

Smart PlusTM

Installation Manual

Model : PHT-35LHS

Version : 1.32



vatech

Notice

This manual covers the installation procedures for the **Smart Plus (PHT-35LHS) digital X-ray imaging system**. The Installation Manual and the User Manual are shipped with each hardware unit.

Brand name: Smart Plus (PHT-35LHS)

Manufactured by: VATECH Co., Ltd.

In this manual, "equipment" refers to **Smart Plus**.

In abbreviated forms, CBCT, CEPH, and PANO denote Cone Beam Computed Tomography, Cephalo, and Panorama, respectively. They are interchangeably used.

The "Optional" in this manual means that the function or features are left to the customer's or user's choice.

A thorough review of this manual is recommended before installation to ensure the proper installation of this equipment. The **Smart Plus** is in steady improvement. The information contained in this manual may be subject to change without notice, justification, or notification of the persons concerned.

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Important Notes




 CAUTION	Moisture could be built upon the equipment from a sudden temperature change inside and outside the installation room. Allow at least an hour before turning ON the equipment to avoid condensation.
 CAUTION	<p>To avoid improperly balanced equipment, install the device on a flat surface to maintain stability.</p> <p>If the equipment is not stable, property damage and personal injury may occur.</p> <p>DO NOT push or pull the equipment.</p> <p>Equipment should only be installed by an authorized technician, complying with proper installation procedures</p>
 CAUTION	Failure to read and understand the information provided in this manual may result in physical injury, damage to the equipment, or equipment failure. Please read each CHAPTER in its entirety and understand the information therein before attempting any of the installation procedures.

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1. Introduction

1.1 Manufacturer's Liability

As the manufacturer, **VATECH** assumes liability for the safe and reliable installation and operation of this equipment only when:

- Equipment installation, including software installation, was conducted by an authorized agent by this installation manual.
- The electrical installation was conducted by the appropriate requirements specified in IEC-60363.
- Genuine original or approved replacement parts are used.
- Maintenance/repair service has been performed by a qualified technician(s) from one of our authorized agents.
- The equipment has been used under a normal condition by the user's manual.
- PC Software has been properly used by the manufacturer's installation instructions and user manuals.

1.2 Customer's Responsibility







Site planning and preparation are the responsibility of the customer. The following points should be considered fundamentally important to all customers of this product:

- Install all required materials before the delivery of the system.
- Complete the floor, ceiling, and walls of the room before installing the equipment.
- Install proper sized junction boxes, with covers, at the necessary locations.
- Install a mains power with the proper voltage output and an adequate kVA rating.
- Install the circuit breaker specified by this manual.
- Provide the installer(s) with the current dimensions of the room including the hallway and entry door sizes.
- The customer must have an electrician install more than two power outlets in the room.

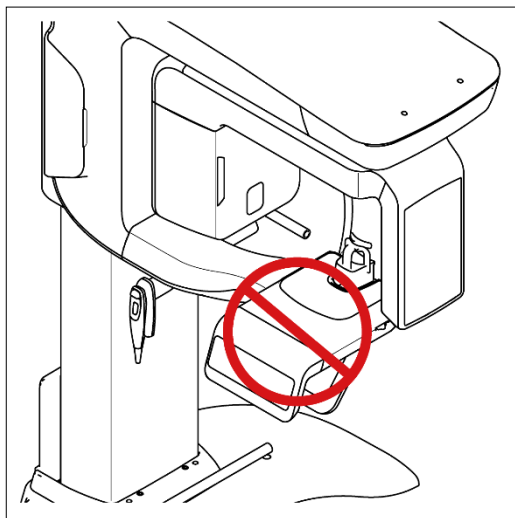
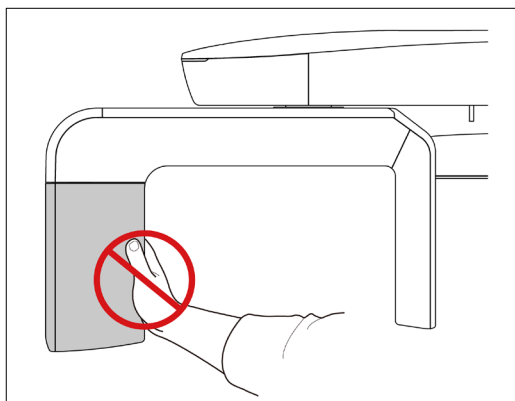
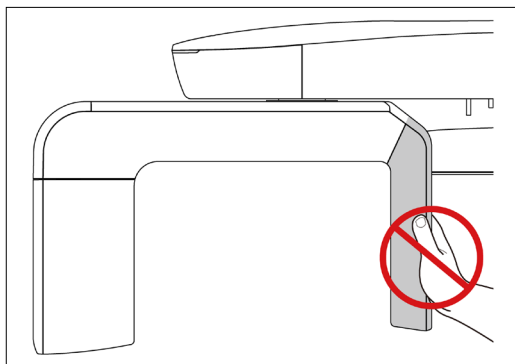
1.3 Conventions in this Manual

The following symbols are used throughout this manual to emphasize information or indicate potential risks to the equipment or user. Make sure that you fully understand each symbol and follow the accompanying instructions.

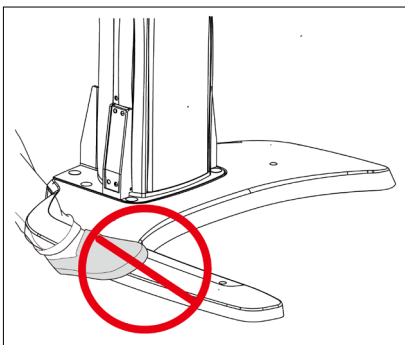
To prevent physical injury and damage to the equipment, please observe all warnings and safety information included in this document.

	WARNING	<p>Indicates that a specific hazard is known to exist which through inappropriate conditions or actions may cause:</p> <ul style="list-style-type: none"> • Severe personal injury (to the operator and patient) • Substantial property damage.
	CAUTION	<p>Indicates that a potential hazard may exist which through inappropriate conditions or actions will or can cause:</p> <ul style="list-style-type: none"> • Minor injury • Property damage.
	IMPORTANT	<p>Indicates that a potential problem may exist which through inappropriate conditions or actions can cause:</p> <ul style="list-style-type: none"> • Property damage.
	NOTE	<p>Indicates precautions or recommendations that should be used in the operation of the system, specifically:</p> <ul style="list-style-type: none"> • Using this Manual • Notes to emphasize or clarify a point.
	RADIATION	<p>Indicates a possible danger from radiation exposure.</p>
	ESD susceptibility	<p>Indicates that an item is susceptible to damage from electrostatic discharges.</p>

Never touch or hold the sensor or tube head areas while moving, installing, or operating the equipment.



DO NOT step on the base unit while installing or operating the equipment.

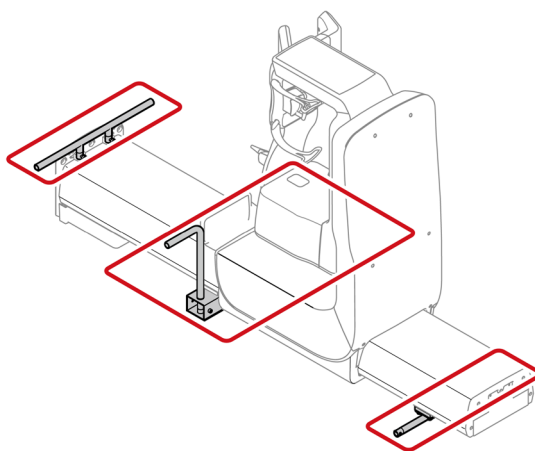


DO NOT use the electric drill for tightening / untightening screws. Use it only for drilling a hole on the wall.



Grab the recommended holding areas only to transport the equipment. (See below)

IMPORTANT

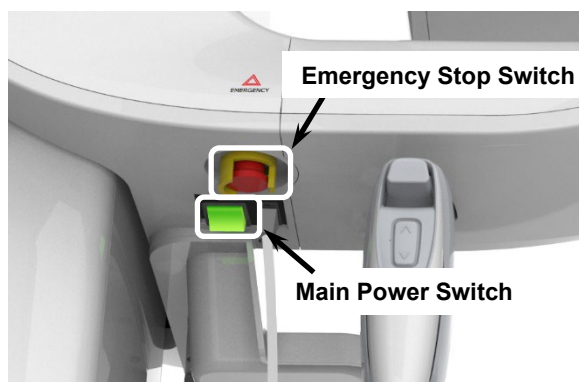


NOTICE

Four installers are required to install the equipment safely.

NOTICE

Locations of the Emergency Stop Switch and the Main Power Switch

**CAUTION**

- Make sure to read and fully understand the installation instructions before installation. The installer must confirm that the system is installed according to the instructions provided by this manual and perform the appropriate procedures therein.
- If the equipment has been stored at temperatures of below 10°C(50°F) for more than a couple of hours, allow the equipment to reach room temperature before applying mains voltage.
- Installation and related work must only be performed by people authorized by VATECH.
- DO NOT connect any items or equipment to this system that are not part of the system: IEC60601-1-1 (3rd edition: 2005).
- Any equipment not approved by VATECH must comply with the applicable standards: IEC 60950-1 (2nd edition: 2005) for IT equipment (Ex: PC) and IEC 60601-1 (3rd edition: 2005) for medical electrical equipment.
- All operators of this equipment are responsible for ensuring that the requirements outlined in IEC 60601-1-1 (3rd edition: 2005): Safety Requirements for Medical Electrical Equipment are fully met to ensure the safety of patients, operators, and the environment.
- Never touch-sensitive areas such as sensors during installation. These areas are indicated at the appropriate stages during the installation procedures.
- The use of wireless phones may interfere with the operation of this equipment.

- Use an ESD (electrostatic sensitive device) wristband during installation and connect it to a ground wire.
- Touch a ground point to discharge static electricity before handling PCB boards.

Installation Site

IMPORTANT

- The PC Monitor, Emergency Cut Off Switch, and X-ray Exposure Switch should be installed near the operator so that he or she can manage them simultaneously in an emergency.
- Proper shielding of the room is essential. The installers are responsible for verifying that all applicable radiation safety requirements are met since the requirement varies depending on the country. Since the requirement varies depending on the country. It is the installer's responsibility to verify that all applicable radiation safety requirements are met.
- DO NOT install the equipment near other devices.
- DO NOT install the equipment in an area that is exposed to strong electromagnetic fields.
- DO NOT install the equipment in an area where there is the risk of an explosion.
- The electrical installation of this system shall comply with all local code requirements for electro-medical systems: IEC 60364-7-710:2002.
- It is strongly recommended that a UPS be installed at the same time as the equipment.
- The equipment, PC, and all peripheral devices must be well-grounded.

Warnings Regarding X-ray Radiation








- Failure to install this equipment in an approved location may be dangerous to the patient and operator.
- Stationary radiation shielding must be installed to protect the operator from radiation.
- The X-ray system may cause injury to the patient if improperly used. Obey all federal and municipal standards regarding radiation safety.
- When exposing the patient to the X-ray, the operator must be behind a protective wall or take other protective actions. The operator should remain at least

2 m (7 feet) away from the X-ray when pressing the Exposure Switch and observe the patient and capture-progression.

- Operators must provide protective clothing to the patient before X-ray capturing. Pregnant women must consult with a doctor before being exposed to an X-ray.

1.4 Marks and Symbols

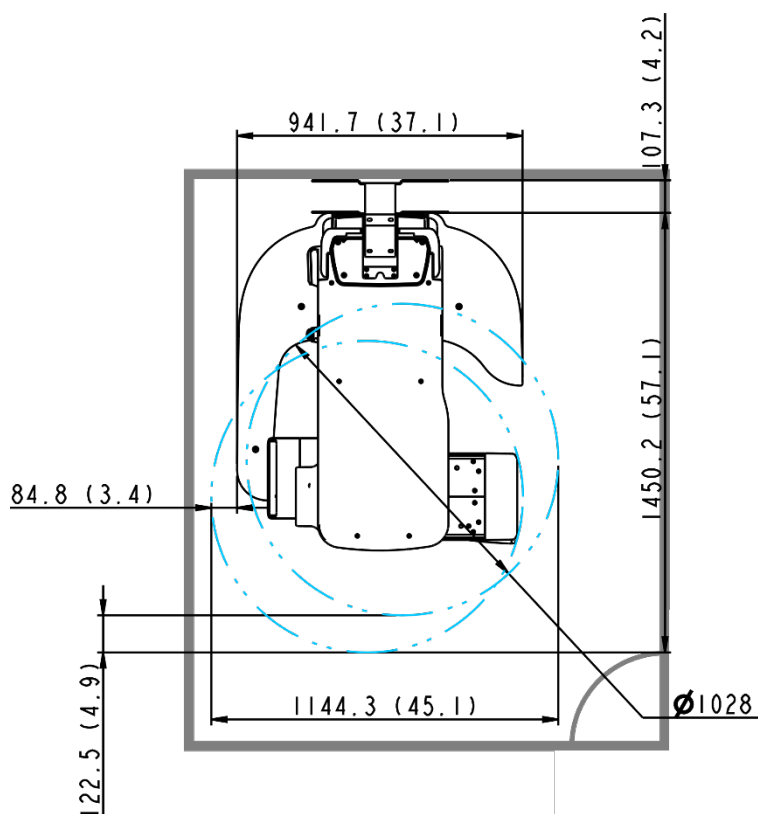
Symbols	Description	Location
	Dangerous voltage	Powerboard/ Inverter board/Mono block
	Protective earth (Ground)	Column
	Off (power: disconnected to the Main Power Switch)	Main Power Switch
	On (power: connected to the Main Power Switch)	Main Power Switch
	Warns ESD hazard.	MCU board/Board package

2. Choosing an Installation Site

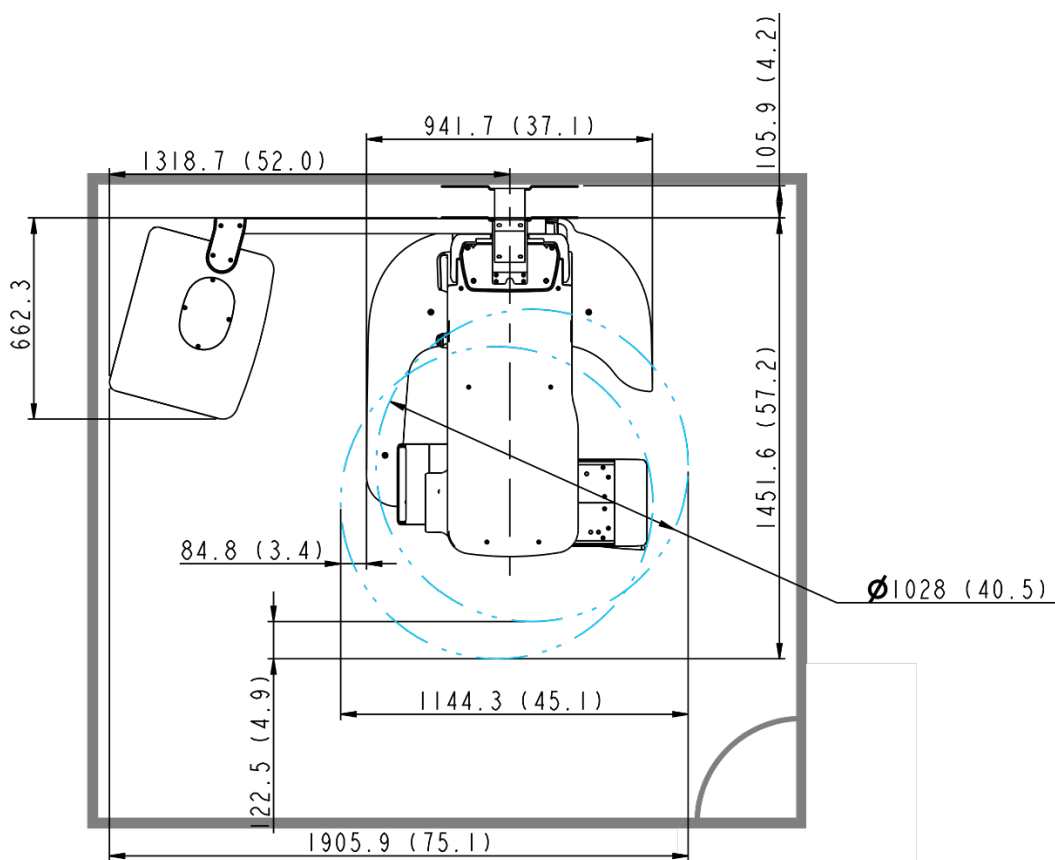
2.1 Room Requirements

IMPORTANT

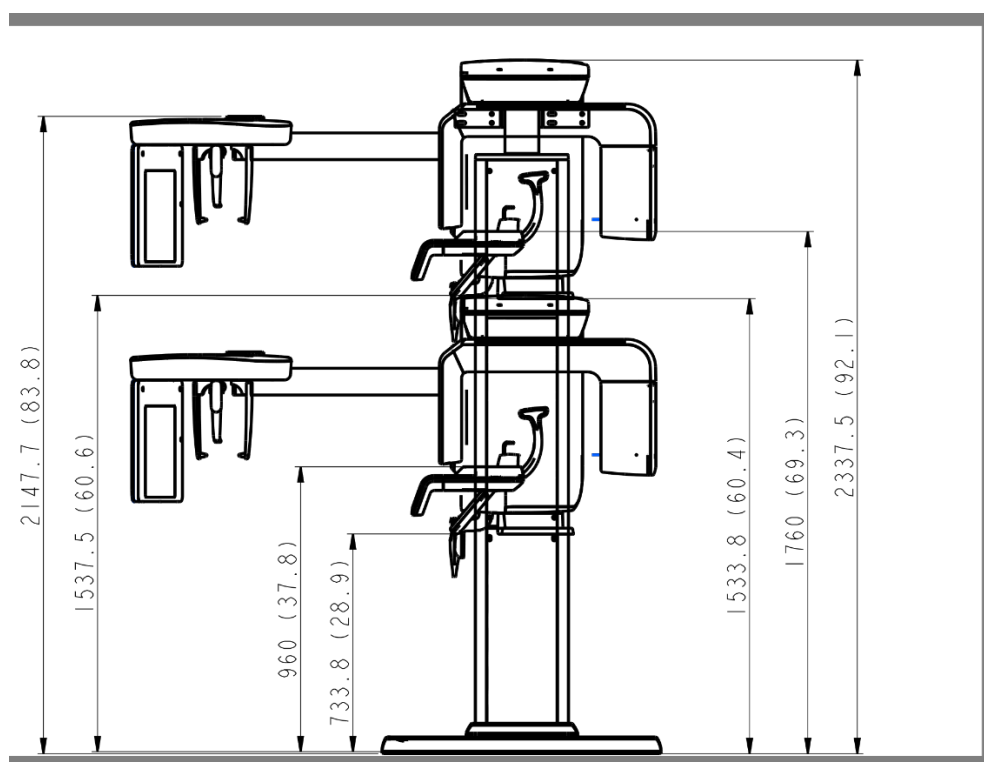
- The location of this equipment should allow for the high visibility of the patient by the operator, and the operator should be as about the patient as possible.
- This equipment should not be installed on thick carpets for stability reasons.
- Anti-static floor materials should be used around the equipment.
- The PC monitor, emergency cut-off switch, and X-ray Exposure Switch should be installed near the operator so that he or she can manage them simultaneously in case of an emergency.



<Without CEPH Unit (optional): 2,044.3 mm (L) x 2,457.5 mm (W) or wider >



<With CEPH Unit (optional): 2805.9 mm (L) x 2,457.5 mm (W) or wider >



<Ceiling Height: 2,437.5 mm (H) or higher >

Minimum Space Required

Without CEPH unit	2,044.3 mm (L) x 2,457.5 mm (W) x 2,437.5 mm (H)
With CEPH unit	2,805.9 mm (L) x 2,457.5 mm (W) x 2,437.5 mm (H)

IMPORTANT

If the ceiling height is less than 2402 mm (without Base) / 2437.5 mm (with Base) (= max. height of the column + 100 mm), refer to **Appendix C. Limiting the Column Height** to lower the max. The height of the column.

Lead Thickness

≥ 1 mm

The width of the Entrance

The door of the X-ray room should have a clearance of more than 800 mm (31.5") wide.

Floor Area

The floor of the X-ray room must be stable and level for system balance.

The floor must be able to support a minimum weight of 500 kg/m² (110 lbs. / feet²)

Protection against Radiation

- To protect against radiation hazards, follow all federal and municipal requirements.
- During exposure, the operator should follow applicable radiation shielding requirements and remain at least 2m (7') from the source of the radiation.
- Maintain visible contact with the patient and a clear view of indicators such as the warning lamp and imaging status on the PC.

2.2 Specifications for Electrical Installation

These specifications are based on the **MEIGaN** (Medical electrical installation guidance notes).

Consult the companion manual for further information: **Volume 3: Specification for Electrical Installation.**

2.3 Electrical Requirement



WARNING

- When using a multiple portable socket outlet (MPSO), ensure to connect PC and equipment of the same outlet.
- Ensure to use one MPSO for one device.
- Ensure to use a power outlet complies with the power cord to prevent unstable system operation.

