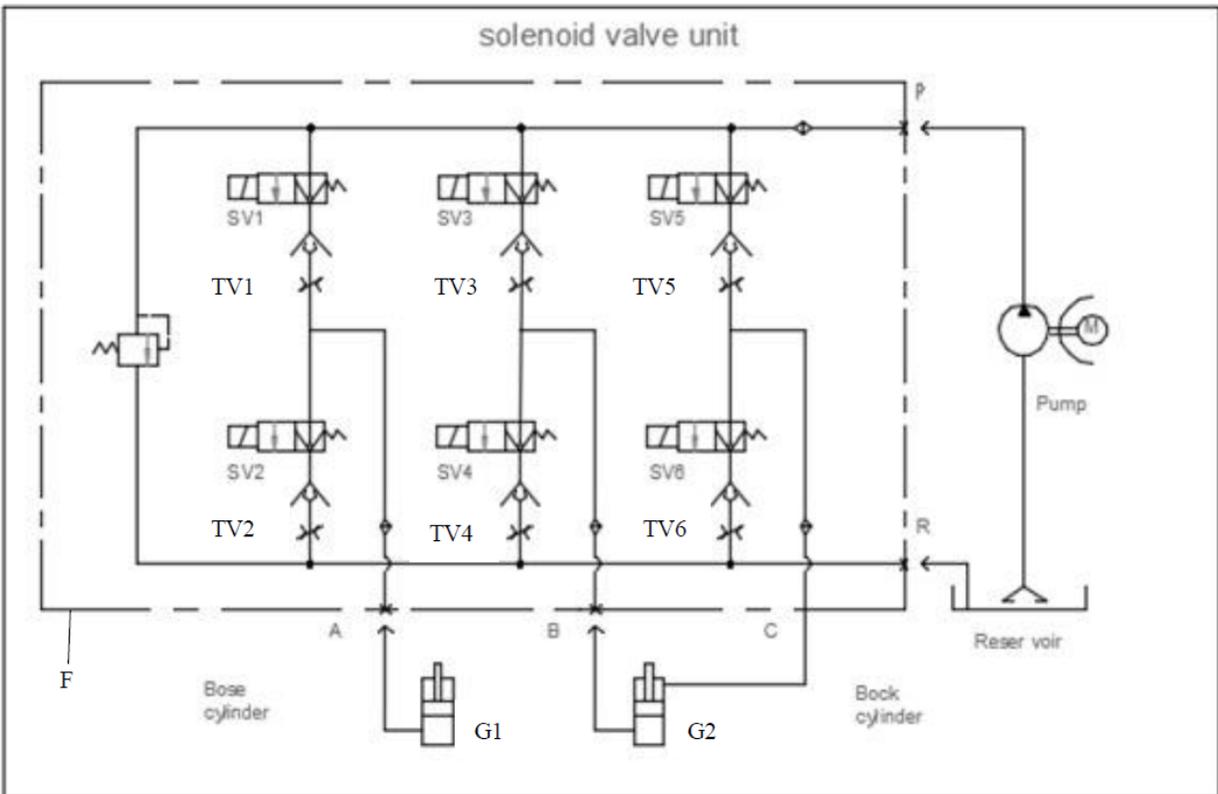
- b. Over the frequency range 150 KHz to 80 MHz, field strengths should be less than 3 V/m.

Emissions TEST	COMPLIANCE LEVEL	TEST DATA	ELECTROMAGNETIC ENVIRONMENT GUIDANCE
RF emission (CISPR 11) Group 1 Compliance Class B Compliance	Limit at 3m [dB(μ V/m)] 200MHz 30 [dB(μ V/m)] 400MHz 37 [dB(μ V/m)] 800MHz 37 [dB(μ V/m)]	Limit at 3m [dB(μ V/m)] 200MHz <20 [dB(μ V/m)] 400MHz <27 [dB(μ V/m)] 800MHz <27 [dB(μ V/m)]	This product has very low radiated emission and it is not likely to cause any interference in nearby electronic equipment.
Harmonic emissions (IEC 61000-3-2) Class A Compliance	Max harmonic does not exceed 100% limit.	Worst harmonic was #5 with 6.66% of the limit.	This product is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Flicker emissions (IEC 61000-3-3)	Highest dt (%): <3.3 Time (mS) >dt: 500 Highest dc (%): <3.3 Highest dmax (%): <7 Highest Pst (10 min): <1	Highest dt (%): = 1 Time (mS) >dt: = 0 Highest dc (%): = 0.34 Highest dmax (%): = 1 Highest Pst (10 min): = 0.415	