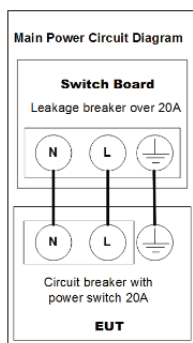
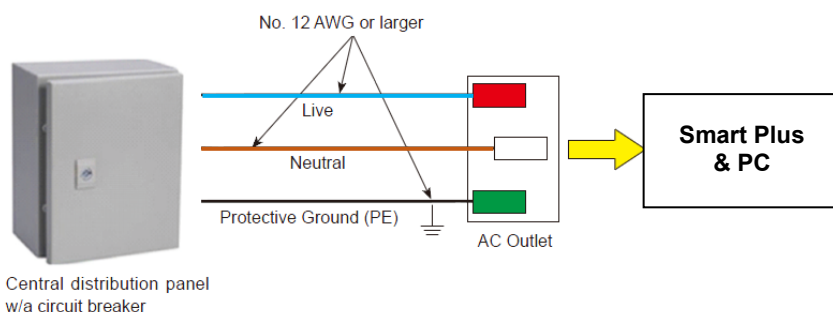
NOTICE

For countries where a stable power supply is not guaranteed, installing an AVR (Automatic Voltage Regulator) that is single-phase and with a capacity of 3kVA or more is recommended to ensure a steady operation. Please consult a local electrician if you are located in an unstable area.

Item	Description
Power Supply Voltage	100 - 240 V ~
Frequency	50 / 60 Hz
Phase	Single
Power rating	2.0 kVA
Accuracy	Tube Voltage (kVp) $\pm 10\%$, Tube Current (mA) $\pm 20\%$, Exposure Time (s) $\pm (5\% + 50\text{ ms})$

- The input line voltage depends on the local electrical distribution system.
- Allowable input voltage fluctuation requirement: $\pm 10\%$.
- **Mode of operation:** non-continuous operation (NFPA 70: long time operation)
- needs waiting time (at least 60 times the exposure time) before the next exposure begins.
- Column operation time: Max. 2 min. On / 18 min. Off (Ratio 1:9)

2. Choosing an Installation Site



NOTICE

- To assure line voltage quality, a separate 3-core grounded power cable connected directly to the central distribution panel with an over-current circuit breaker rated for 20A must be used.
- Maximally allowed deviation of the tube voltage/tube current/exposure time:
Tube Voltage (kVp) $\pm 10\%$ / Tube Current (mA) $\pm 20\%$ / Exposure Time (s) $\pm (5\% + 50\text{ ms})$ according to IEC 60601-2-63.
- The mains resistance should not exceed 0.045 ohm at 100 V and 0.19 ohm at 240 V.
- This equipment should be connected to the earthed outlet.

2.4 Environmental Specifications

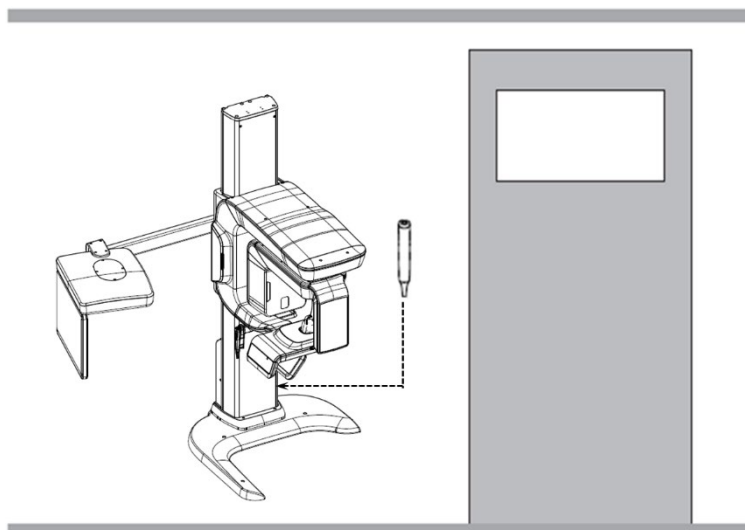
	Item	Description
During Operation	Temperature	10 ~ 35 °C
	Relative humidity	30 ~ 75 %
	Atmospheric pressure	860 ~ 1060 hPa
During Transport and Storage	Temperature	-10 ~ 60 °C
	Relative humidity	10 ~ 75 % (non-condensing)
	Atmospheric pressure	860 ~ 1060 hPa

2.5 Exposure Switch Installation Options

There are three options for installation, depending on the configuration of the site. Nevertheless, the 2nd option is preferred.

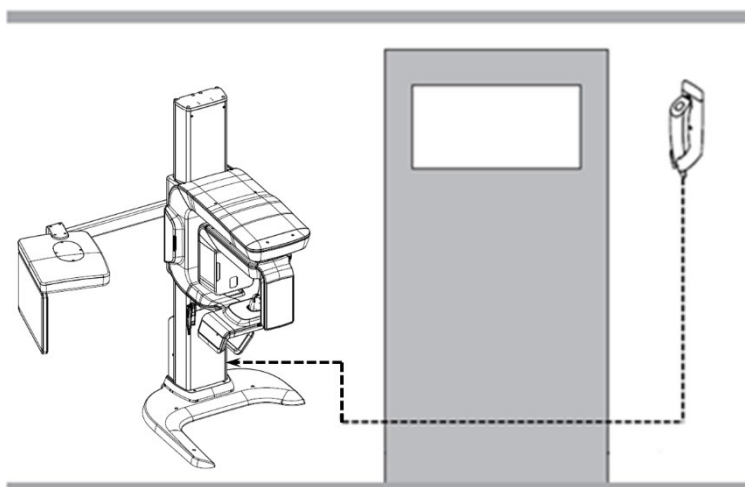
Option No. 1:

The user operates the **Exposure Switch** from inside the X-ray room.



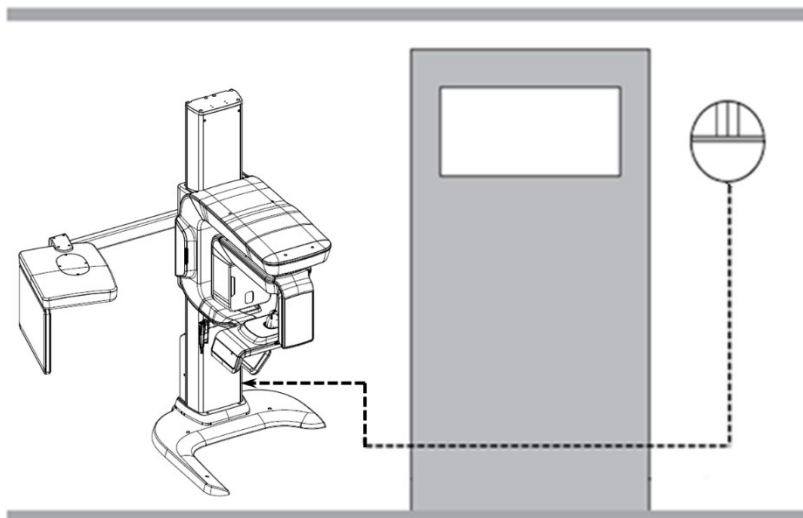
Option No. 2:

The user operates the **Exposure Switch** from outside the X-ray room. The **Exposure Switch** holder is mounted on the wall.



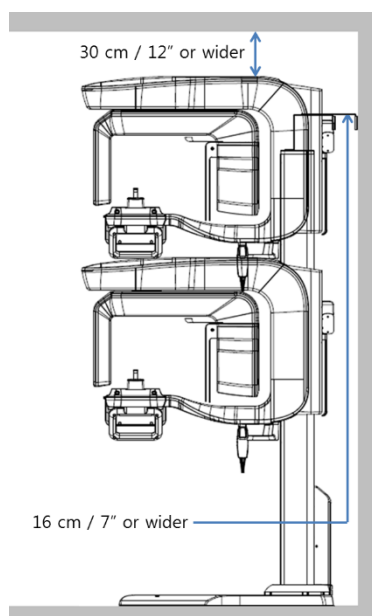
Option No. 3:

The 3rd party **Exposure Switch** (not VATECH's) is used on the demand of the customers. For this scenario, see Appendix D "Connecting the 3rd party The **Exposure Switch**" for details.

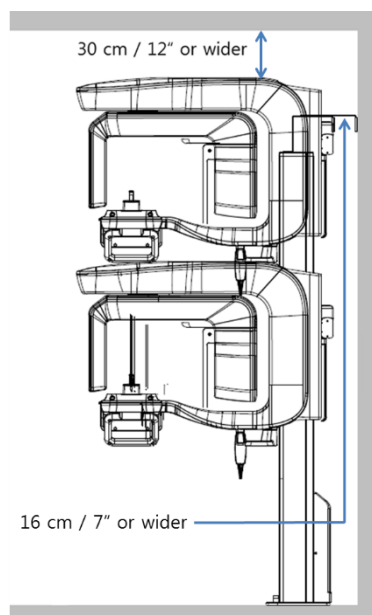


2.6 Installation Versions

Base-stand Type



Wall-mount Type



2.7 Installing the Warning Lamp and Door Interlock Switch

Refer to **Appendix A** for a complete installation guide.

- This system can be equipped with a warning lamp and the Door Interlock Switch which are activated when the X-ray is energized.
- The warning lamp and Door Interlock Switch are not included with the equipment.
- The warning lamp and the Door Interlock Switch must be installed by a qualified technician.

2.8 Installing the Emergency Stop Switch

Refer to **Appendix B** for a complete installation guide.

- Install the Emergency Stop Switch along with the main power cable in the central distribution panel.
- Install this switch so that it is within easy reach of the operator but cannot be accidentally pressed.
- The switch must be a fool-proof model.

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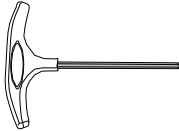
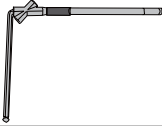
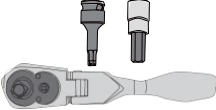
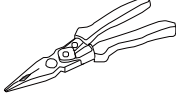
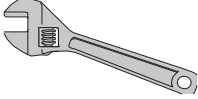
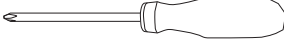

3. Before Installing the System

IMPORTANT


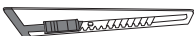


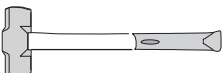
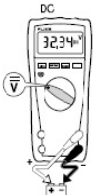

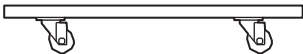
Before or during the system installation, make sure to use **checklist No.3 through No.6** in **Appendix F. Installation Checklist**.

3.1 Required Tools

The following tools are necessary to install the **Smart Plus**.

Item	Figure	Size
Wrench Set		1.5 mm - 10 mm (0.06" - 0.4")
T-shaped Hex Wrench		6 mm - 10 mm (0.24" - 0.4")
Hex Wrench w/ Handle		6 mm - 10 mm (0.24" - 0.4")
Ratchet Wrench		Tips: 3 mm - 8 mm (0.12" - 0.3")
Needle-nose Pliers		Regular
Monkey Wrench		N/A
Cross Head Screwdriver w/ Magnetic Tip		L = 200 mm (7.9")
Spirit Level		N/A

3. Before Installing the System

Item	Figure	Size
Anti-Static Glove		N/A
Knife		N/A
Tape Ruler	 (for Wall Mount type)	5 m
Marker Pen (thick tip)	 (for Wall Mount type)	N/A
Hammer	 (for Wall Mount type)	N/A
Multimeter		N/A
Hammer Drill	 (for Wall Mount type)	L = 200 mm (7.9")
Transport Dolly		N/A

Smart Plus (PHT-35LHS) is an advanced 4 in 1 digital X-ray imaging system that incorporates PANO, CEPH (Optional), CBCT, 3D MODEL Scan imaging capabilities into a single system.

Smart Plus (PHT-35LHS), a digital radiographic imaging system, acquires and processes multi FOV diagnostic images for dentists. Designed explicitly for dental radiography, **Smart Plus** is a complete digital X-ray system equipped with imaging viewers, an X-ray generator, and a dedicated SSXI detector.

The digital CBCT system is based on a CMOS digital X-ray detector. The CMOS CT detector is used to capture 3D radiographic images of the head, neck, oral surgery, implant, and orthodontic treatment. **Smart Plus** can also acquire 2D diagnostic image data in panoramic and cephalometric mode.

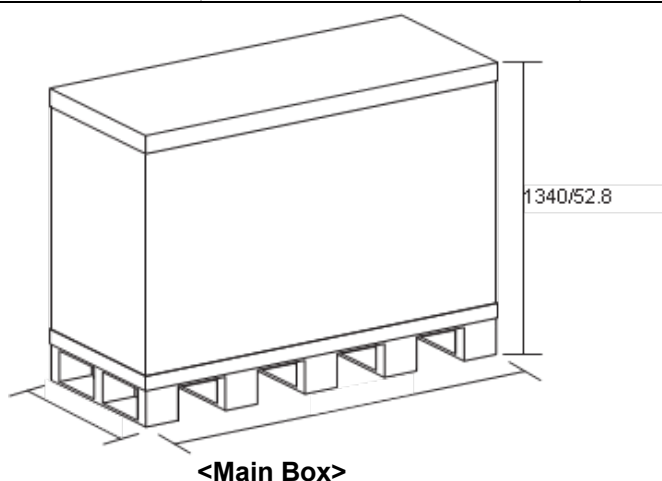
3.3 Unpacking Boxes

NOTICE

- All packages and Styrofoam used to ship this equipment are recyclable.
- Return the package to your **VATECH** Service Representative or dispose of it in compliance with the legal regulations of your country.

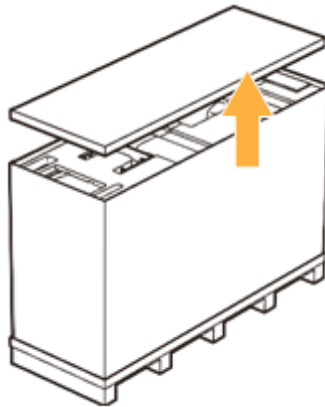
3.3.1 Box No. 1 - Main Box

Component	Size (mm / inch)	Weight (kg / lbs.)
<ul style="list-style-type: none"> ▪ Column and Rotating Unit Assembly ▪ Accessories and Parts ▪ PC System (Optional) ▪ Monitor (Optional) 	2100 (L) x 750 (W) x 1340 (H) / 82.7" (L) x 29.5" (W) x 52.8" (H)	274 / 604



Removing the Cover

1. Move the main box to a convenient place as close as possible to the installation location.
2. Separate the top cover after removing the strapping bands.

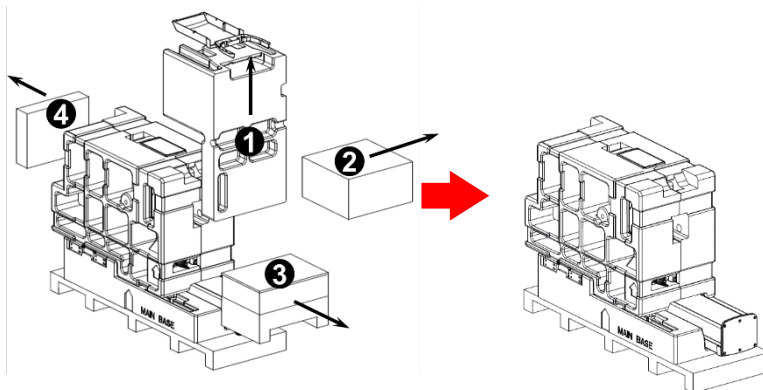


3. Lift a small distance, remove the side covers.
4. Remove the plastic wrap covering the box by using a cutter.

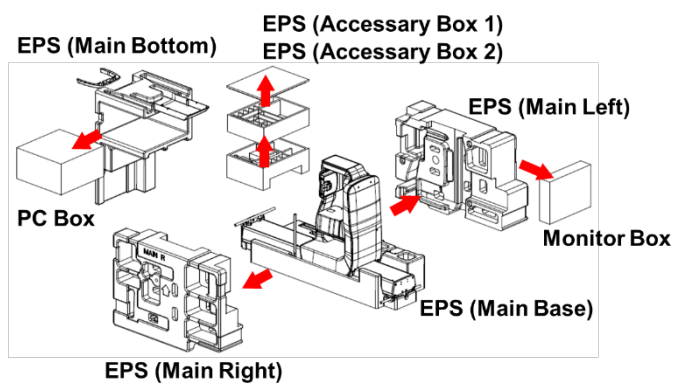


While one installer is removing a side cover, another installer should hold the other covers to prevent them from falling to the ground.

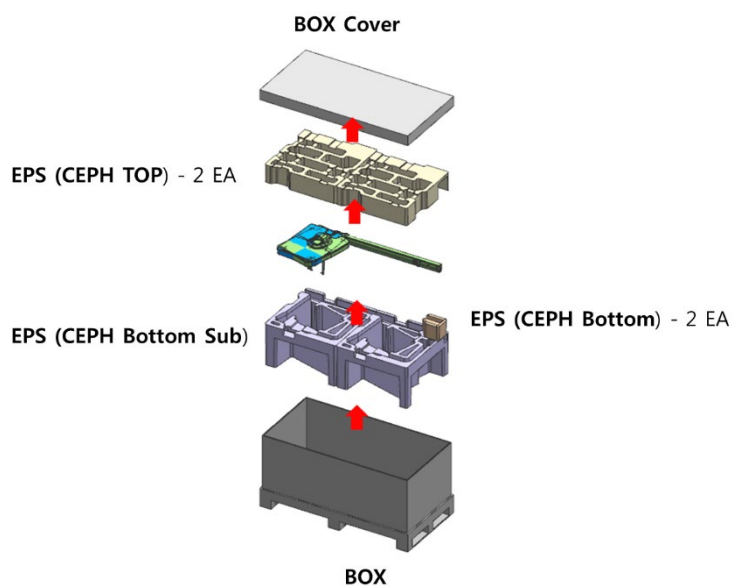
5. Remove the component boxes and packing materials in the sequence as shown in the figure.



PANO Box Configuration

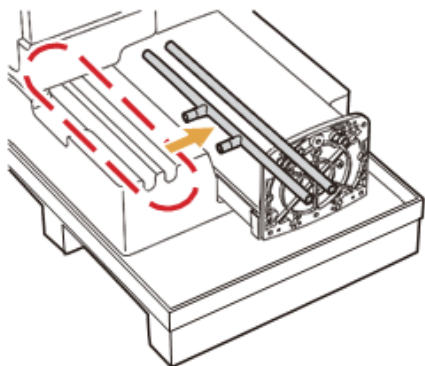


CEPH Box Configuration





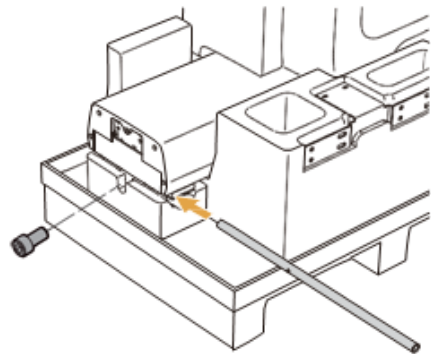
Transportation

1. Pull out the upper and lower carrying handles from EPS (Main Base).



2. Assemble the upper carrying handle by using one wrench bolt.

Wrench Bolt	M8 x 25 (2 Sems) - 1 pcs	
Allen Wrench	6 mm / 0.24"	





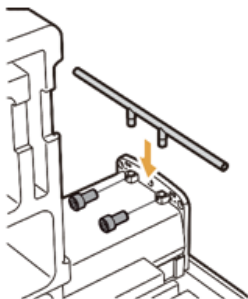
NOTICE

The Wrench Bolt is attached to the upper carrying handle. Remove the bolt from the handle first.

3. Before Installing the System

3. Assemble the lower carrying handle by using two Wrench Bolts.

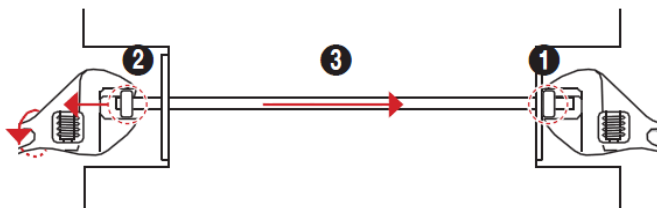
Wrench Bolt	M8 x 30 - 2 pcs	
Allen Wrench	6 mm / 0.24"	



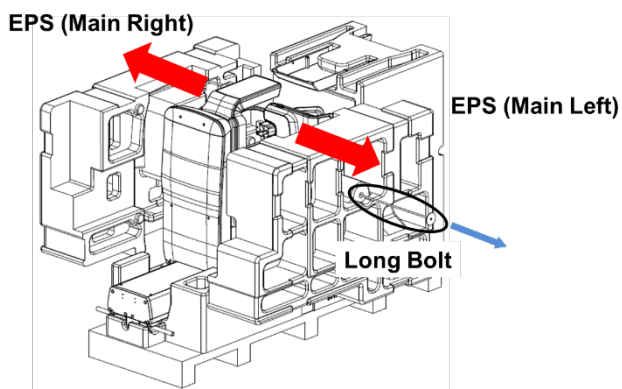
NOTICE

The Wrench Bolt is attached to the Column unit.
Remove the bolts from the Column first.

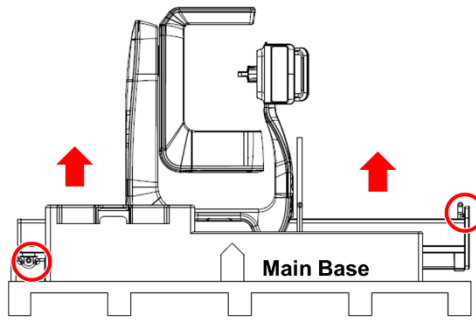
4. Remove the **EPS (Main Right)** and **EPS (Main Left)** as follows:
- 1) Remove the fixing tapes on the EPS by using a cutter.
 - 2) Remove the **Long Bolt** and nuts by using two monkey wrenches.



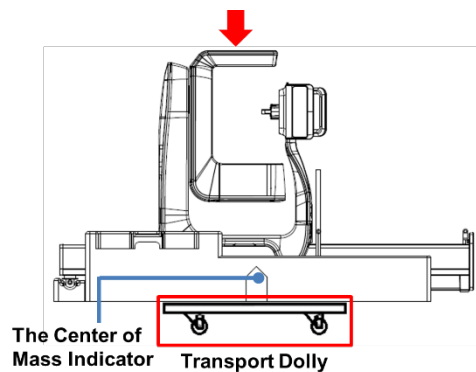
- 3) Remove the **EPS (Main Right)** and **EPS (Main Left)**.



5. Pull out the **Main Unit** with the **EPS (Main Base)** from the pallet.

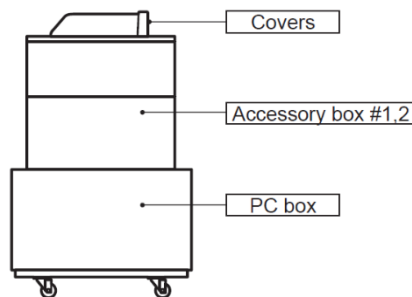


6. Put the **Main Unit** with the **EPS (Main Base)** on a Transport Dolly and move it to the installation site.



IMPORTANT

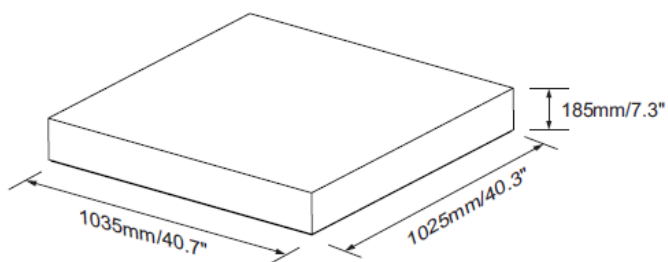
- When putting the Main Unit on the dolly, make sure that the center of the mass indicator is aligned with the center of the dolly.
- If you move the unit manually, make sure that the persons holding the upper handle take the lead.



<Transportation Example>

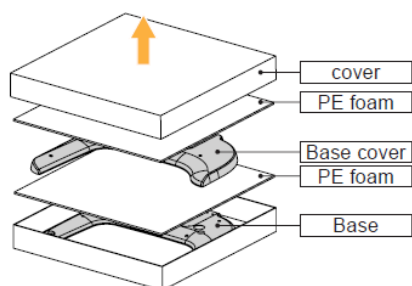
3.3.2 Box No. 2 - Base Unit

Component	Size (mm / inch)	Weight (kg / lbs.)
Base	1035(L) x 1025(W) x 185(H) / 40.7"(L) x 40.3"(W) x 7.3"(H)	65 / 143



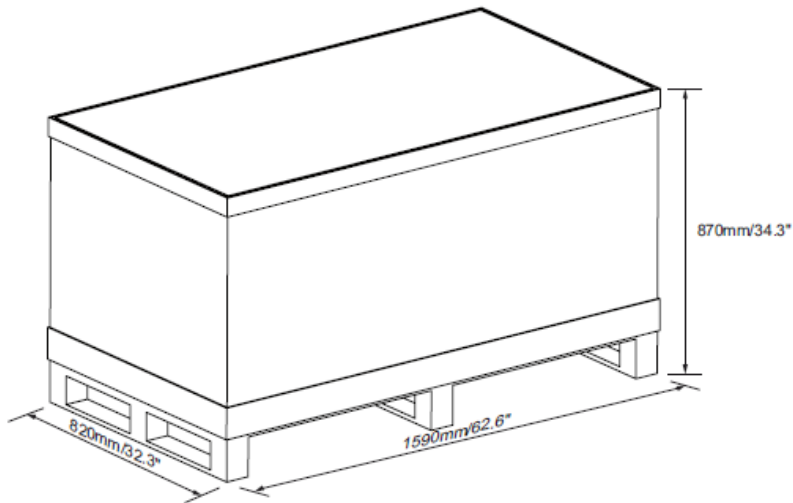
Removing the cover

1. Open the box cover and remove the packing material as shown in the figure.



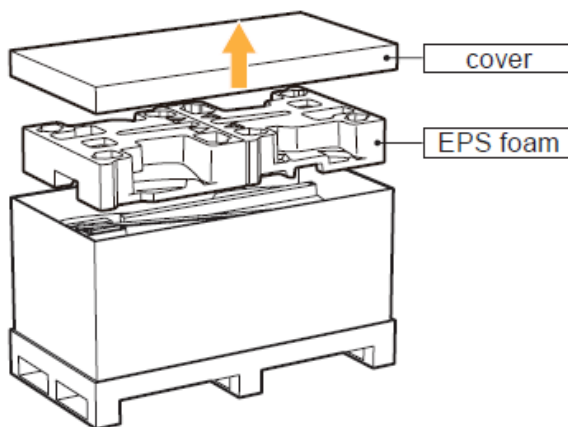
3.3.3 Box No. 3 – CEPH Unit (Optional)

Component	Size (mm / inch)	Weight (kg / lbs.)
CEPH unit	1590(L) x 820(W) x 870(H) / 62.6"(L) x 32.3"(W) x 34.3"(H)	50 / 110



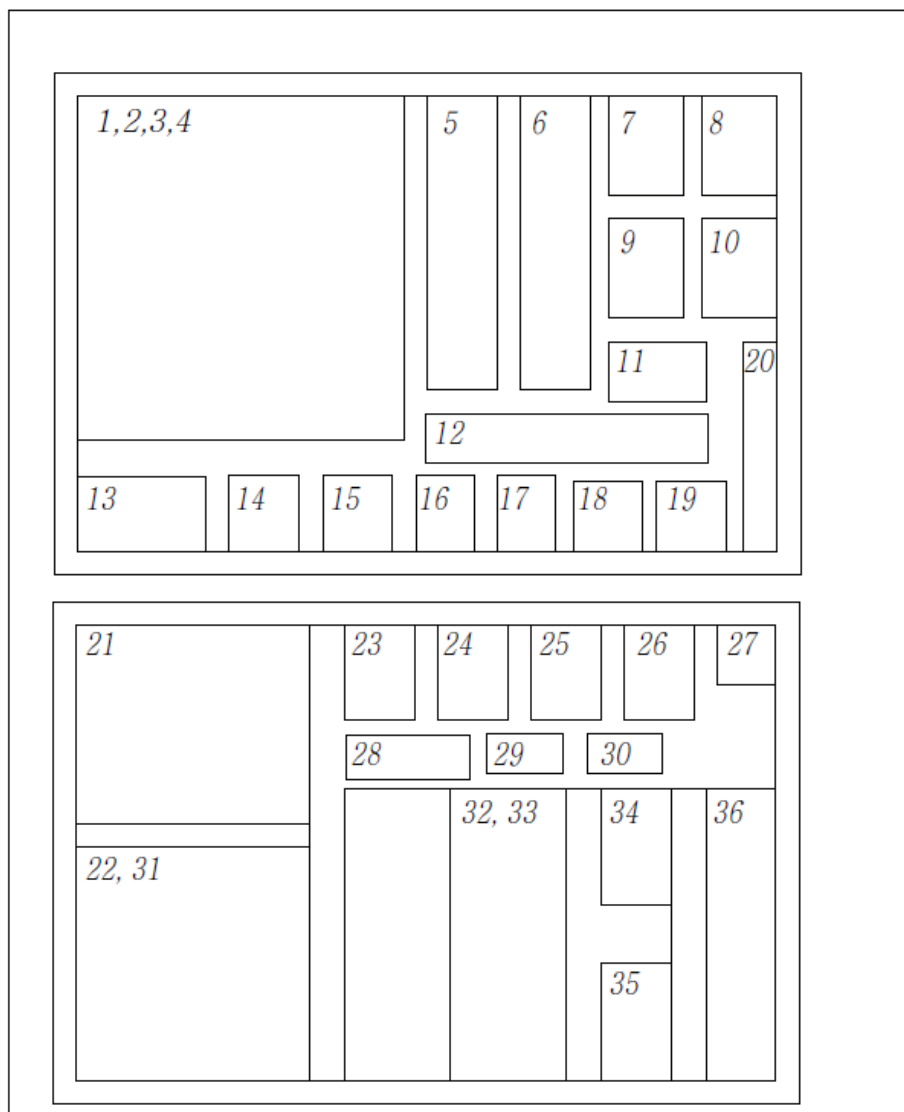
Removing the cover

1. Open the box cover and remove the packing material as shown in the figure.











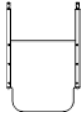

3.4 Checking the Parts

3.4.1 Location Layout of the Parts and Accessories











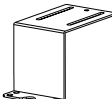


3.4.2 Parts List

In the Accessory Box 1 & 2
















Part No.	Items	Specification	Figure	QTY	Comments	Confirmed (OK?)
1	Manuals	User Manual		1		Yes <input type="checkbox"/> No <input type="checkbox"/>
		Installation Manual		1		Yes <input type="checkbox"/> No <input type="checkbox"/>
		2D Viewer Manual		1	For EzDent-i	Yes <input type="checkbox"/> No <input type="checkbox"/>
		3D Viewer Manual		1	For Ez3D-i	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Installation USB			1		Yes <input type="checkbox"/> No <input type="checkbox"/>
	License Key			1	For EzDent-i and Ez3D-i	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Remote Exposure Switch (Doorbell type)			1	Available in U.S. only	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Remote Exposure Switch Cable (Doorbell type)			1	Available in U.S. only	Yes <input type="checkbox"/> No <input type="checkbox"/>
2	Exposure Switch			1		Yes <input type="checkbox"/> No <input type="checkbox"/>
	Exposure Switch Holder			1		Yes <input type="checkbox"/> No <input type="checkbox"/>
	Double-Sided Sticker			1		Yes <input type="checkbox"/> No <input type="checkbox"/>
	Screws	M3X16		2		Yes <input type="checkbox"/> No <input type="checkbox"/>
3	Carpus Plate			1	CEPH Option	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Handrest Sticker			1		Yes <input type="checkbox"/> No <input type="checkbox"/>







3. Before Installing the System

Part No.	Items	Specification	Figure	QTY	Comments	Confirmed (OK?)
4	Alignment Plate			1	Floor Mount Option	Yes <input type="checkbox"/> No <input type="checkbox"/>
5	Temple Supports	Right & Left		1 set		Yes <input type="checkbox"/> No <input type="checkbox"/>
6	Anti-Static Gloves			1 pair		Yes <input type="checkbox"/> No <input type="checkbox"/>
7	Chinrest	Special		1		Yes <input type="checkbox"/> No <input type="checkbox"/>
8	Left Blank Intentionally					
9	Chinrest	Normal		1		Yes <input type="checkbox"/> No <input type="checkbox"/>
10	Left Blank Intentionally					
11	Sanitary Vinyl Cover	For Normal Bite		1		Yes <input type="checkbox"/> No <input type="checkbox"/>
12	Bite	Normal		1		Yes <input type="checkbox"/> No <input type="checkbox"/>
		Deep*		1	*. Deep Bite Block is only available in some Asian countries.	Yes <input type="checkbox"/> No <input type="checkbox"/>
		Special A		1		Yes <input type="checkbox"/> No <input type="checkbox"/>
		Special B		1		Yes <input type="checkbox"/> No <input type="checkbox"/>
13	Left Blank Intentionally					
14	Caps	For Ear Rods		2 + 2	CEPH Option (2: on the equipment)	Yes <input type="checkbox"/> No <input type="checkbox"/>

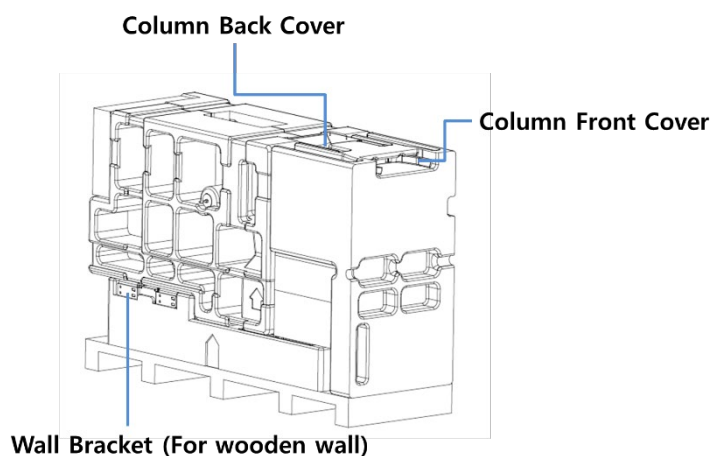
Part No.	Items	Specification	Figure	QTY	Comments	Confirmed (OK?)
	Silicon Cover	For Nasal Positioner		1	CEPH Option: extra	Yes <input type="checkbox"/> No <input type="checkbox"/>
15	Left Blank Intentionally					
16	Silicon Cap	White		8		Yes <input type="checkbox"/> No <input type="checkbox"/>
17	Base Cap	Small		3	Base Option	Yes <input type="checkbox"/> No <input type="checkbox"/>
18	Left Blank Intentionally					
19	Left Blank Intentionally					
20	Cable Tie			10		Yes <input type="checkbox"/> No <input type="checkbox"/>
21	Frame Grabber System	Optic Cable		1		Yes <input type="checkbox"/> No <input type="checkbox"/>
		LAN Cable		1		Yes <input type="checkbox"/> No <input type="checkbox"/>
		IFG Card (or) FTG Card (or) LEG Card		1		Yes <input type="checkbox"/> No <input type="checkbox"/>
	MODEL Scan Jig			1	For the 3D MODEL Scan model	Yes <input type="checkbox"/> No <input type="checkbox"/>
22	Column Bracket			1		Yes <input type="checkbox"/> No <input type="checkbox"/>
23	Wrench Bolt	M10 x 25 w/ Spring and Flat Washers		6	Base Option	Yes <input type="checkbox"/> No <input type="checkbox"/>
24	Wrench Bolt	M8 x 45		2	Base Option	Yes <input type="checkbox"/> No <input type="checkbox"/>




3. Before Installing the System

Part No.	Items	Specification	Figure	QTY	Comments	Confirmed (OK?)
25	Wrench Bolt	M8 x 20		4		Yes <input type="checkbox"/> No <input type="checkbox"/>
	Spring Washer			4		Yes <input type="checkbox"/> No <input type="checkbox"/>
	C_E_Washer			4		Yes <input type="checkbox"/> No <input type="checkbox"/>
26	Truss Bolt	M5 x 8		3	Base Option	Yes <input type="checkbox"/> No <input type="checkbox"/>
27	Truss Bolt	M4 x 8		10		Yes <input type="checkbox"/> No <input type="checkbox"/>
28	Flat Head Screw	M3 x 6		2	CEPH Option	Yes <input type="checkbox"/> No <input type="checkbox"/>
	CEPH Arm Cover 4			1		Yes <input type="checkbox"/> No <input type="checkbox"/>
29	Flat Head Screw	M5 x 12		4		Yes <input type="checkbox"/> No <input type="checkbox"/>
30	Set Screw	M10 x 20		4		Yes <input type="checkbox"/> No <input type="checkbox"/>
31	Protractor			1		Yes <input type="checkbox"/> No <input type="checkbox"/>
	Wall Plate			1		Yes <input type="checkbox"/> No <input type="checkbox"/>
	Terminal Block 3 Pole			1		Yes <input type="checkbox"/> No <input type="checkbox"/>
32	Middle Bracket			1	Optional	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Wrench Bolt	M8 x 25 w/ Spring and Flat Washers		2		Yes <input type="checkbox"/> No <input type="checkbox"/>
	Nut	M8		2		Yes <input type="checkbox"/> No <input type="checkbox"/>
33	UP / DOWN Switch			1	Optional	Yes <input type="checkbox"/> No <input type="checkbox"/>
	UP / DOWN Switch Holder			1		Yes <input type="checkbox"/> No <input type="checkbox"/>

Part No.	Items	Specification	Figure	QTY	Comments	Confirmed (OK?)
	Double-Sided Sticker			1		Yes <input type="checkbox"/> No <input type="checkbox"/>
	Truss Bolt	M4 x 10		2		Yes <input type="checkbox"/> No <input type="checkbox"/>
34	Wood Screw	M8 x 60		8	For Wood	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Spring Washer			4		
	Flat Washer			4		
	Wood Screw	M12 x 70		2	For Wood	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Anchor Bolt	5/16 x 60 w/ Spring and Flat Washers		10	For Concrete	Yes <input type="checkbox"/> No <input type="checkbox"/>
35	Wrench Bolt	M8 x 25 w/ Spring and Flat Washers		2		Yes <input type="checkbox"/> No <input type="checkbox"/>
	Nut	M8		2		Yes <input type="checkbox"/> No <input type="checkbox"/>
36	Wall Bracket Rear			1		Yes <input type="checkbox"/> No <input type="checkbox"/>

Another location



Items	Specification	Figure	Qty.	Comments	Location	Confirmed (OK?)
Base Front Cover	N/A		1	N/A	On the upper side of the EPS (Main Bottom)	Yes <input type="checkbox"/> No <input type="checkbox"/>
Column Back Cover	N/A		1	N/A	On the upper side of the EPS (Main Bottom)	Yes <input type="checkbox"/> No <input type="checkbox"/>
Wall Bracket (For Wood Wall)	16 inches		1	For the USA only	Under the bottom side of the EPS (Main Left)	Yes <input type="checkbox"/> No <input type="checkbox"/>


4. Installing the Equipment: Base Stand (Optional)

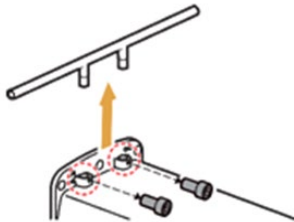
4.1 Assembling the Base and Main Units

NOTICE



If the installation site is a concrete floor, go to section **4.4 Fixing the base (Optional)** and do number **1** first, after that turn back **4.1 Assembling the Base and Main Units**.

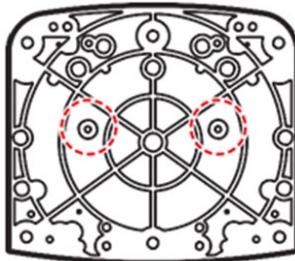
1. Remove the lower carrying handle.

Allen Wrench	6 mm / 0.24"	
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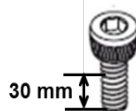
2. Put two wrench bolts into the holes on the bottom of the column unit.

Allen Wrench	6 mm / 0.24"	
Wrench Bolt	M8 x 45 - 2 pcs (Part No. 24)	



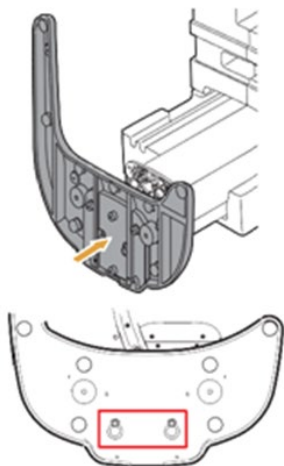
IMPORTANT

Put the bolts into the holes until about 30 mm are left outside.



4. Installing the Equipment: Base Stand (Optional)

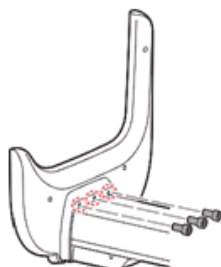
- Put the base unit to the column unit by engaging the base holes in the bolts as shown in the figure.



Hold the base unit to keep it from falling.

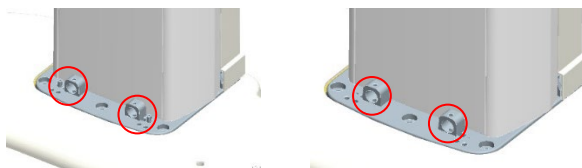
- Put the base unit to the column unit by engaging the base holes in the bolts as shown in the figure.

Allen Wrench	6 mm / 0.24"	
Wrench Bolt	M10 x 25 - 3 pcs (Part No. 23)	




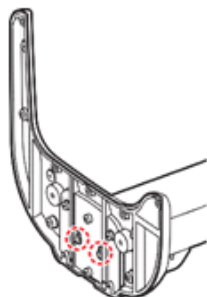
NOTICE

If you do not use the base during the installation, remove 2 pcs of Truss bolts while installing the front cover as below.

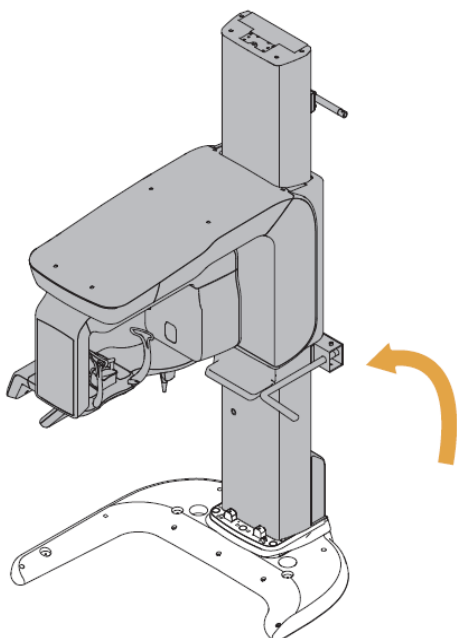


5. Tighten the two wrench bolts.

Allen Wrench	6 mm / 0.24"	
--------------	--------------	---





6. Put the equipment in a vertical position slowly while holding the upper handle.

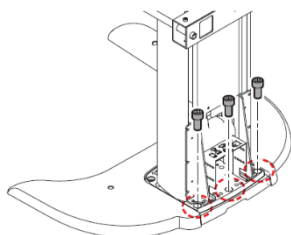


DO NOT damage the cables. Before erecting the equipment, keep them clear of the equipment.