Appendix
Wiring Diagram



Hydraulic Fluid Power Schematics



Pump: single phase AC hydraulic motor pump

F: six in one solenoid valve

P, A, B, C, R: solenoid valve fittings

G1: base movement cylinder

G2: back movement cylinder

SV1: base up solenoid (fluid supply)

SV2: base down solenoid (fluid return)

SV3: back down solenoid (fluid supply)

SV4: back down solenoid (fluid return)

SV5: back up solenoid (fluid supply)

SV6: back up solenoid (fluid return)

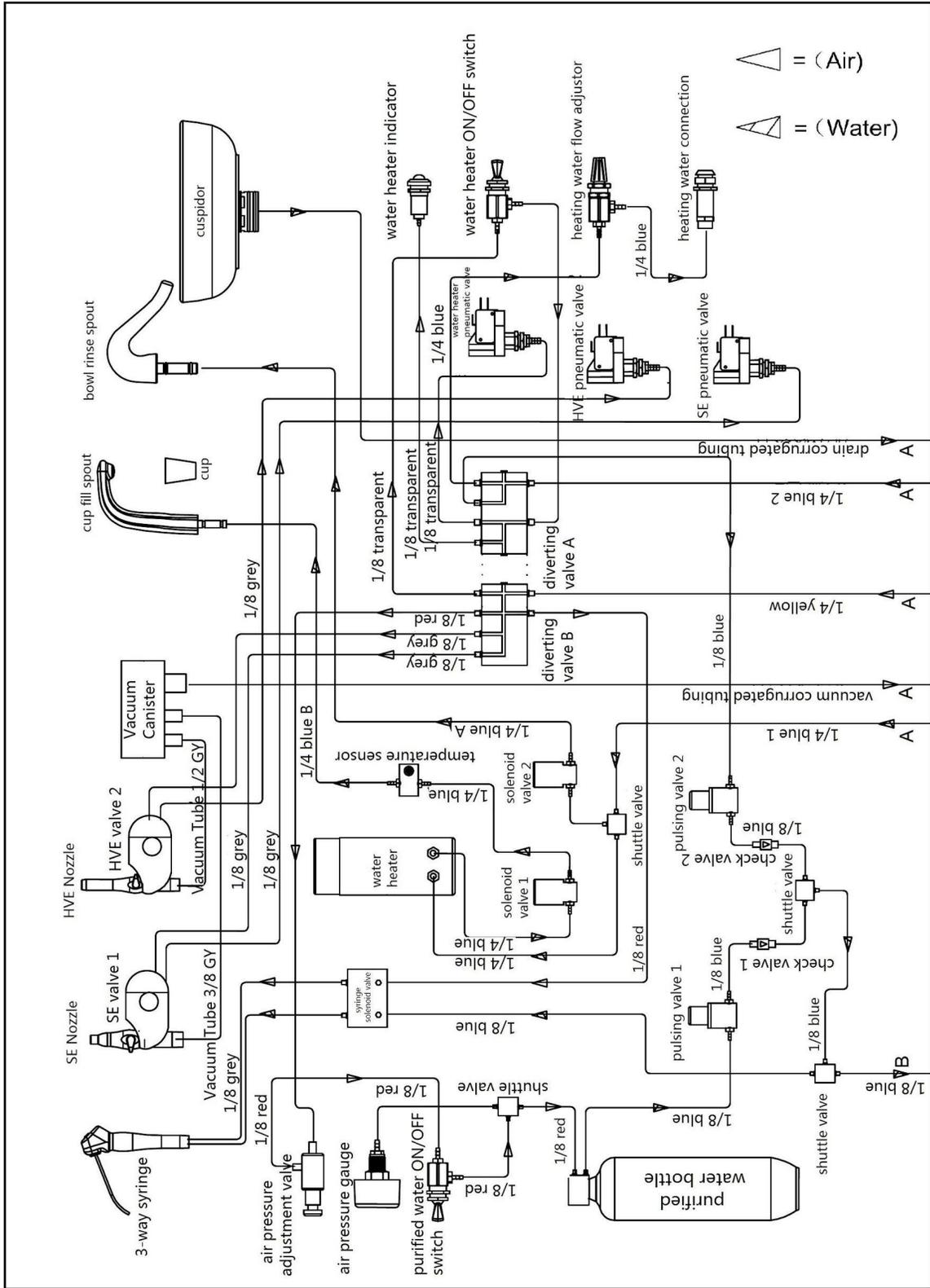
TV1, TV2, TV3, TV4, TV5, TV6:

adjustable throttle

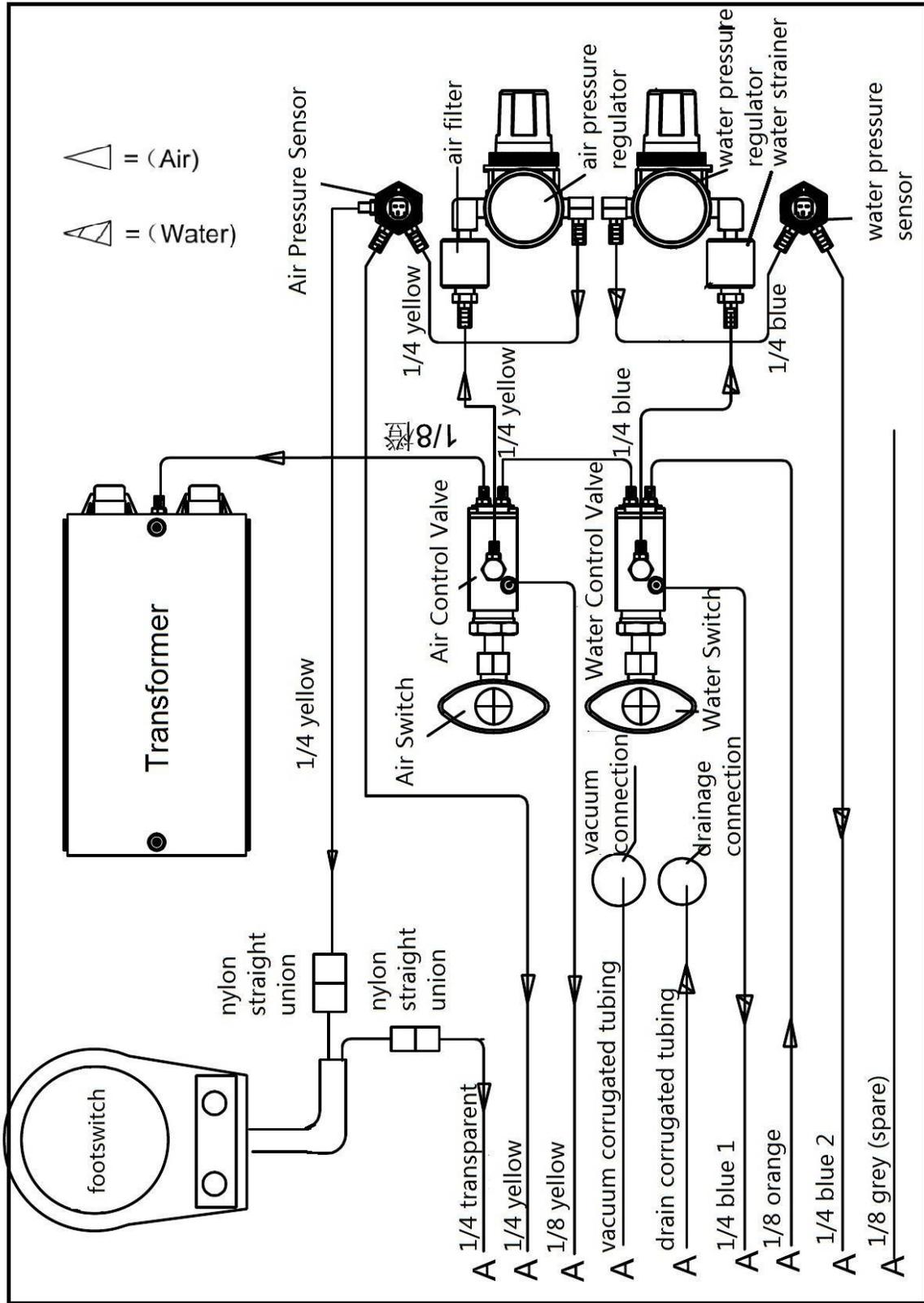
Reservoir: hydraulic reservoir

Delivery System Tray Tubing Diagram

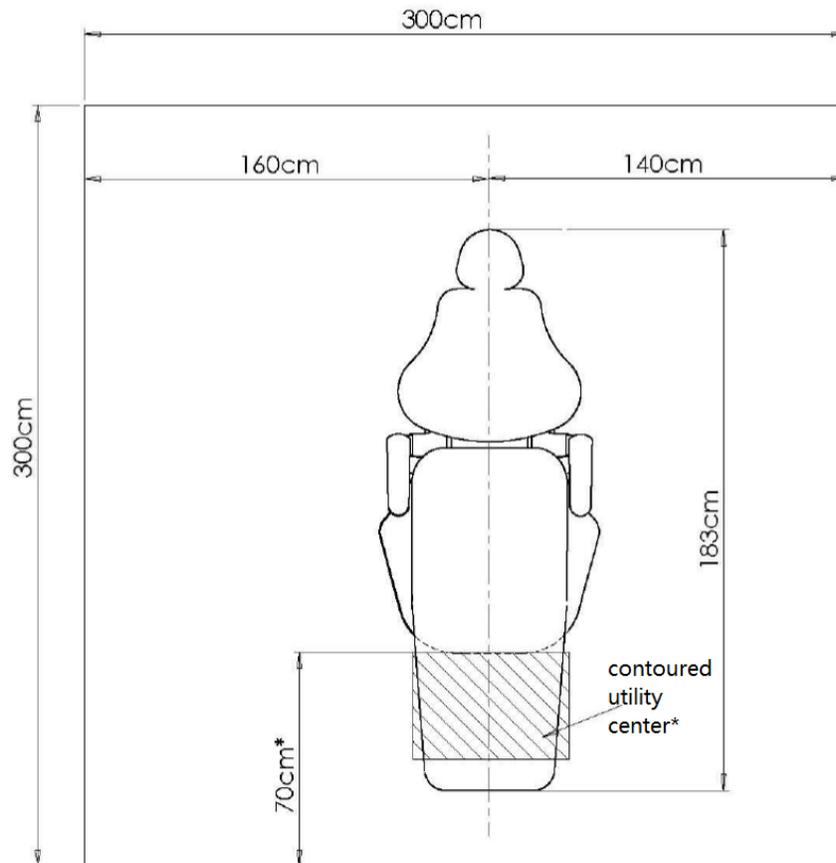
Side Box Tubing Diagram



Contoured Utility Box Tubing Diagram



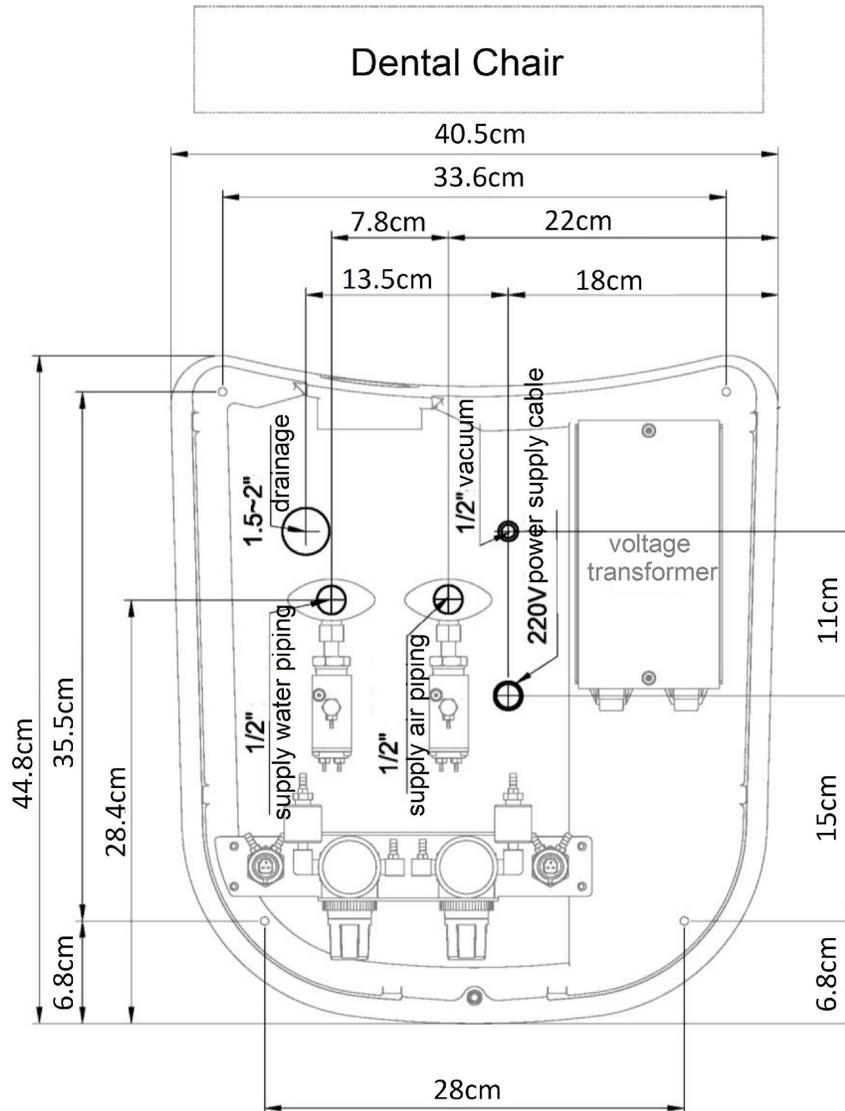
Dental Chair Required Operating Area



Note:

1. *contoured utility center size and tubing diagrams are shown on the next appendix.
2. *dental chair front clearance space is required to have at least 70cm away from the wall.
3. Each dental chair required operating area is 9 m².