4. Installing the Equipment: Base Stand (Optional)

7. Tighten the three wrench bolts to attach the base unit.

Allen Wrench	8 mm / 0.31"	
Wrench Bolt	M10 x 25 - 3 pcs (Part No. 23)	



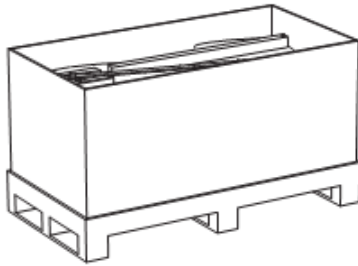
4.2 Installing the CEPH Unit (Optional)



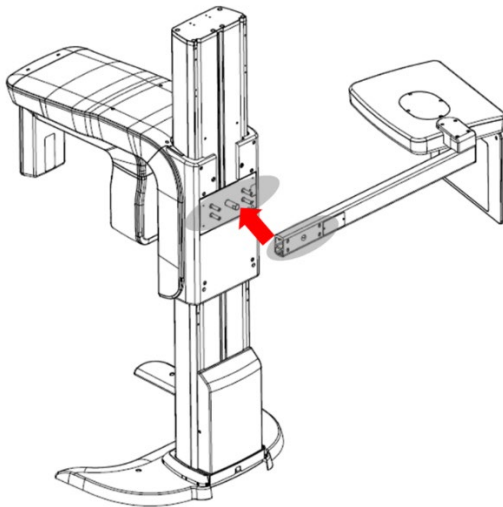
WARNING

Never hold the areas of the collimator, sensor, and tube head.

1. Now it is assumed that the CEPH box has already been opened.

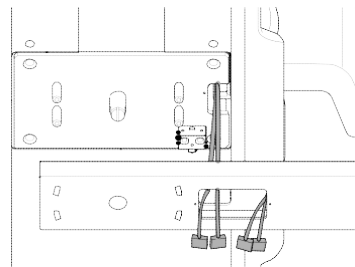


2. Remove the plastic wrap covering the column unit and the tape for fixing the CEPH cables by using a cutter.
3. Move and mount the CEPH unit on the Main Unit carefully, while observing the insertion state of 4 studs.






IMPORTANT

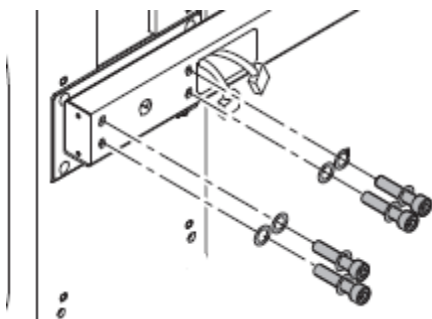
Make sure the CEPH cables from the equipment go through the CEPH armhole.



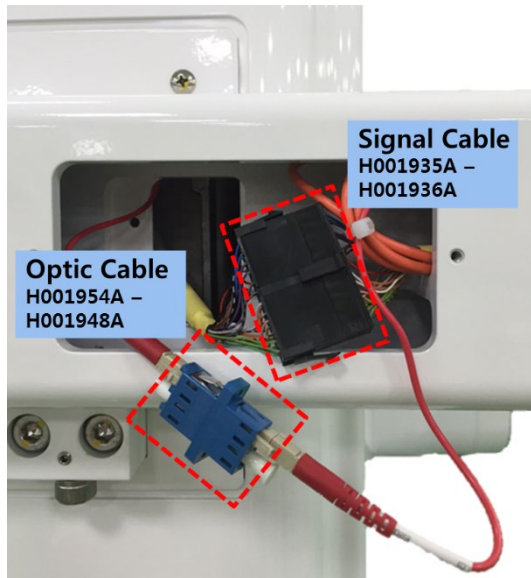
4. Installing the Equipment: Base Stand (Optional)

4. Tighten the three wrench bolts to attach the base unit.

Allen Wrench	8 mm / 0.31"	
Wrench Bolt	M8 x 20 - 3 pcs (Part No. 25)	
Flat Washer	(Part No. 34)	



5. Connect the cables as shown in the figure.

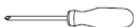




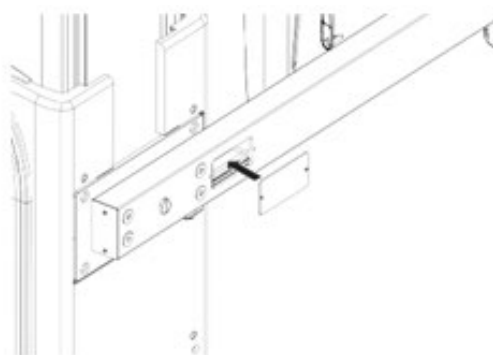
When managing the fiber optic cable,

- DO NOT bend, pull, or crush it.
- Ensure that the caps of the fiber optic cable have been removed.
- DO NOT touch the tip of the fiber optic cable to prevent it from being dirty.
- Insert the fiber optic cable fully until the click sound is heard.

4. Installing the Equipment: Base Stand (Optional)

6. Put the cables inside the CEPH Arm and assemble the CEPH arm cover by using two flat head screws.

Cross Head Screwdriver w/ Magnetic Tip	6 mm / 0.24"	
Flat Head Screw	M3 x 6 - 2 pcs (Part No. 28)	
CEPH Arm Cover 4	(Part No. 28)	



4.3 Installing the Wall and Column Brackets


Assembling the Column Bracket



WARNING

The column bracket must be properly installed. Otherwise, the equipment may be shaken during the scanning.

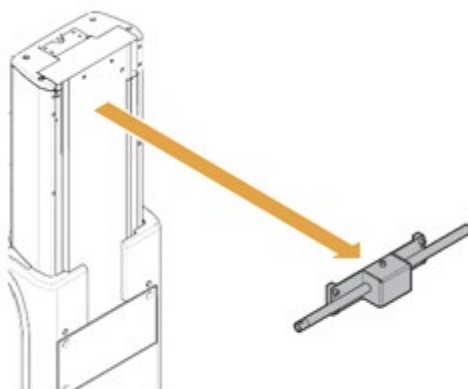
1. Move the equipment to the installation site near the wall.
2. Remove the lower carrying handle.

Allen Wrench	8 mm / 0.31"	
--------------	--------------	---

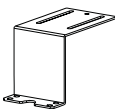


CAUTION

One installer should hold the handle, while the other is removing the bolts.

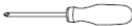



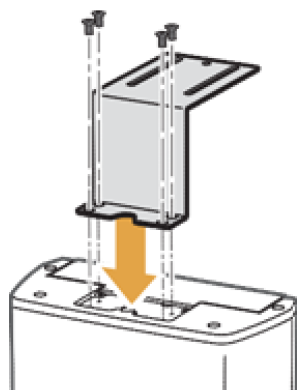
3. Remove the plastic wrap covering the column unit by using a cutter.
4. Prepare the column bracket.

Column Bracket	(Part. No. 22)	
----------------	----------------	---

4. Installing the Equipment: Base Stand (Optional)

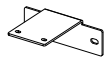

5. Assemble the column bracket to the top of the column with four flat head screws.

Cross Head Screwdriver w/ Magnetic Tip	6 mm / 0.24"	
Flat Head Screw	M5 x 12 - 4 pcs (Part No. 29)	



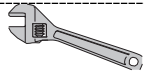



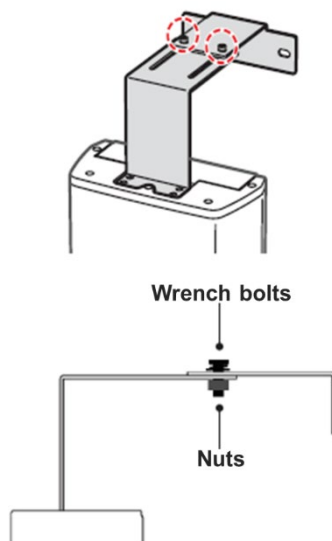
Combining Column and Wall Brackets

1. Prepare the wall bracket.

Wall Bracket	(Part No. 36)	
Wall Bracket (for Wood Wall)	Optional (Part No. 37)	

2. Combine the column and wall brackets in the following manner with the 2 wrench bolts.

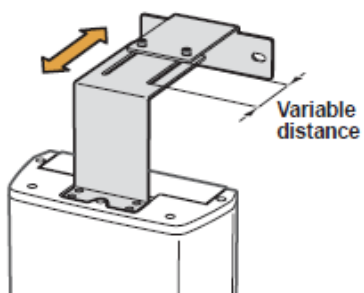
Allen Wrench	8 mm / 0.31"	
Wrench Bolt	M8 x 25 w/ Spring and Flat Washers (Part No. 35)	
Monkey Wrench	N/A	
Nut	M8 - 2 pcs (Part. No. 35)	



DO NOT tighten the bolts fully yet.

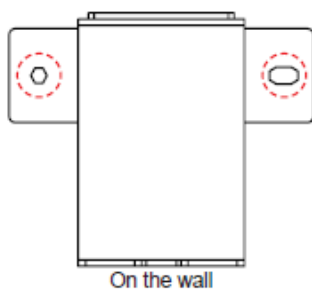
Marking Points on the Wall

1. Move the equipment to the installation site as close as possible.
2. Adjust the distance between the wall and equipment by moving it slightly, so that the wall bracket touches the wall.



3. Mark the anchor bolt locations on the wall.

Marker	N/A	
--------	-----	---





Drilling on the Wall

1. Drill the wall holes of size 10.5 mm x 30 mm (depth) using the concrete hammer drill.





2. Remove the debris and clean the holes using the dust pump.
3. Using the hammer, insert a Fischer strong anchor into the hole.

Fischer strong anchor	M8 x 30	
Hammer	N/A	







4. Using the hammer, insert an EHS tool into the inner bolt.

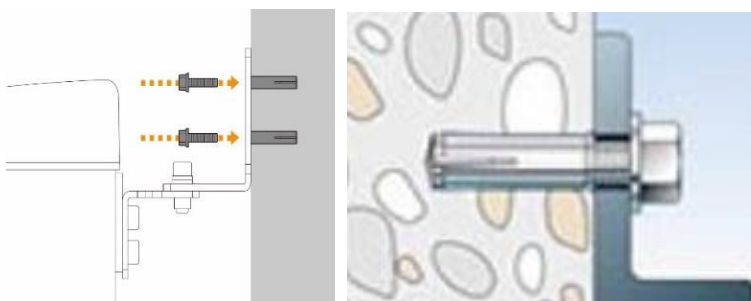
EHS tool	EAW H 8x30	
Hammer	N/A	

4. Installing the Equipment: Base Stand (Optional)

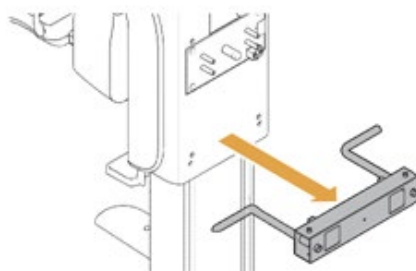
Combining the Equipment with the Anchor Bolts

1. Place the equipment on the alignment plate, while observing 4 Hex bolts are being appropriately inserted through each hole.

Hex Bolt	M8 x 15	
Spring washer	M8	
Flat washer	M8	
Torque wrench	Spanner type	




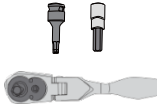


2. Remove the middle carrying handle.

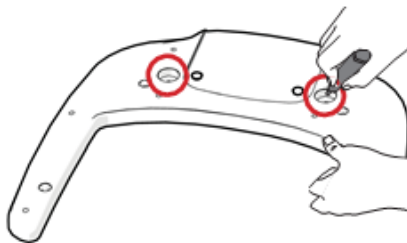


4.4 Fixing the Base (Optional)

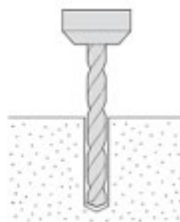
Concrete Floor

Anchor Bolt	5/16 x 60 w/ Spring and Flat Washers 2 pcs (Part No. 34)	
Hammer Drill	L = 200 mm (7+- .9")	
Hammer	N/A	
Ratchet Wrench	Tips: 3 mm - 8 mm (0.12" - 0.3")	

- Before installing the equipment, put the base unit on the installation site and mark 2 locations on the floor



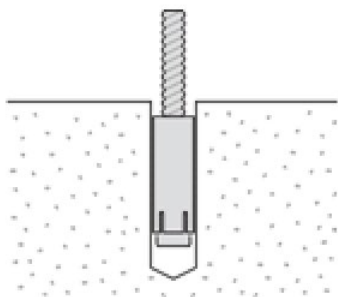
- Drill the floor holes of size 12mm x 30mm (depth) using the concrete hammer drill.



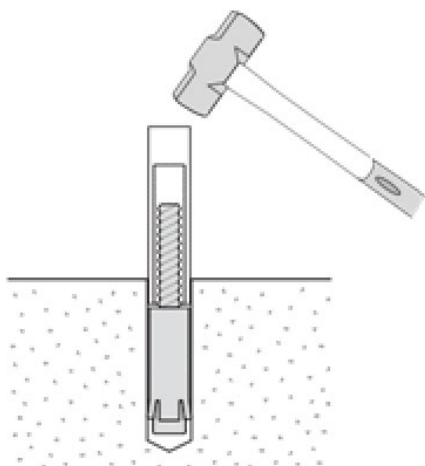
- Remove the debris and clean the holes using the dust pump.

4. Installing the Equipment: Base Stand (Optional)

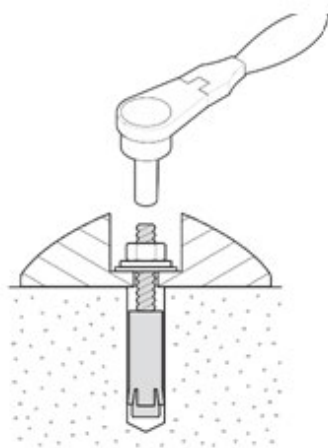
4. Remove nuts and washers, put the anchor bolts into the holes.





5. Secure the anchor bolts with the hammer.



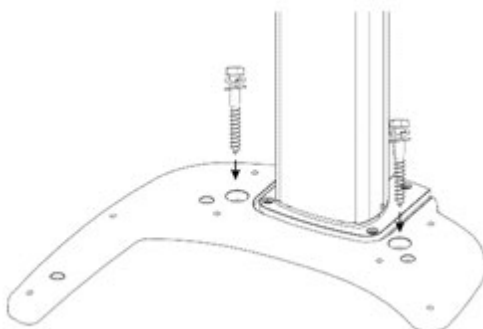
6. Place the base unit combined equipment in the proper position, lock the nuts and washers using a ratchet wrench.



Wooden Floor




Wood Screws	M12 x 70 – 2 pcs (Part No. 34)	
Hammer Drill	L = 200 mm (7.9")	

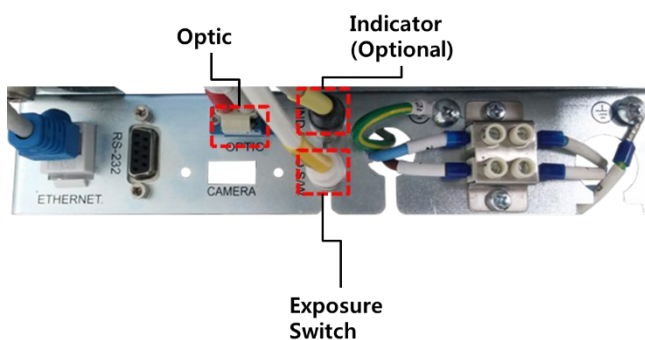
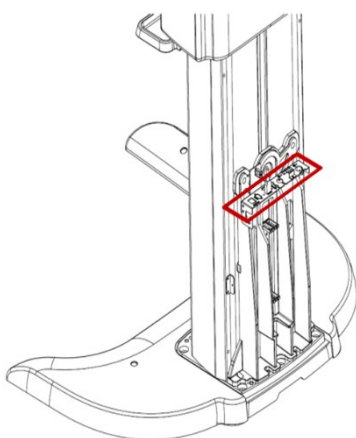
1. Secure the base unit using wood screws.



4.5 Connecting the Cables to the Equipment.

1. Connect the cables in the back of the column as shown in the figure.

Optic Cable	Cable No. H000014A (Part No. 21)	
Cable Tie	(Part No. 20)	
Exposure Switch	(Part No. 2)	



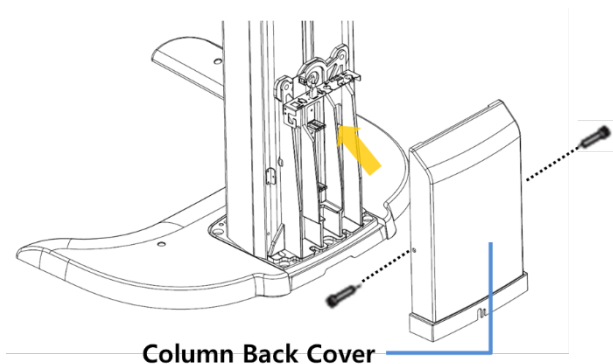
NOTICE

Use the Cable Tie (Part No. 20) to fix the cables as shown below after the connection is completed.

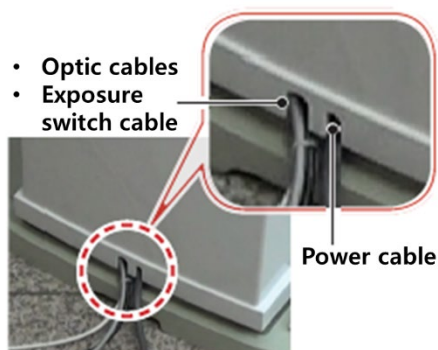


2. Assemble the Column Back Cover with four truss bolts.

Truss Bolt	M4 x 8 – 2 pcs (Part No. 27)	
Cross Head Screwdriver w/ Magnetic Tip	6 mm / 0.24"	




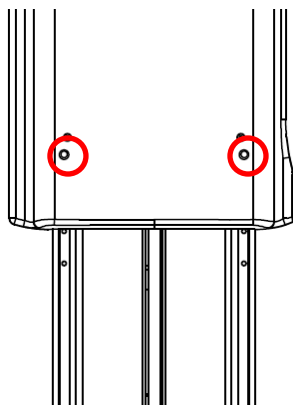
3. Ensure the cables go through the Column Back Cover holes as shown in the figure.



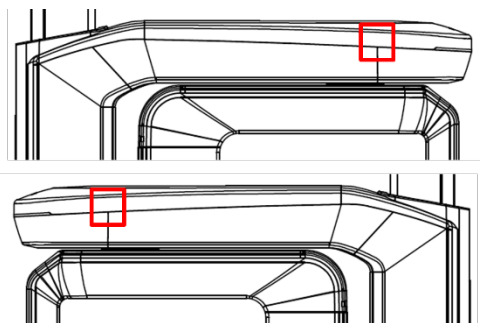
4.6 Removing the Transportation Safety Bolts

1. Remove the two-column fixing bolts including the tags.

Allen Wrench	6 mm / 0.24"	
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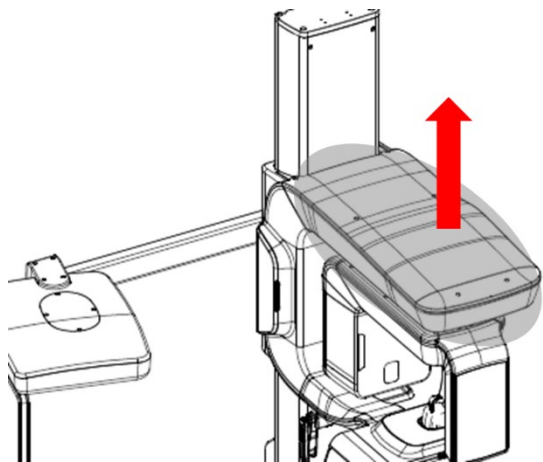


2. Remove the semi-clear tape on both sides.



Be careful not to scratch the cover.

3. Remove the Vertical Frame Cover.



4. Remove four Safety Bolts and two Safety Brackets including the tags.

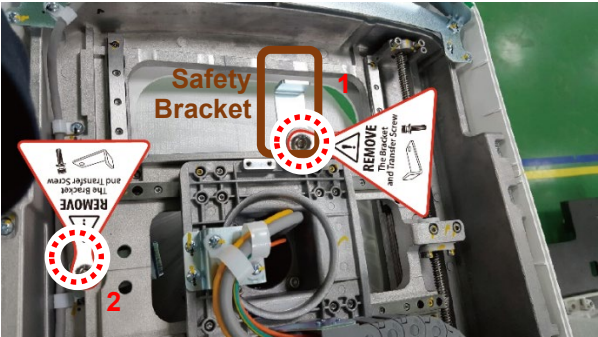
Allen Wrench	6 mm / 0.24"	
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CAUTION

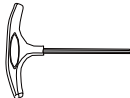

Be sure not to damage the cables when removing the bolts.

IMPORTANT

The Safety Bracket is removable only after the Safety Bolt upon it is removed.



4.7 Leveling the Equipment

T-shaped Hex Wench	8 mm / 0.3"	
Spirit Level	N/A	

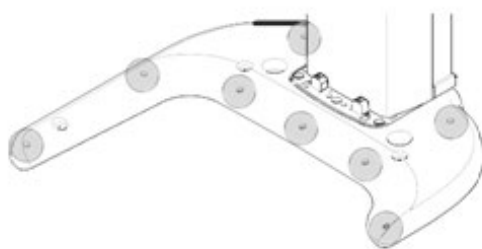
IMPORTANT

Ensure that the Spirit Level should rest only on the locations indicated in the following figures to obtain the accurate center.

1. Prepare the Spirit Level.
2. Turn the Rotating Unit clockwise so that the X-ray tube head faces the front as shown in the figure.



3. Turn all eight screws on the base plate unit clockwise until they touch the ground.

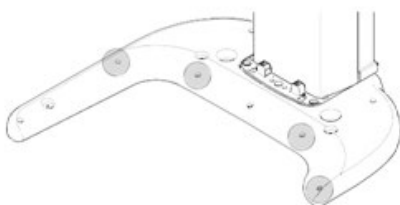


Leveling Right and Left

1. Place the Spirit Level, as shown in the figure.



2. Adjust the base until the bubble on the Spirit Level centers in the middle, by turning left and right screws clockwise or vice versa.

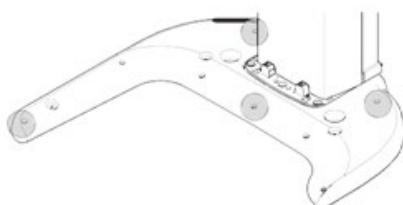


Leveling the Front and Back

1. Place the Spirit Level on the Vertical Frame, as shown in the following figure.




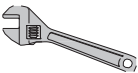
2. Adjust the screws until the bubble of Spirit Level centers (level), by turning the front and back screws clockwise or vice versa.

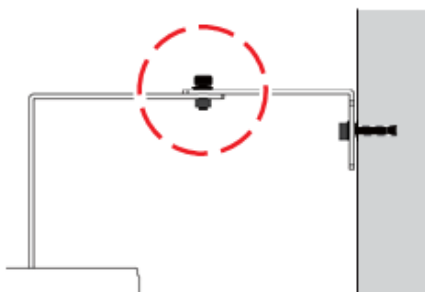


3. When the leveling is completed, make sure that all eight set screws touch the floor by turning them clockwise if necessary.

4.8 Tightening the Bolts

1. Tighten the joint bracket bolts.

Allen Wrench	6 mm / 0.24"	
Monkey Wrench	N/A	

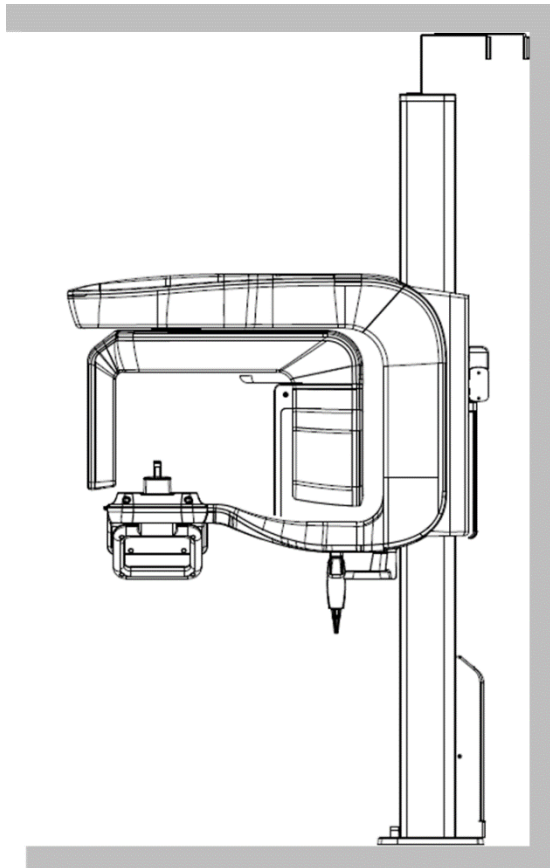


5. Installing the Equipment: Wall Mount

5.1 Installing the Equipment

You are advised to plan and study the installation environment carefully in advance before proceeding since the installation involves drilling the wall and floor. Pre-installation planning is crucial to a successful installation.

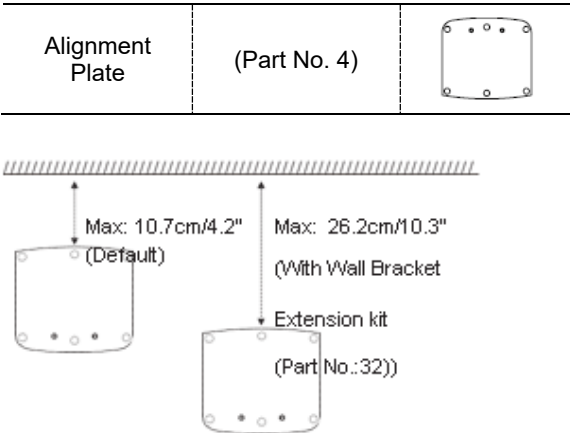
Accurate marking is of critical importance for a successful installation.




Installation Overview

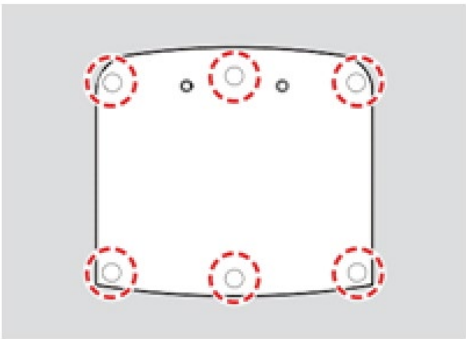
Marking Points on the Floor

1. Put the aligning plate on the floor near the wall where the equipment should be installed as shown in the figure.



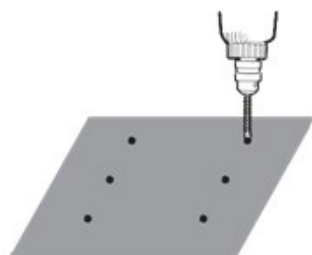
2. Mark 6 anchor bolts holes on the floor.

Marker	N/A	
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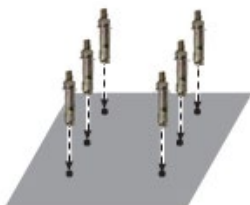
Drilling the Floor

1. Remove the aligning plate.
2. Drill the floor holes (size: 10.5 x 30 mm) by using the concrete hammer drill.



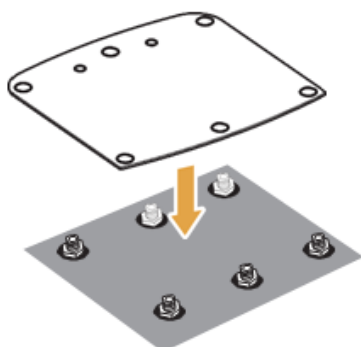
3. Remove the debris and clean the holes with the dust pump.
4. Put the anchor bolts into the holes and attach them with the hammer. Verify that the anchors are secured.

Anchor Bolt	5/16 x 60 w/ Spring and Flat Washers 2 pcs (Part No. 34)	
Hammer Drill	L = 200 mm (7.9")	

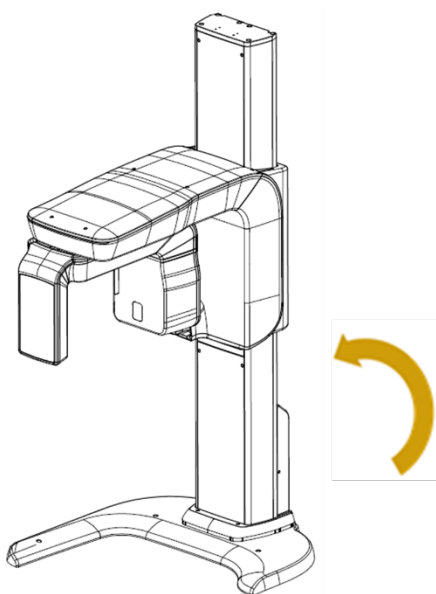


Combining the Equipment with the Anchor Bolts

1. Put the aligning plate on the floor and ensure that all anchored bolts come through the holes on the plate.



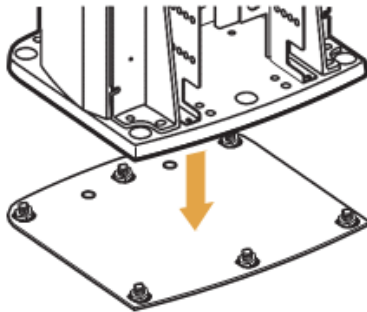
2. Put the equipment in a vertical position slowly while holding the upper handle as shown in the figure.



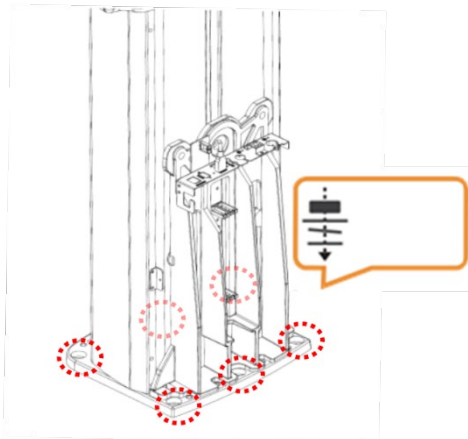
Be careful not to damage the cables before erecting the equipment. Keep them clear of the equipment.

5. Installing the Equipment: Wall Mount

3. Put the Equipment on the aligning plate while making sure that the column bottom holes engage in the anchored bolts.



4. Put the washers and nuts into the six anchored bolts on the floor and tighten the nuts loosely. Make sure that you put the fasteners in the sequence as shown in the figure.



IMPORTANT

- DO NOT tighten the nuts until the leveling is completed.
- While one installer is tightening the nuts, the other installers should hold the middle handle to prevent the equipment from falling.


5.2 Installing the CEPH Unit (Optional)


Please refer to section 4.2 Installing the CEPH Unit (Optional).

5.3 Installing the Wall and Column Brackets

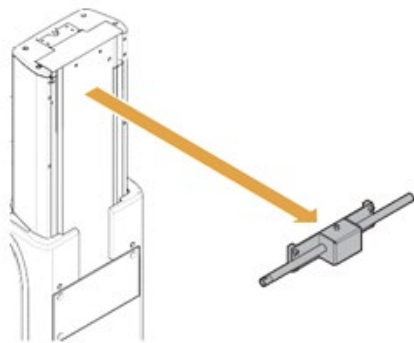
Assembling the Column Bracket

- 1. Move the equipment to the installation site near the wall.
- 2. Remove the lower carrying handle.

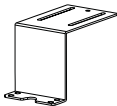
Allen Wrench	6 mm / 0.24"	
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**CAUTION**

One installer should hold the handle, while the other is removing the bolts.

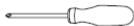



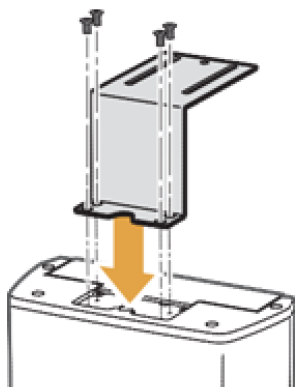
- 3. Remove the plastic wrap covering the column unit by using a cutter.
- 4. Prepare the column bracket.

Column Bracket	(Part. No. 22)	
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5. Installing the Equipment: Wall Mount

5. Assemble the column bracket to the top of the column with four flat head screws.

Cross Head Screwdriver w/ Magnetic Tip	6 mm / 0.24"	
Flat Head Screw	M5 x 12 - 4 pcs (Part No. 29)	



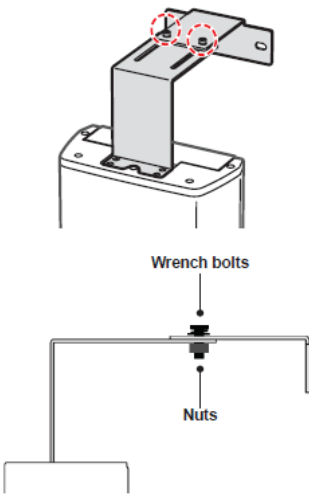
Combining Column and Wall Brackets

1. Prepare the wall bracket.

Wall Bracket	(Part No. 36)	
Wall Bracket (for Wood Wall)	Optional (Part No. 37)	

2. Combine the column and wall brackets in the following manner with the 2 wrench bolts.

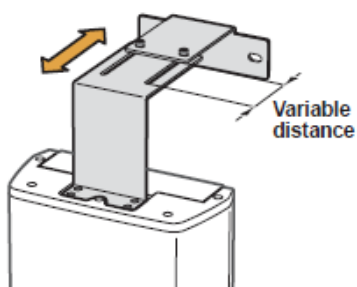
Allen Wrench	6 mm / 0.24"	
Wrench Bolt	M8 x 25 w/ Spring and Flat Washers (Part No. 35)	
Monkey Wrench	N/A	
Nut	M8 - 2 pcs (Part. No. 35)	




DO NOT fully tighten the bolts yet.

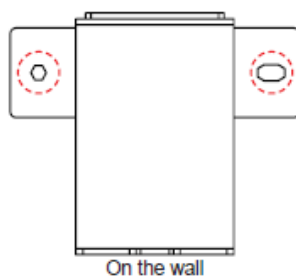
Marking Points on the Wall

1. Move the equipment to the installation site as close as possible.
2. Adjust the distance between the wall and equipment by moving it slightly, so that the wall bracket touches the wall.



3. Mark the anchor bolt locations on the wall.

Marker	N/A	
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Drilling on the Wall

- 1. Drill the wall holes of size 10.5 mm x 30 mm (depth) using the concrete hammer drill.





- 2. Remove the debris and clean the holes using the dust pump.
- 3. Using the hammer, insert a Fischer strong anchor into the hole.

Fischer strong anchor	M8 x 30	
Hammer	N/A	







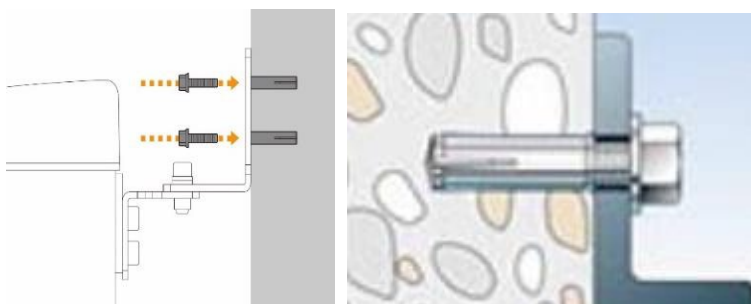
- 4. Using the hammer, insert an EHS tool into the inner bolt.

EHS tool	EAH H 8x30	
Hammer	N/A	

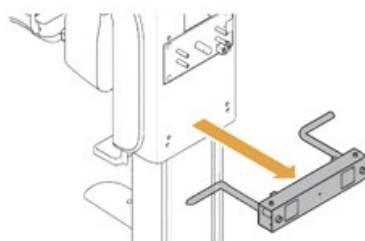
Combining the Equipment with the Anchor Bolts

1. Place the equipment on the alignment plate, while observing 4 Hex bolts are being appropriately inserted through each hole.

Hex Bolt	M8 x 15	
Spring washer	M8	
Flat washer	M8	
Torque wrench	Spanner type	



2. Remove the middle carrying handle.



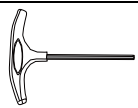

5.4 Connecting the Cables to the Equipment

Please refer to section **4.5 Connecting the Cables to the Equipment**.

5.5 Removing the Transportation Safety Bolts

Please refer to section **4.6 Removing the Transportation Safety Bolts**.

5.6 Leveling the Equipment

T-shaped Hex Wench	8 mm / 0.3"	
Spirit Level	N/A	

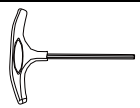

IMPORTANT

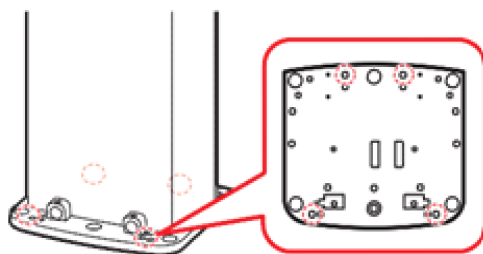
Ensure that the Spirit Level should rest only on the locations indicated in the following figures to obtain the accurate center.

1. Prepare the Spirit Level.
2. Turn the Rotating Unit clockwise so that the X-ray tube head faces the front as shown in the figure.



3. Put the set screws into the four holes and turn them clockwise with the hex wrench until they touch the aligning plate.

T-shaped Hex Wench	8 mm / 0.3"	
Set Screw	M10 x 20 – 4 pcs (Part No. 30)	



4. Put the Spirit Level on the location as shown in the figure.

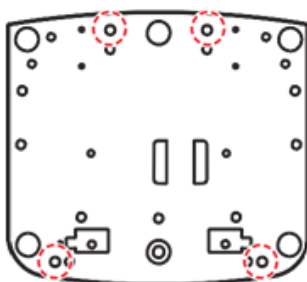


▲ For leveling right and left





▲ For leveling front and rear

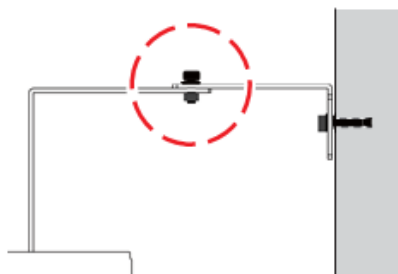
5. Turn each set screw clockwise or counterclockwise to make the equipment level while another person monitors the level indicator.



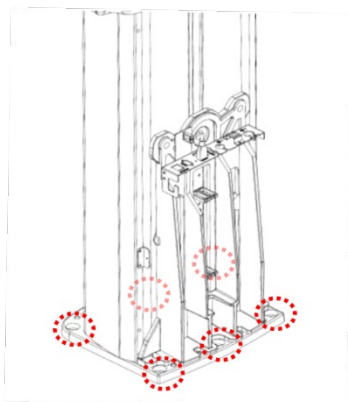
5.7 Tightening the Bolts

1. Tighten the joint bracket bolts.

Allen Wrench	6 mm / 0.24"	
Monkey Wrench	N/A	



2. Tighten the nuts in the anchored bolts on the floor.





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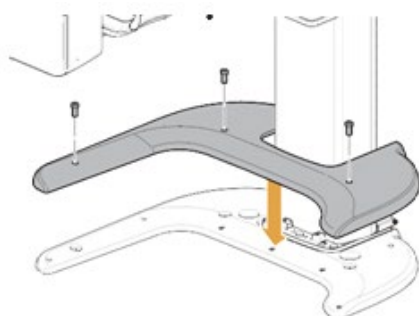
6. Completing Miscellaneous Works

6.1 Assembling Various Covers

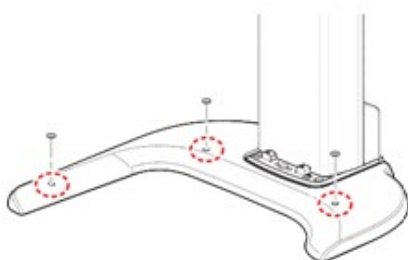
Base Cover (Optional)

Truss Bolt	M5 x 8 – 3 pcs (Part No. 26)	
Base Cap	3 pcs (Part No. 17)	

1. Assemble the base cover and fix it with three Truss Bolts.





2. Cover 3 holes on the base with three Base Caps.



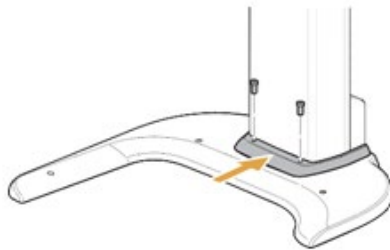
Base Front Cover**NOTICE**

If you do not use the base during the installation, remove 2 pcs of Truss bolts while installing the front cover as below.

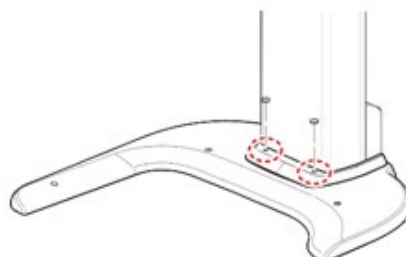


Truss Bolt	M4 x 8 – 2 pcs (Part No. 27)	
Silicon Cap	2 pcs (Part No. 16)	

1. Assemble the base cover and fix it with two Truss Bolts.



2. Cover 3 holes on the base with two white Silicon Caps.





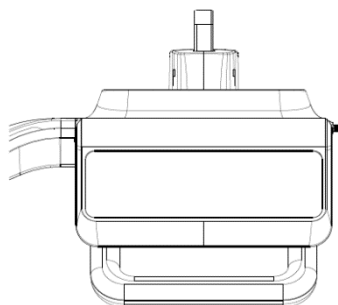
6.2 Assembling the Temple Supports and the Chinrest

IMPORTANT


Assembling the Temple Supports and the Bite Block should be done after acquiring a test image is completed.

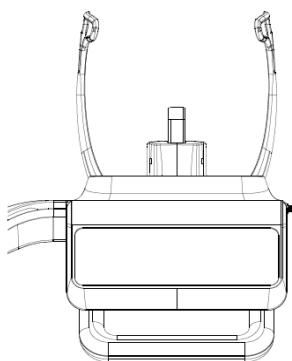
1. Insert the normal Chinrest and the normal Bite Block into the unit.