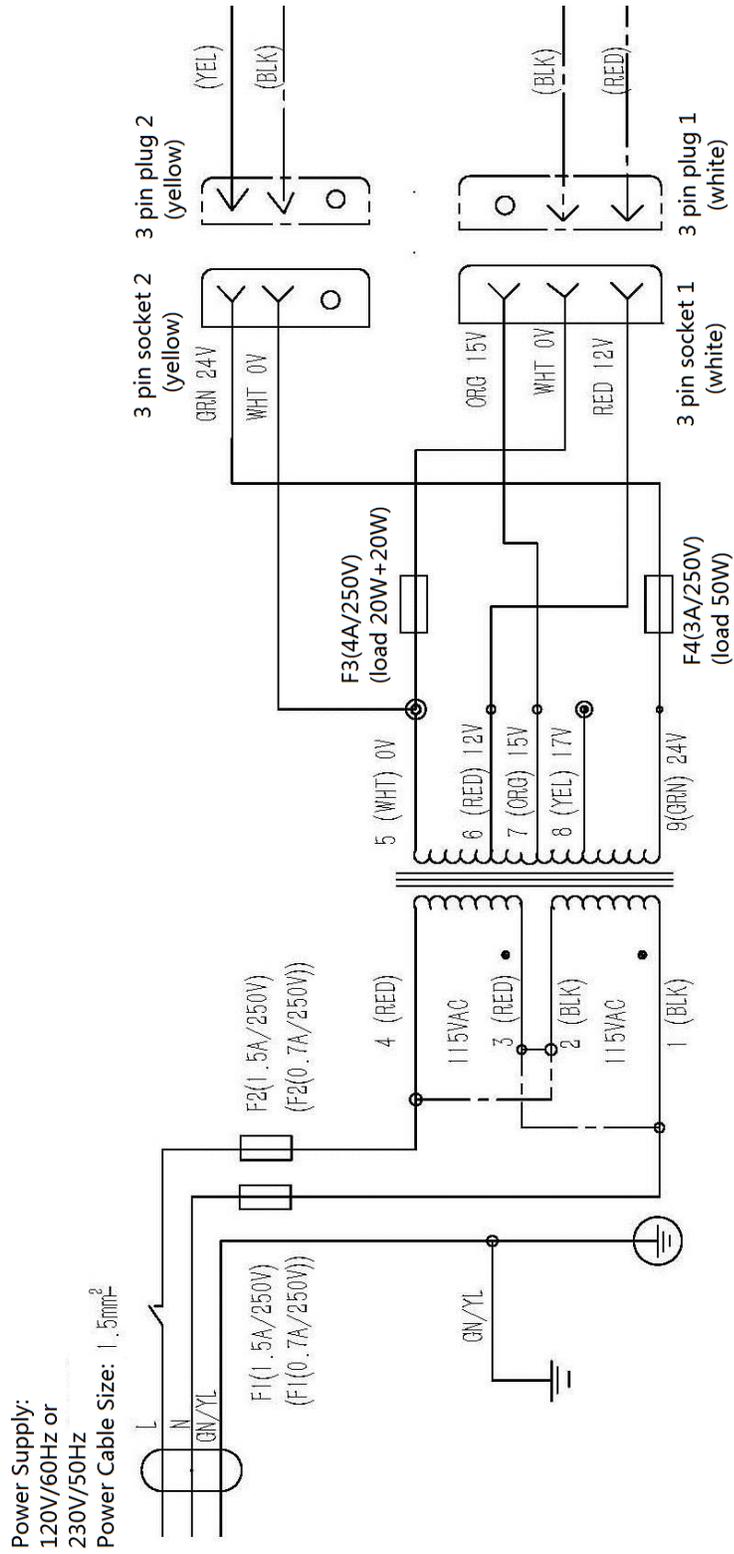
Contoured Utility Center Detail



Note:

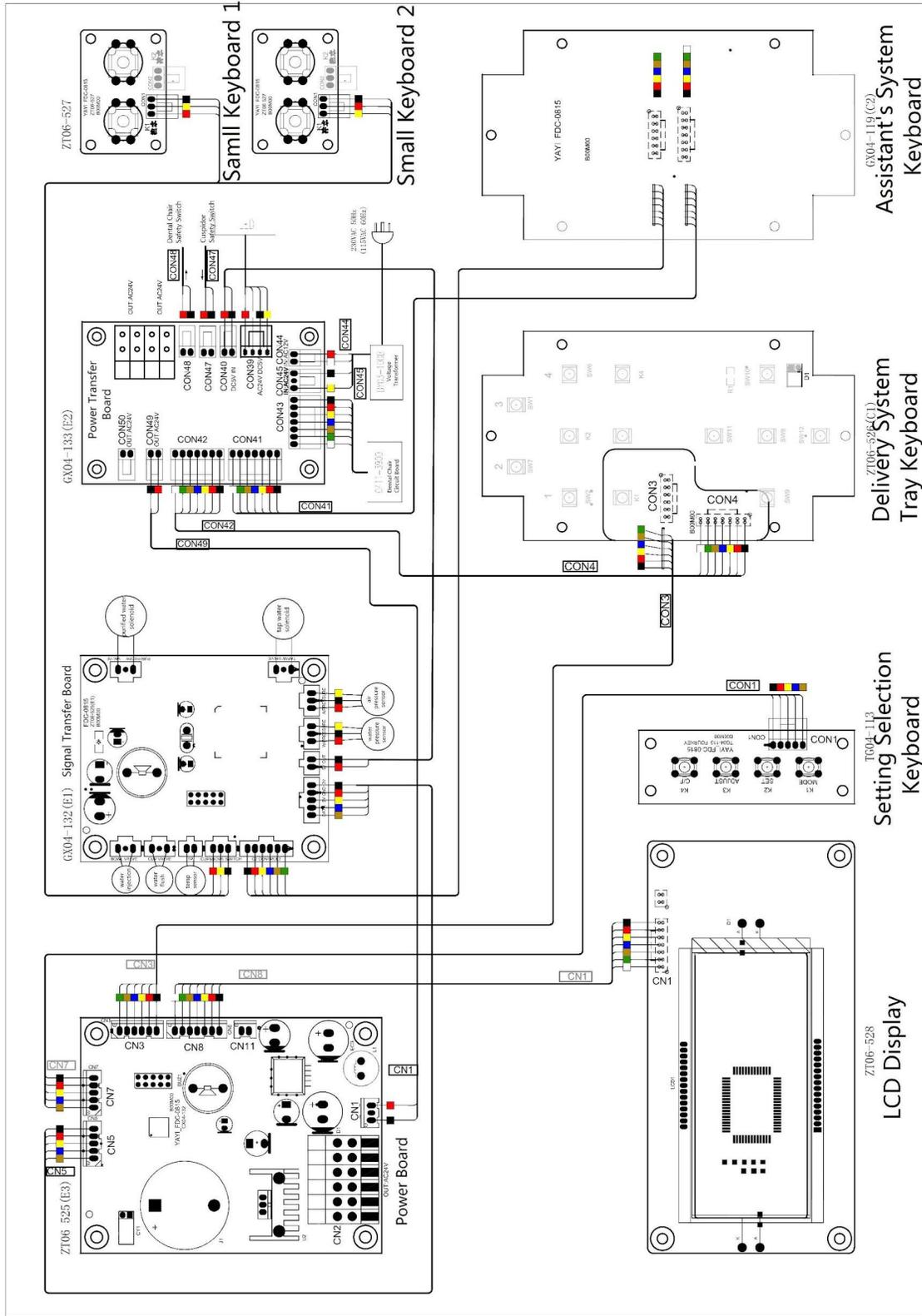
1. Air supply pipe, water supply pipe and central vacuum pipe are in 1/2" diameter size. They are all extending 30mm above the ground level.
2. Drainage pipe has diameter size 1.5" to 2". It is extending 30mm above the ground level.
3. Supply power is 220V. There is an overcurrent protection system provided for each dental chair. It is the best to install the overcurrent protection system at the left hand side of the chair. The overcurrent protection system and the wall outlet shall be at least 40cm above the ground level. Any wiring cables underneath the ground level shall all be protected with electrical conduit, conduit shall be extending 30-40mm above the ground level.

Voltage Transformer Wiring Diagram



Note: Refer to the above diagram, connect 120V or 230V power supply cable accordingly.
 120V F1, F2 requires fuse size 1.5A/250V
 230V F1, F2 requires fuse size 0.7A/250V

Circuit Board Schematics



Warranty Statement

All FDC products sold to and installed by dealers are warranted to be free from defects in workmanship and materials for one year from date of purchase. Hydraulic motor pump itself has factory warranty of five years. During this period, FDC will replace any defective part at no charge to the customer. FDC however, WILL NOT be responsible for dealer or service company labor charges or shipping charges.

This warranty does not cover normal wear and tear, stains, cuts or scratches of upholstery or surface finishes or parts sold to OEM customers.

Staining, discoloration or deterioration of the equipment caused by disinfectant solutions is not covered under the warranty.

FDC will pay the return freight charges from the factory to the dealer. This warranty does not cover damage resulting from improper installation, misuse or accidents incurred in shipping and handling.

All claims against the freight carrier must be initiated at the time the damaged items are received. The claim is the responsibility of the customer.

We are constantly striving to improve our products. We reserve the right to make modifications without the need for prior notification and are not obliged to modify previously manufactured items or equipment.

Accessories such as high/low speed handpieces, 3-way syringe, HVE & SE, scaler and any other high frequent maintenance items such as axel and rubber seals are not covered under this warranty.

Warranty period begins as soon as installation is complete and accepted by the end user. Please contact your local dealers for more information on the product warranty.

Caution: only authorized service technicians should attempt to service FDC equipment. The use of other than the manufacturer authorized technicians will void the warranty.