Chinrest (Normal)	1 pc (Part No. 9)	
Bite (Normal)	1 pc (Part No. 12)	







2. Insert the Temple Supports.

Temple Supports	1 set (Part No. 5)	
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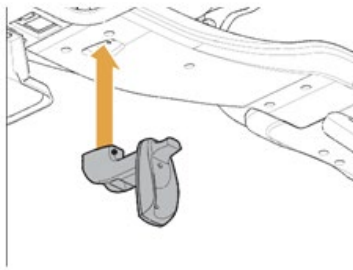


6.3 Installing the Switch Holders

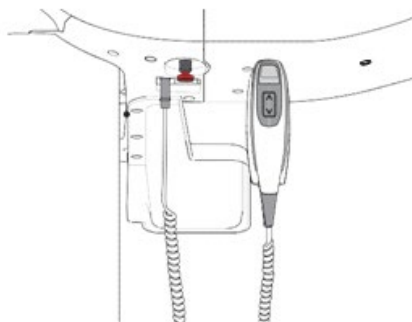
UP / DOWN Switch Holder	1 pc (Part No. 2)	
UP / DOWN Switch	Optional - 1 pc (Part No. 33)	
Exposure Switch Holder	1 pc (Part No. 33)	
Truss Bolt	M4 x 10 – 2 pcs (Part No. 33)	

UP / DOWN Front Cover

1. Assemble the UP/DOWN Switch Holder on the bottom of the Vertical Frame with two Truss Bolts (M4 x 10).



2. Connect the UP/DOWN switch to the unit and hang it on the UP / DOWN Switch Holder

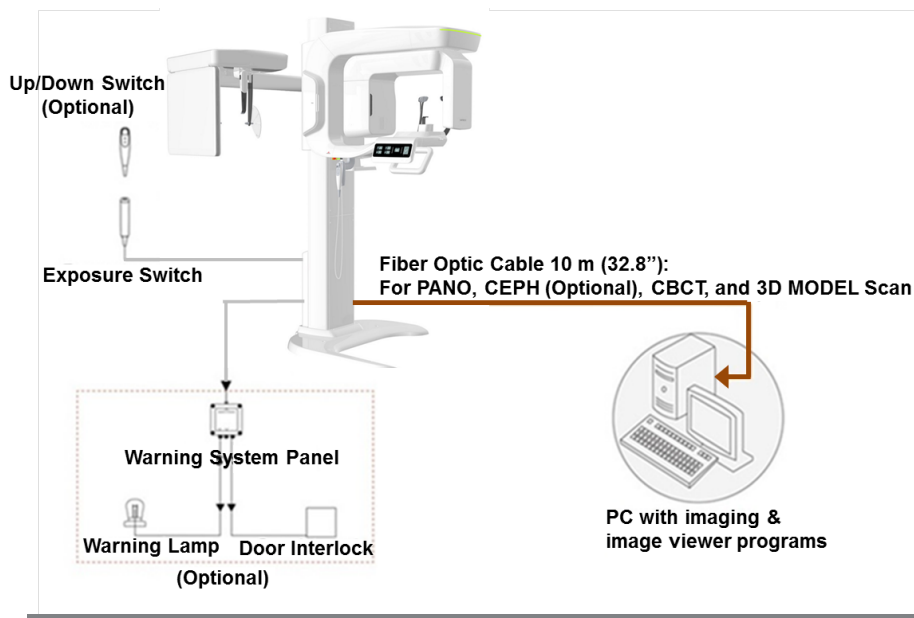


Exposure Switch Holder

1. Locate the Exposure Switch Holder with a sticker and two screws.
2. Install the Exposure Switch Holder on the wall at the appropriate height using two screws.

7. Setting up PC

7.1 Direct Connection Diagram



Fiber Optic Cable - Used to transfer image data to the PC.

Warning System Panel - Used to provide a visible indicator: Light on when the equipment is irradiating X-ray.

IMPORTANT

For countries where a stable power supply is not guaranteed, installing an AVR (Automatic Voltage Regulator) that is single-phase and with a capacity of 3kVA or more is recommended to ensure a steady operation. Please consult a local electrician if you are located in an unstable area.

7.2 The Recommended PC Requirements

IMPORTANT

- Ensure that the PC system meets the requirements of the imaging and image viewer software.
- If your PC does not meet the recommended specifications provided below, it may result in degraded image quality.
- The PC system that comes with Smart Plus undergoes rigorous testing for software compatibility before it is shipped. For this reason, any subsequent changes to the hardware or software may cause malfunctions.
- Ensure that the PC is properly grounded for protective purposes.
- Avoid placing multiple portable socket outlets on the floor.
- Always use the PC components that are UL-approved.

CAUTION

Prior to using the PC, ensure that Windows Defender Firewall is enabled to protect your PC and data from network security threats.

Item	Specifications (HP)
CPU	Intel Xeon W-2223 3.6 GHz 4 Core Processor
RAM	2X8GB DDR4-2400 Registered RAM
HDD	1TB SATA 7200 rpm
Graphics board	NVIDIA GeForce GTX1060 6GB
Ethernet Interface	Integrated Intel I218LM PCIe GbE Controller Intel Ethernet I210-T1 PCIe NIC (Option)
Serial Port (RS232)	HP Serial Port Adapter Kit (Option)
Power Supply	≥ 700 Watts (90% efficient)
Slots	2 PCI Express Gen3 x16 slot 1 PCI Express Gen3 x 8 Slot 1 PCI Express Gen2 x 4 Slot 1 PCI Express Gen2 x 1 Slot 1 PCI 32bit/33MHz
CD/DVD drive	DVD Writer 5.25"
Operating System	Windows 10
Recommended System	HP Z4

Configure the Default Behavior for Windows Defender Firewall

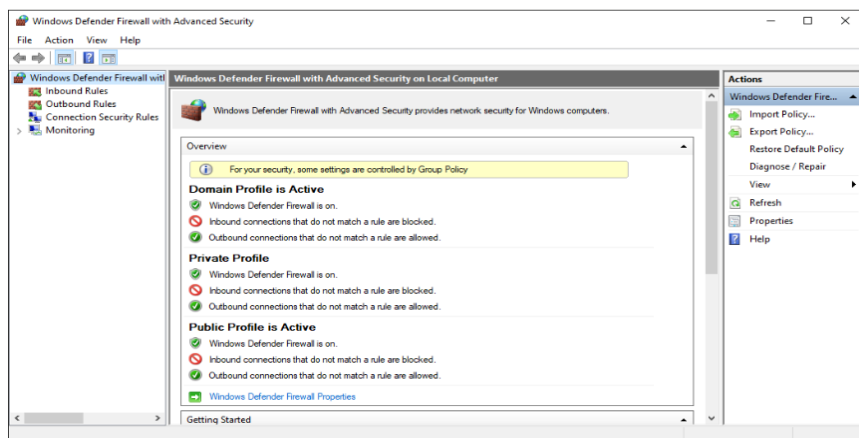
To enable Windows Defender Firewall with Advanced Security and configure its default behavior, follow the steps below:

IMPORTANT

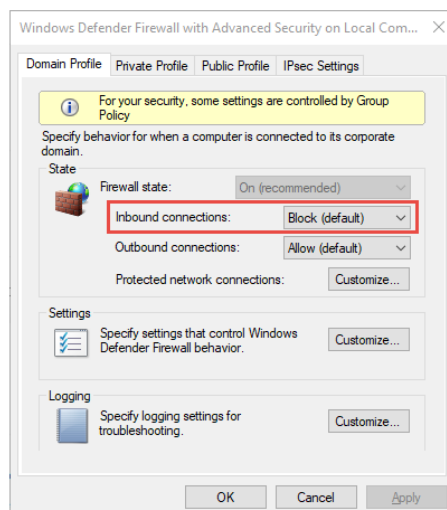
Administrative Credentials

Before enabling Windows Defender Firewall, you must be a member of the **Domain Administrative Group** or have a permission to modify the GPO(Group Policy Objects).

1. To open the Group Policy Management Console, enter '**gpedit.msc**' in the search window.
2. Click Windows Defender Firewall Properties and check if each location network is set as below.



3. If the settings are different, follow the steps below to configure each network location type (Domain, Private, Public).



- 1) Click the tab that corresponds to the network location type.
- 2) Change **Firewall State** to **On**.
- 3) Change **Inbound connections** to **Block**.
- 4) Change **Outbound connections** to **Allow**.



To ensure maximum security, do not change the default setting ('block') for Inbound connections.

7.3 Installing the Internal Peripherals

⚠ CAUTION

Allow enough time to dissipate remnant energy after unplugging the power cord from the main outlet or PC.

IMPORTANT

- Disregard this section in case the PC system is supplied with the equipment. (The peripherals have already been installed inside the PC.)
- Whenever managing the fiber optic frame grabber board:



1. Wear the anti-static glove.



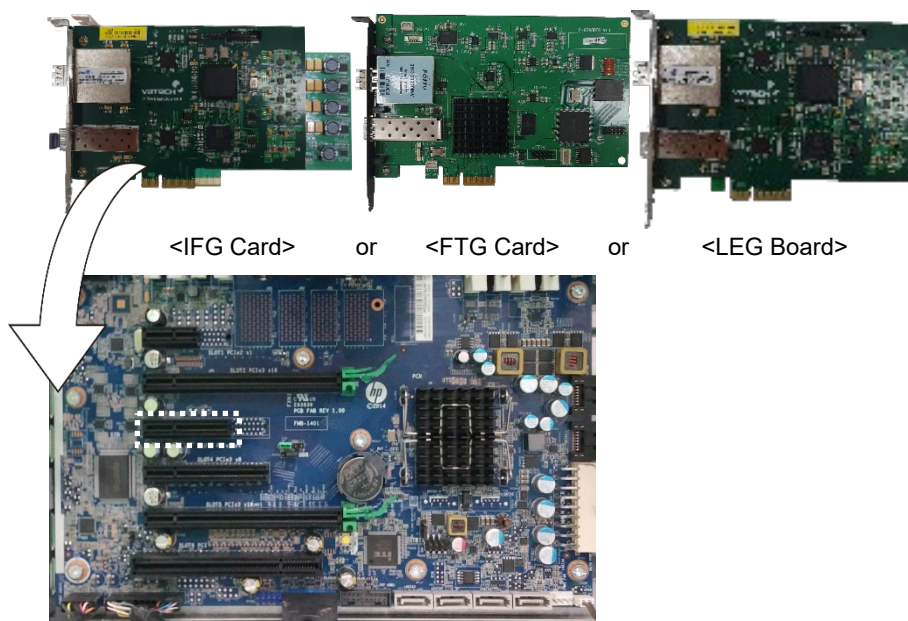
2. DO NOT wear the likes of a thick jacket.

NOTICE

The following figures and descriptions are based on the PC model Z4 from HP.

Installing selectable Frame Grabber Board

1. Unplug the power cable from the back of the PC and wait for a while.
2. Open the PC cover.
3. Insert the frame grabber (Part No. 21) carefully into that PCIe2 x 4 slot and lock it.





Double-check the locking status between the board and its holder after the board is installed. A bad insertion of the board into the PC slot could cause failure for Dark calibration data acquisition or noisy image acquisition.

4. Put the slot holder back to its initial position.

7.4 Connecting the Cables to PC

NOTICE

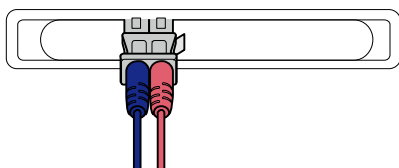
- Always check the cable condition visually. Surprisingly, unexpected errors affecting image acquisition arise from the bad cable or its bad contact condition.
- Connect the regular cables for PC: keyboard, mouse, and video in advance.
- The following figures and descriptions are based on the PC model Z4 from HP.

Fiber Optic Cable	1 pcs (Part No. 21)	
License Key	1 pcs (Part No. 1)	

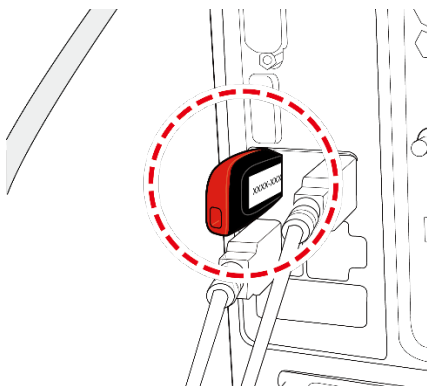
1. Remove the caps of the fiber optic cable.



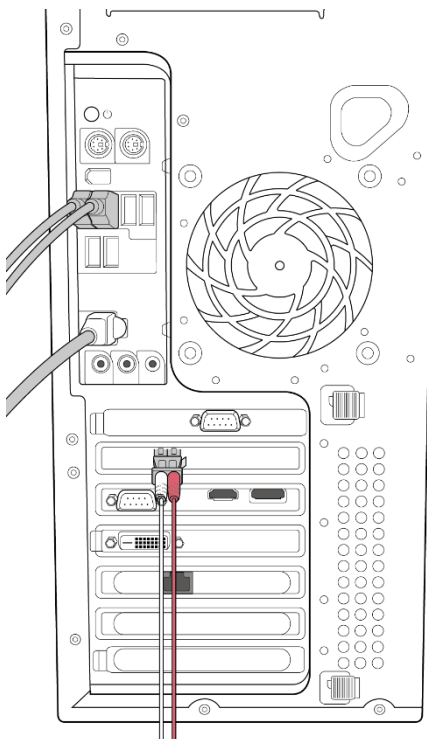
2. Connect the Fiber Optic Cable.



3. Insert the 3D viewer License Key into a USB port.



4. Confirm the result after connections are as same as below.

**NOTICE**

The illustrations may differ from the actual product.

8. Setting up PC's Environment Variables

NOTICE

Disregard this section in case the PC system is supplied with the equipment. (The environment variables of the PC have already been set on the PC.)

8.1 Before Beginning

IMPORTANT

- Ensure that the Emergency Stop Switch is in the OFF position before starting with the InstallShield installation.
- DO NOT install the programs irrelevant to image acquisition and view on the same PC. There may be subtle conflicts between them, leading to the malfunction.
- The PC system supplied with the equipment is intended to be used as an image acquisition only. To the PC server for image management, it is strongly recommended to use a different PC.
- The programs related to the acquisition, viewing, and man Insert the 3D viewer USB imputation of images should be installed on the formatted PC, where no other program(s) except the operating system (OS) is present.
- Before InstallShield installation, ensure that the video card driver installed on the PC is the most up-to-date version. To check this, go to the website of the graphics card manufacturer.

Checking PC BIOS Settings

The PC is shipped, with its BIOS settings, as specified in **Appendix E: Checking PC BIOS Settings**. Before proceeding to the next sections, check the BIOS status. In case the BIOS settings have not been configured in advance, or the settings are different, perform the following steps.

1. Reboot the PC and go to BIOS setting mode.
2. Set the variables as shown in the following table.

PC BIOS default			
Main Menu	Sub1 Menu	Sub2 Menu	Setup Value
Advanced	Power Options	Runtime Power Management	[Disable]
Advanced	Power Options	Idle Power Savings	[Normal]
Advanced	Power Options	Enhanced Halt State (C1E)	[Disable]

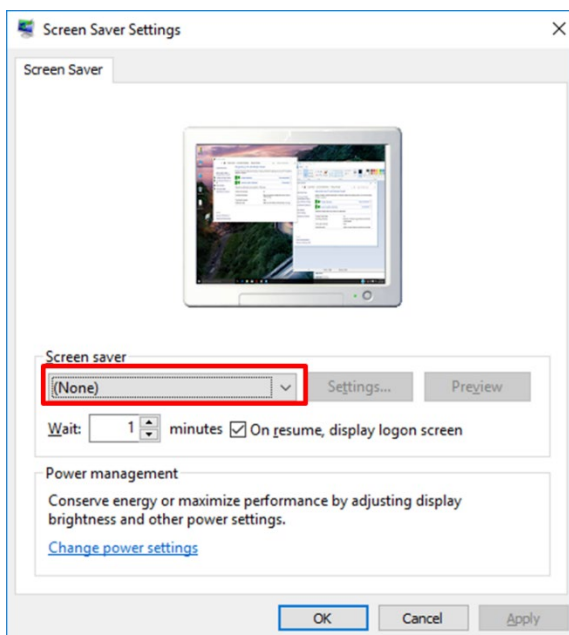
- When you update the BIOS settings, the "EnhancedHalt State (C1E)" option will be displayed.

8.2 Setting up the Power Management Options

To avoid disruptive and abnormal operation while acquiring an image, it is required to reconfigure some parameters on the Windows operating system.

Disable the Screen Saver

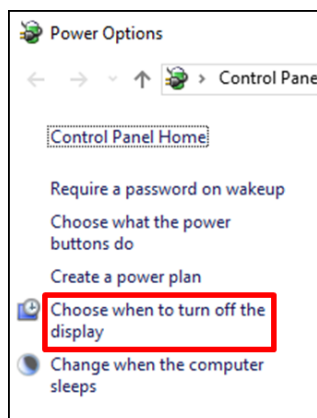
1. Open the Start screen, type **Screen Saver** in the search box.
2. On-Screen Saver Settings screen select **(None)** in the pull-down menu.



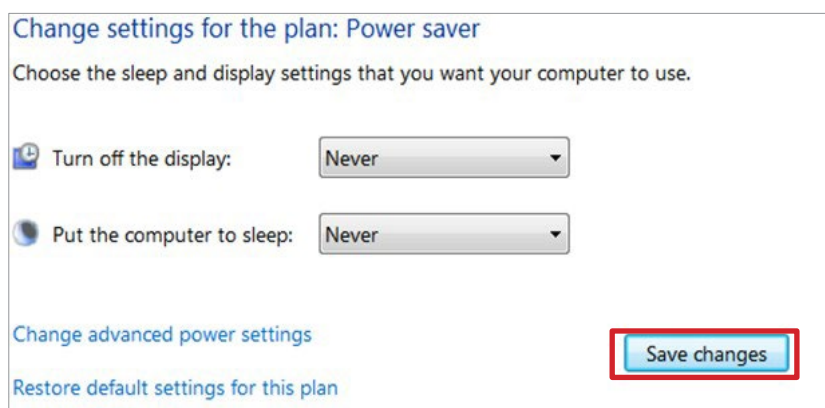
3. Click **OK** to apply the settings.

Selecting the Power Options: Monitor and System

1. Open the Start screen, type **Power Options** in the search box.
2. Click **Choose when to turn off the display**.



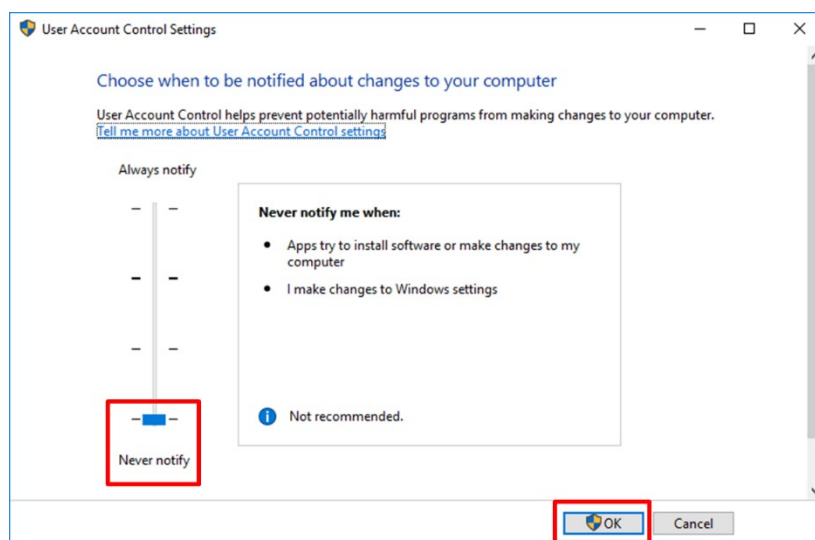
3. Select **Never** for both **Turn off the display** and **Put the computer to sleep** fields.



4. Click **Save changes** to apply the settings.

8.3 Turning off the User Account Control

1. Open the Start screen, type **User Account Control** in the search box.
2. Disable the UAC by moving the slider bar down to the bottom, **Never notify**. Then, click **OK** to apply change settings.



8.4 Setting Folder Exclusions with Anti-virus Software

IMPORTANT

- Set the virus scan exception for the files and folders related to this equipment.
- DO NOT run the memory-resident background programs unrelated to the equipment.
- It is recommended to run the virus scan only when the equipment is idle.
- Turn the firewall off.
- Always use the blank USB drive whenever possible.

Some files used by the **Smart Plus** are incorrectly recognized as viruses/trojans by anti-virus software. If you are using anti-virus software on your PC, you must exclude those files from all scans performed by the anti-virus software.

For **Smart Plus**, the following folders, and files inside for relevant software should be excluded from the virus scan.

Path	Software
C:\Program Files\Vatech	Ez3D-i/EzDent-i
C:\VCaptureSW	Console Software

NOTICE

- Suppose the anti-virus program from McAfee is running in the background.
- The procedure to set folder exclusions is similar for most anti-virus programs.

1. Open the McAfee anti-virus program and select the **VirusScan**.
2. Right-click the On-Access Scan menu option and left-click the Properties tab.
3. Select the All Processes → Detection → Exclusions menu option and choose the Add menu button.
4. Navigate to the folders or the files you want to designate an exclusion path for and select the checkbox to Also Exclude Subfolders.
5. Click **OK** when completed and exit McAfee for the path exclusion to be completed.

9. Installing Software

NOTICE

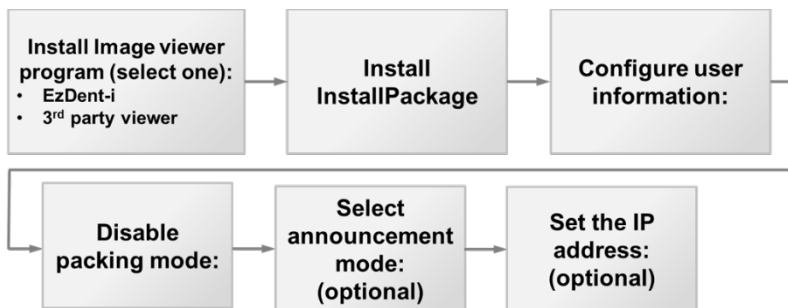
Disregard this section in case the PC system is supplied with the equipment. (The software has already been installed.)

9.1 Before Beginning

IMPORTANT

- Ensure that the Emergency Stop Switch is in the OFF position before starting with the InstallShield installation.
- DO NOT install programs on the PC where the image viewer and image acquisition programs are installed. Downloading irrelevant programs to the same PC may cause conflicts between programs and result in equipment failures.
- The image viewer program such as **EzDent-i** or the one from the 3rd party should be installed in advance before the InstallShield installation. For information on their installation procedures, refer to the corresponding manuals.
- Before InstallShield installation, ensure that the video card driver installed on the PC is the most up-to-date version. To check this, go to the Website: www.nvidia.com.
- Perform a virus scan for the PC and InstallShield program with the anti-virus program before proceeding with its installation.

9.2 Software Installation Flow



9.3 Installing Image Viewer Program

IMPORTANT

One of the image viewer programs among the **EzDent-i** or 3rd party program must be installed at this time. For the details on the installation procedures, refer to the corresponding manuals.

9.4 Installing the InstallShield

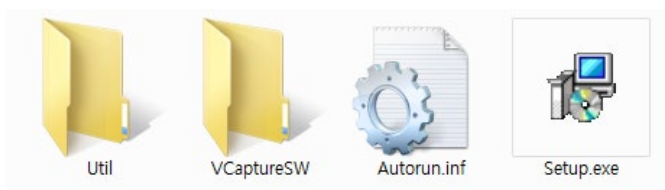
NOTICE

The InstallShield installation information is included in the USB drive provided as an accessory.

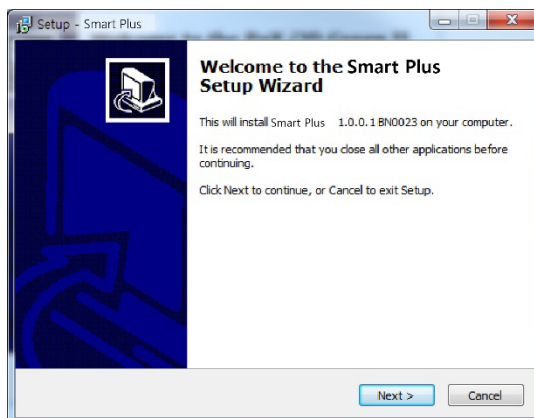
Please check the serial number.txt (e.g., 047-011752.txt) file.

047-011752 - 제품명	
국립(국) 현업(현) 서비스(서) 보(보) 드(드)용량(용)	
Es3D Plus Sta	None
Es3D Plus Pro1	None
Es3D Plus Pro	None
Es3D 1	None
Model	Pak-I
Modality	PANO
CT Sensor Type	None
Pano Sensor Type	AnyPano-X(ND)
Depth Sensor Type	None
Frame Grabber Type	Ethernet
Additional Options 1	None
Additional Options 2	DirectX

1. Turn on the PC and the equipment if they are not yet.
2. Insert the USB drive into the USB connector and then **perform a virus scan for the PC before installing the InstallShield.**
3. Go to the InstallShield folder and run **Setup.exe**.



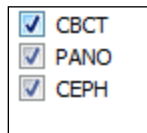
4. The following screen will appear. Click **Next**.



5. Confirm that the equipment model (**Smart Plus**) is selected and click **Next**.

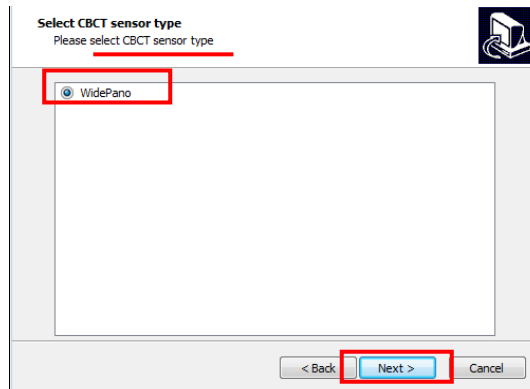


- Confirm that all modalities are checked as below. If the CEPH feature is not included in the equipment, uncheck the CEPH option. Moreover, click **Next**.



<input checked="" type="checkbox"/>	CBCT
<input checked="" type="checkbox"/>	PANO
<input checked="" type="checkbox"/>	CEPH

- Confirm that the **"WidePano"** is selected in the CBCT sensor type selection window and click **Next**.

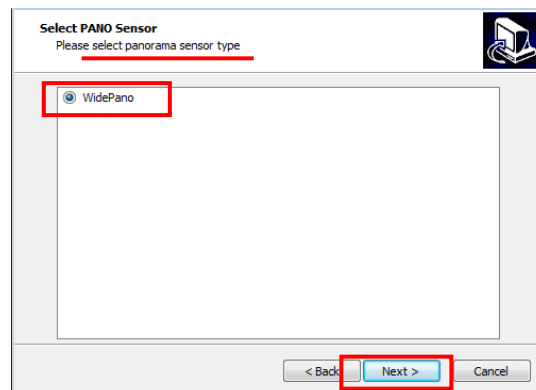


Select CBCT sensor type
Please select CBCT sensor type

☒ WidePano

< Back Next > Cancel

- Confirm that the **"WidePano"** is selected in the PANO sensor type selection window and click **Next**.

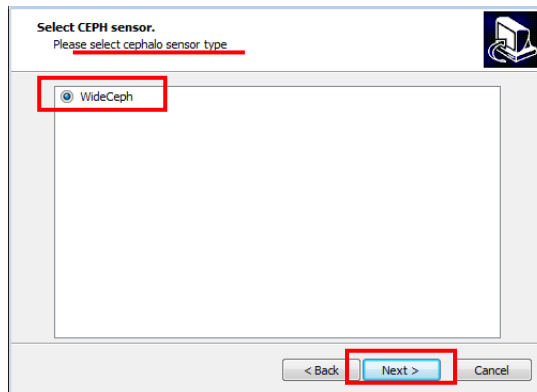


Select PANO Sensor
Please select panorama sensor type

☒ WidePano

< Back Next > Cancel

9. (Optional) Confirm that the **“WideCEPH”** is selected in the CEPH sensor type selection window and click **Next**.

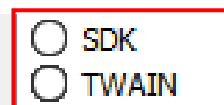


10. Select the default port number: **COM2**.

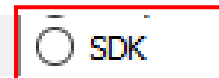
IMPORTANT

Select the port number: **COM2**. The same COM port number should be used between the equipment and PC.

11. Select the language and click **Next**.
 12. Select the connection for CR modality (Pano, Ceph) and click **Next** to continue.



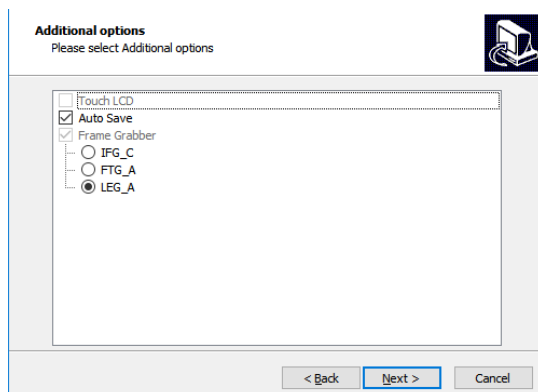
13. Select the connection option for CBCT modality and click **Next** to continue.



NOTICE

Select **SDK** for step 12 and 13 when EzDent-i is installed in your system.

14. Check the options according to the product specifications.



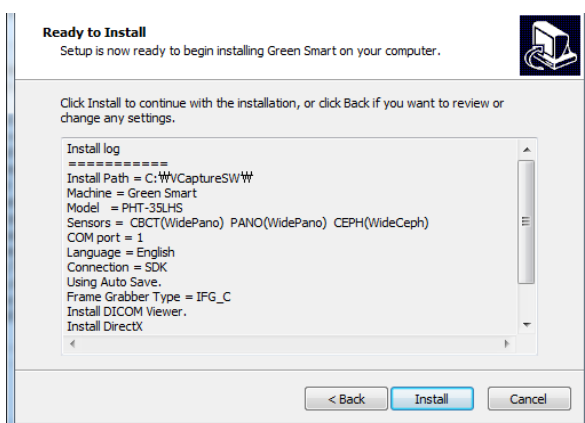
NOTICE

When the AutoSave is checked, the image data acquired saved automatically.

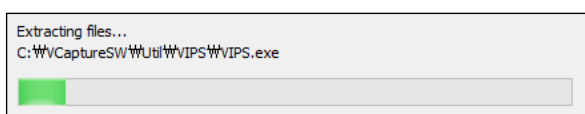
15. Confirm that the following drivers are selected. For the first-time installation, select all.

- ☒ DICOM Viewer
- ☒ DirectX
- ☒ Frame Grabber Driver

16. You can check the information entered so far with the **Ready to Install** window. If necessary, you can modify it by clicking **Back**.

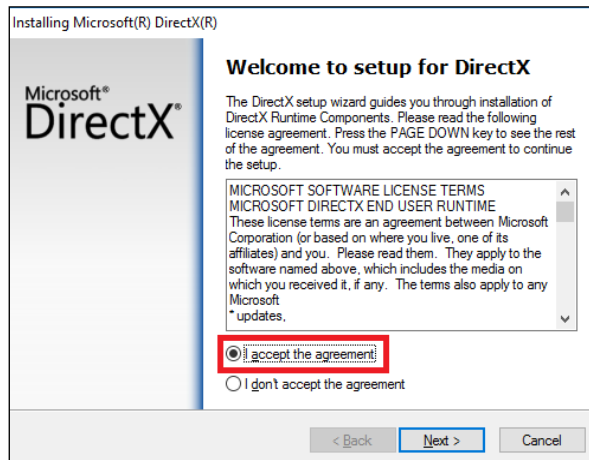


17. When the information is confirmed, click **Install** to continue.

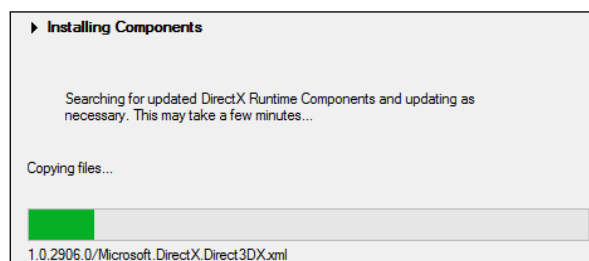
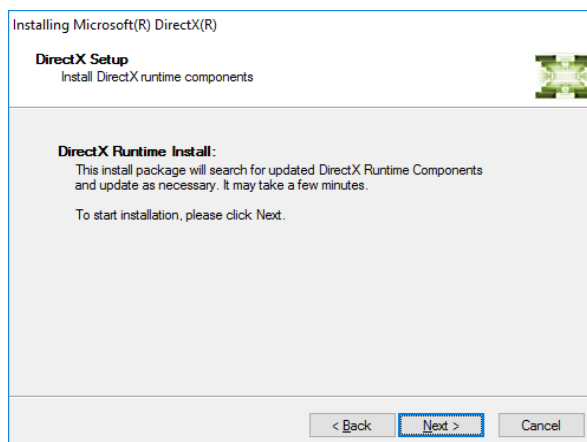


Installing the DirectX

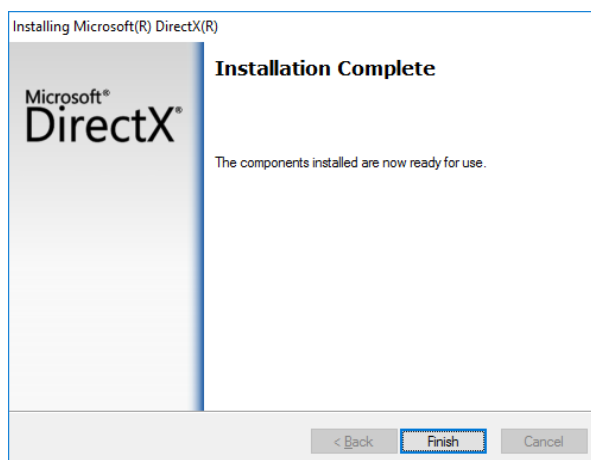
1. InstallShield will continue to DirectX® installation process. Select “**I accept the agreement**” in the Welcome window.



2. Click **Next** to start the installation.



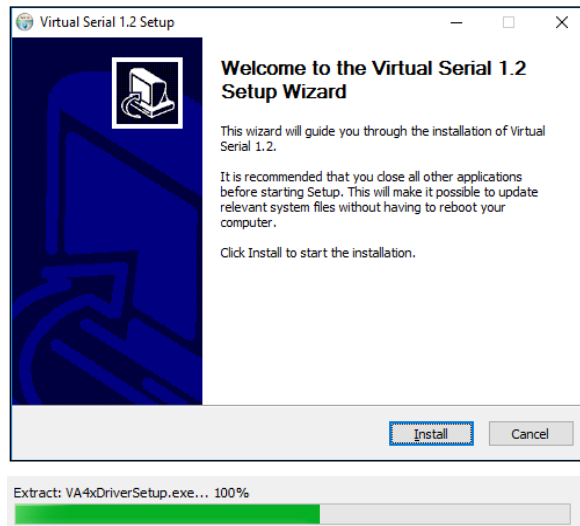
3. Click **Finish** to exit the wizard.



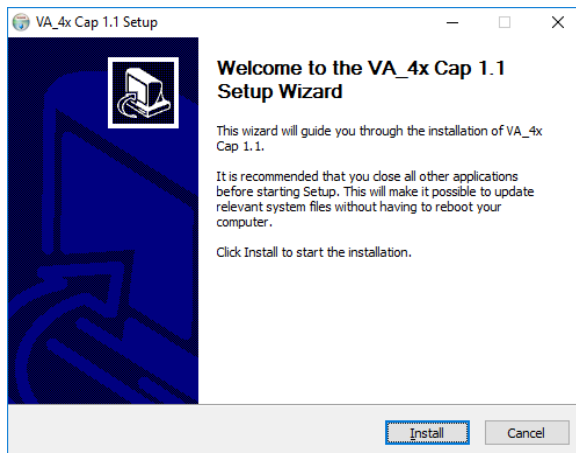
Installing the Frame Grabber (Virtual Serial)

<Inform Grabber>

1. After completing the Direct X® installation, Virtual Serial installation will be started. Click **Install** in the Welcome window.

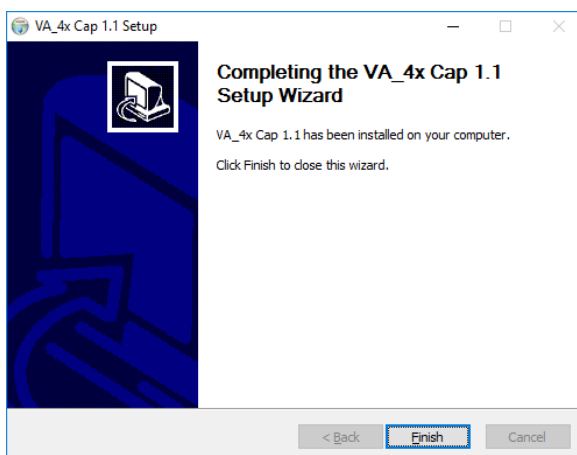


2. During installation, VA_4x Cap 1.1 installation wizard will appear. Click **Install** to start the installation.

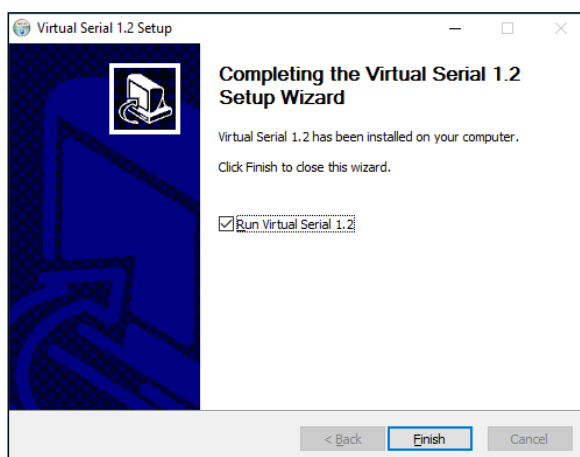


3. If the Windows Security pop-up window appears, click **Install**.

- Click **Finish** to exit the wizard.

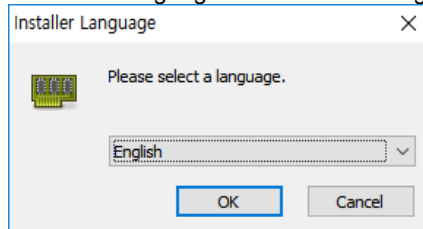


- Microsoft Visual C++ 2010 x64 Redistributable** installation or maintenance window will appear. Select one of the options and click **Next** to continue the process.
- Click **Finish** to exit the **Visual C++ 2010 x64 Redistributable** installation or maintenance wizard.
- When the Virtual Serial installation is completed, click **Finish** to exit the wizard.

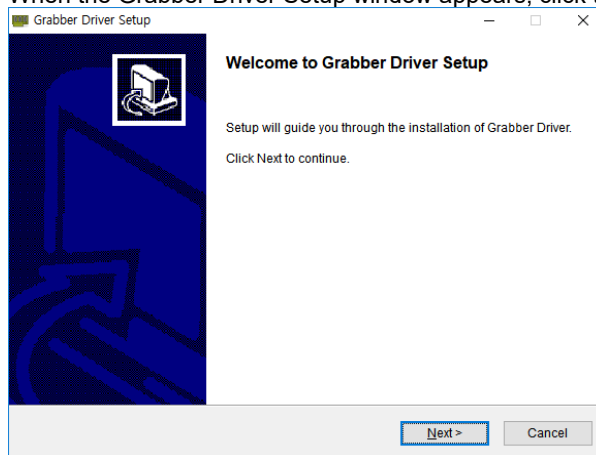


<Electron Grabber>

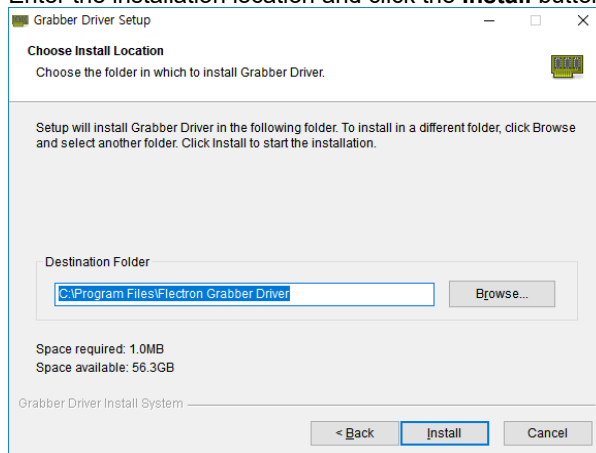
1. After completing the Direct X® installation, Grabber Driver Setup will be started. Select the language in the installer language window and press the **OK** button.



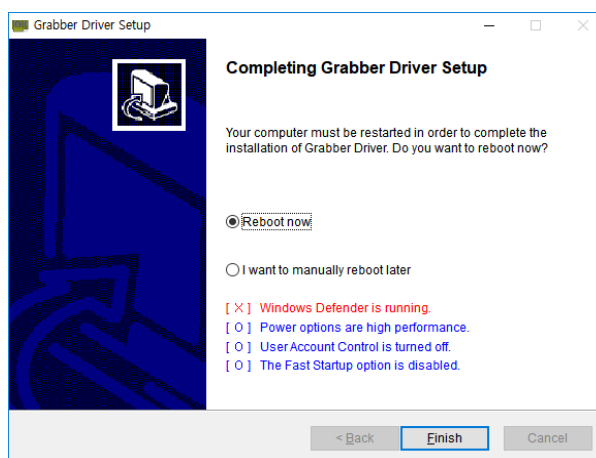
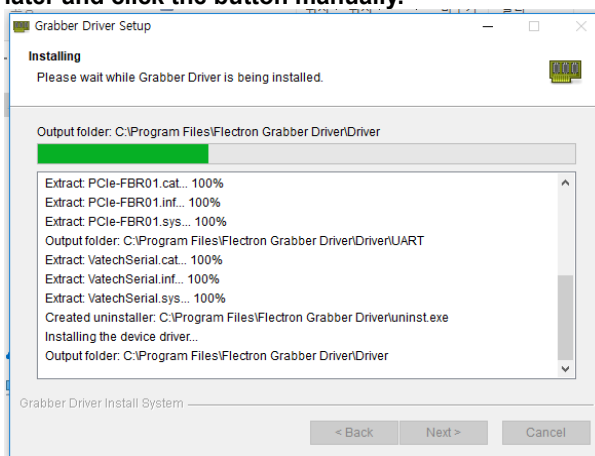
2. When the Grabber Driver Setup window appears, click the **Next** button.



3. Enter the installation location and click the **Install** button.



4. The "Installing" window will appear and disappear, and the Completing Grabber Driver Setup window will appear. Choose the **Reboot now** or **I want to reboot later** and click the button manually.



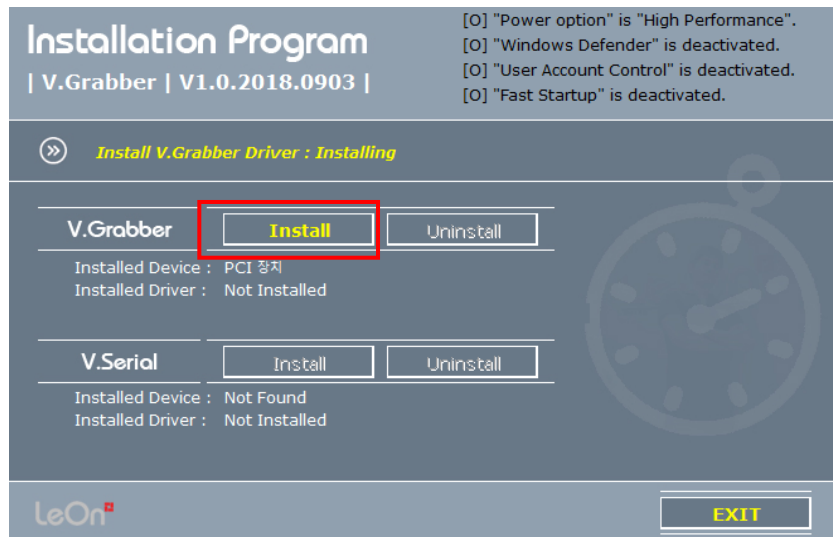
NOTICE

If an error occurs during installation, it will be displayed in red font color below. If no abnormality is found, it is displayed in blue font color.

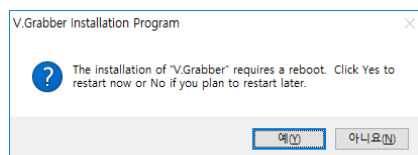
[X] Windows Defender is running.
 [O] Power options are high performance.
 [O] User Account Control is turned off.
 [O] The Fast Startup option is disabled.

<Leon Grabber>

1. After completing the Direct X® installation, the installation program will be started. Select the language in the installer language select window and press the **OK** button.
2. Press the V.Grabber's **Install** button.

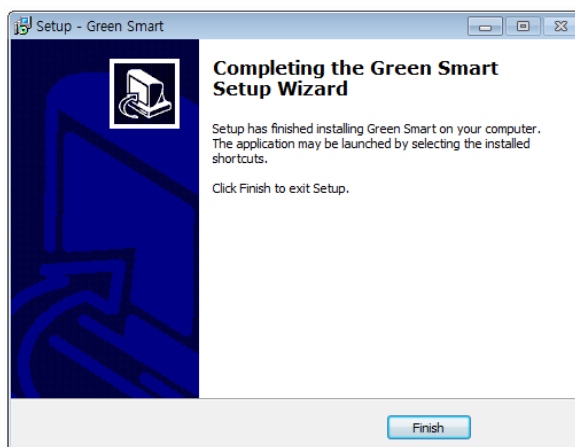


3. The installation is completed and the V.Grabber Installation Program window appears. Click the Yes button to immediately reboot, or the NO button to reboot later.



Finishing Installation

1. The installation has just been completed. Click **Finish** and restart the PC.



Verifying that All Components are Properly Installed

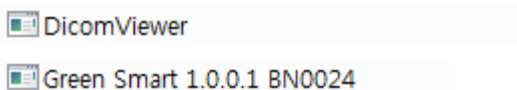
1. Locate the file: **Smart Plus_Install_Log.txt** on the desktop.



2. Open it to check the file. You can find out that all components are installed.
3. Go to section **9.5 Setting up the User Information**.

Uninstalling Software

1. Open the Start screen, type **Uninstall a Program** in the search box.
2. Find the programs you want to uninstall and double-click the program to uninstall.



3. When you are asked if you want to continue, click **Yes** or **OK** and follow the prompts to finish the uninstallation.

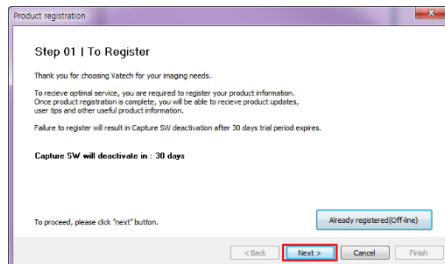
9.5 Setting up the User Information

9.5.1 Setting EzDent-i

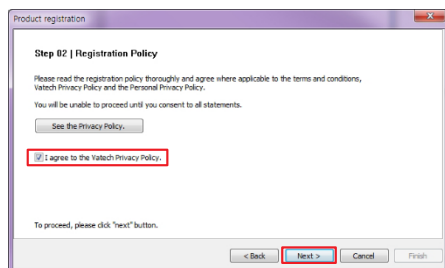
Registering Product

It is required to register a product when initiating the imaging program. The registration window will be displayed when executing the program.

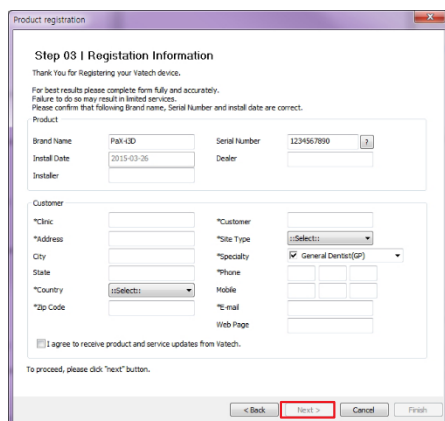
1. Click **Next** to proceed.



2. Select **"I agree to the Vatech Privacy Policy"** and click **Next**.



3. Enter the required information and click **Next**.

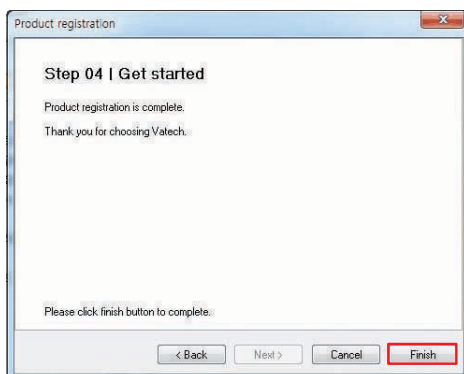


If the console PC is connected to the internet, go to step 4.

If the console PC is **NOT** connected to the internet, go to step 5.

<For the Console PC connected to the Internet>

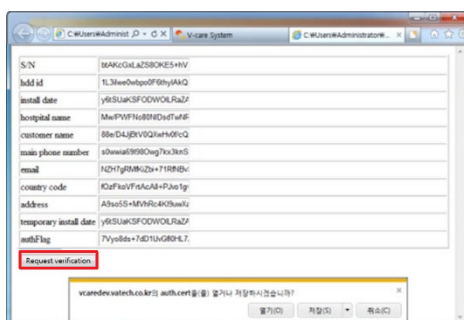
- Click **Finish**.

<For the Console PC NOT connected to the Internet>

- Click **Download file** to download and save the file (HTML type) into a memory device.



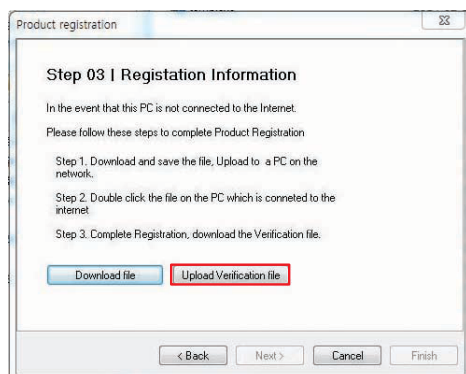
- Execute the file in the memory device from the PC connected to the internet.
- Click **Request verification**.



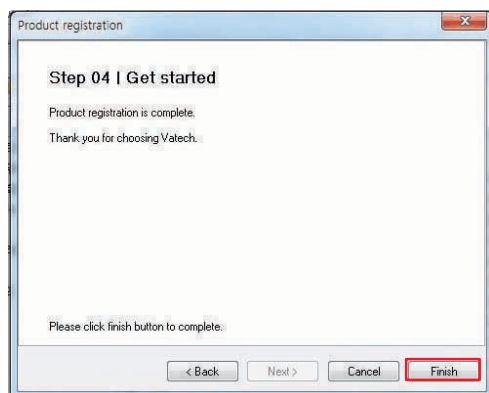
8. Download **auth.cert** file.



9. Copy the downloaded **auth. cert** file to the console PC.
10. Click the **Upload Verification file** to upload **auth. cert** file.



11. Click **Next**.
12. Click **Finish**.

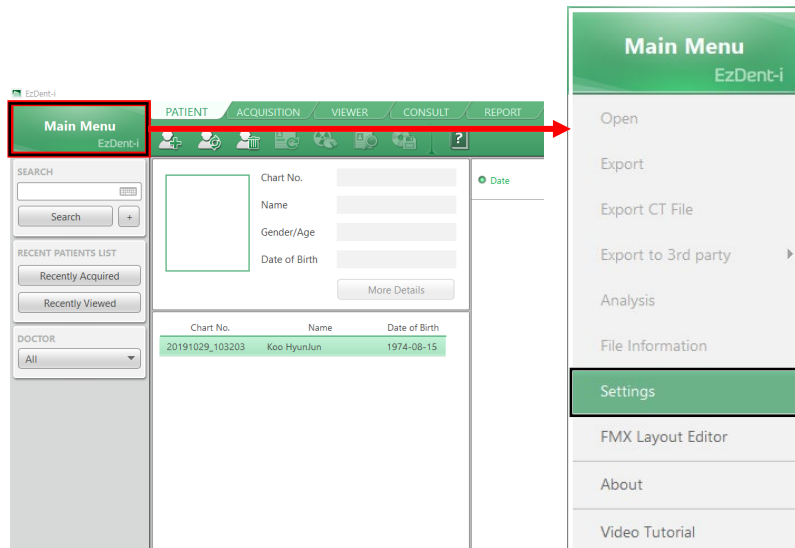


Setting the Imaging Acquisition Options

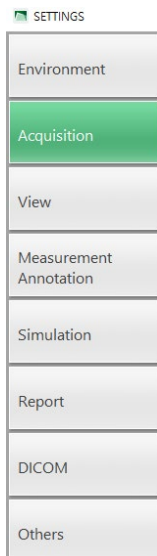
1. Start EzDent-i on your PC.



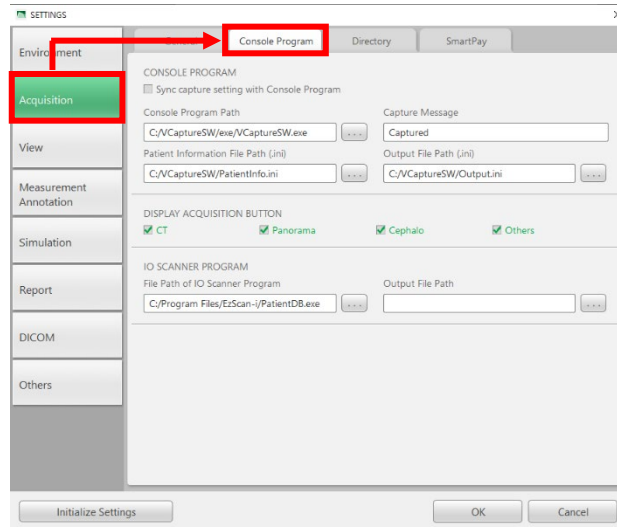
2. Click **Main Menu**, then select **Settings**.



3. In setting widow, click **Acquisition**.

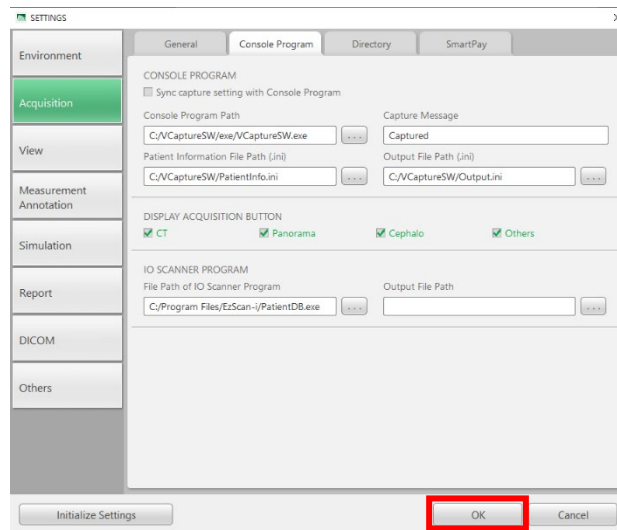


4. In the Acquisition tab, click **Console Program**.



In the **Console Program** tab, check:

- whether “Sync capture setting with console program” is selected
 - Console software path
 - Patient information file path
 - Display acquisition button.
5. Click **OK** and restart the computer to apply the new setting.



Creating a New Patient Record

NOTICE

For further details on this subject, refer to the accompanying **EzDent-i** Manual.

1. Click the **Add Patient** from the **PATIENT** tab.

The screenshot shows the EzDent-i software interface. The top navigation bar includes tabs for PATIENT, ACQUISITION, VIEWER, CONSULT, and REPORT. The PATIENT tab is active. On the left, there is a 'Main Menu' section with a 'SEARCH' box and a 'RECENT PATIENTS LIST' section with buttons for 'Recently Acquired' and 'Recently Viewed'. The main area displays a form for adding a new patient. The form includes fields for 'Chart No.', 'Name', 'Gender/Age', and 'Date of Birth'. A 'More Details' button is located at the bottom right of the form.

2. Enter the required fields (*) in the patient information:

- Chart number
- First name
- Last name

the rest of the fields are optional, but it is recommended that you fill them in.

The screenshot shows the 'ADD PATIENT' dialog box. It contains the following fields and options:

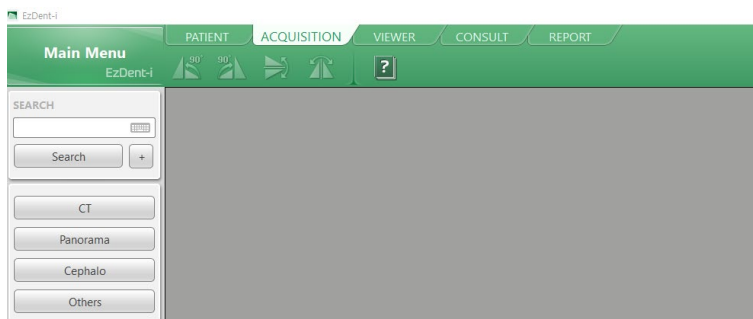
- Chart No.***: 20220217_163229
- Last Name**: (empty)
- First Name**: (empty)
- Name***: (empty)
- Gender**: Male (dropdown menu)
- Date of Birth**: Year: 2022, Month: 1, Day: 1 (dropdown menus)
- Doctor 1**: None (dropdown menu)
- Doctor 2**: None (dropdown menu)
- Social ID**: (empty)
- Phone**: (empty)
- Mobile**: (empty)
- E-Mail**: (empty)
- Zip Code**: (empty)
- Address**: (empty)

Buttons at the bottom: Add, Cancel.

3. Click **Add** to save the patient record.

Initiating the Imaging Program

1. Click the **ACQUISITION** tab. The imaging mode selection menu will appear in the left pane (see below).



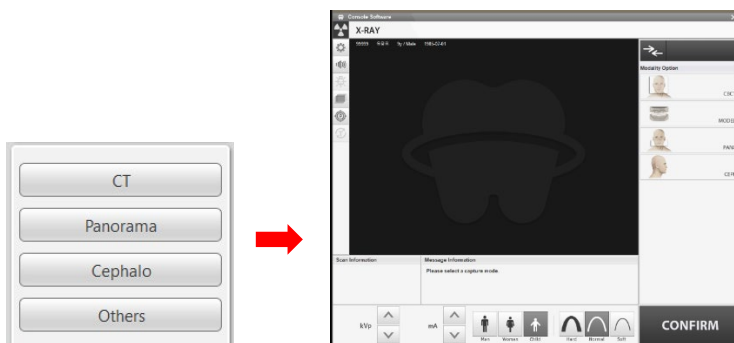
NOTICE

The imaging mode selection menu may differ due to your equipment's option (CEPH or non-CEPH) or the Display option you selected in the **Settings** (see below).

DISPLAY ACQUISITION BUTTON

☒ CT ☒ Panorama ☒ Cephalo ☒ Others

2. When you click an imaging mode, the main GUI for the selected mode appears



NOTICE

If the equipment is still in packing mode, the error code E001 appears. Go to 9.5.2 Setting Console Software > **Disabling the Packing Mode** to disable packing mode.

3. Go to **9.5.2 Setting Console Software** to set imaging variables for the selected mode.

9.5.2 Setting Console Software

IMPORTANT

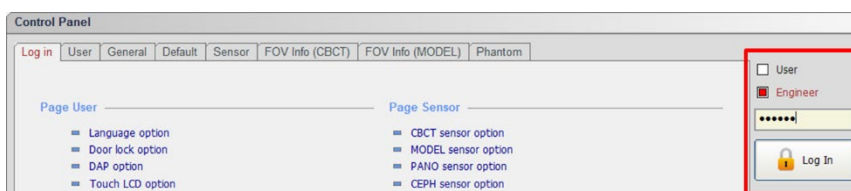
The following information should be entered, following the user requirements.

Configuring the Parameters

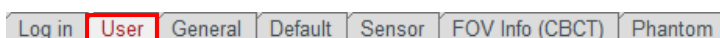
- From the main GUI window, click the settings icon in the upper right corner.



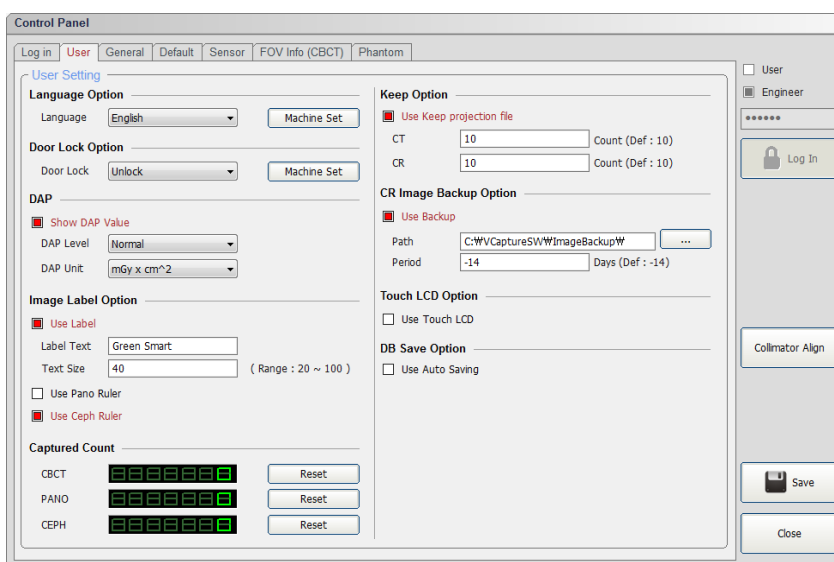
- Log in the tap will be open by default. On the right side of the screen, select **Engineer** and type the password ('vatech') and then click **Log In**.



- Click on the **User** tab.



- The User Settings are displayed as shown in the following figure.



5. In the **Image Label Option**, check that the default equipment's brand name and text size are displayed as shown in the following figure.

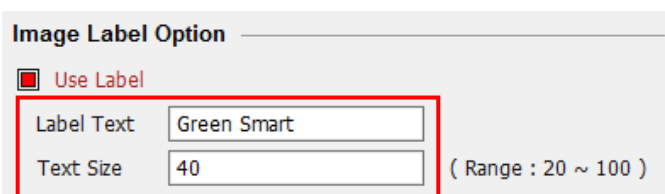


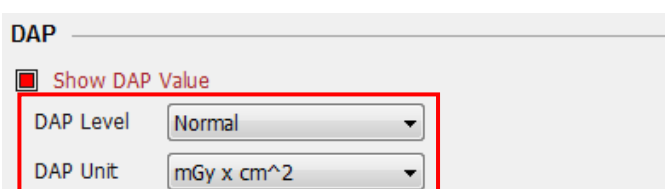
Image Label Option

☒ Use Label

Label Text: Green Smart

Text Size: 40 (Range : 20 ~ 100)

6. In the **DAP**, check that the default DAP Level and DAP Unit are displayed as shown in the following figure.



DAP

☒ Show DAP Value

DAP Level: Normal

DAP Unit: mGy x cm²

7. In the **Language Option**, the default language setting is English. If necessary, change the language setting from the drop-down list and click **Machine Set**.

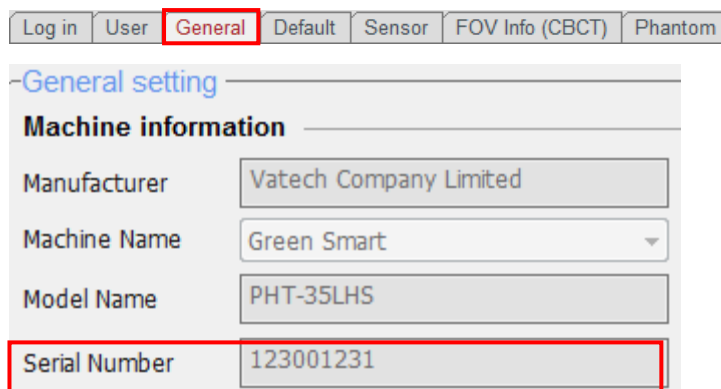


Language Option

Language: English

Machine Set

8. Click on the **General** tab and type the equipment's serial number in the **Machine information**.



Log in User **General** Default Sensor FOV Info (CBCT) Phantom

General setting

Machine information

Manufacturer: Vatech Company Limited

Machine Name: Green Smart

Model Name: PHT-35LHS

Serial Number: 123001231

9. In the **Patient Information Setting**, configure the Link Type, File Path, and File Name as shown in the following figure.

Patient information setting

CT Link Type	PatientInfo File	
File Path	C:\VCaptureSW\	...
File Name	PatientInfo.ini	
CR Link Type	PatientInfo File	
File Path	C:\VCaptureSW\	...
File Name	PatientInfo.ini	

10. In the **Link Information Setting**, configure the Link Type and File Extension as below.

Fields	When EzDent-i is used
CT / CR Link Type	SDK Link
CR Save Name	.DCM

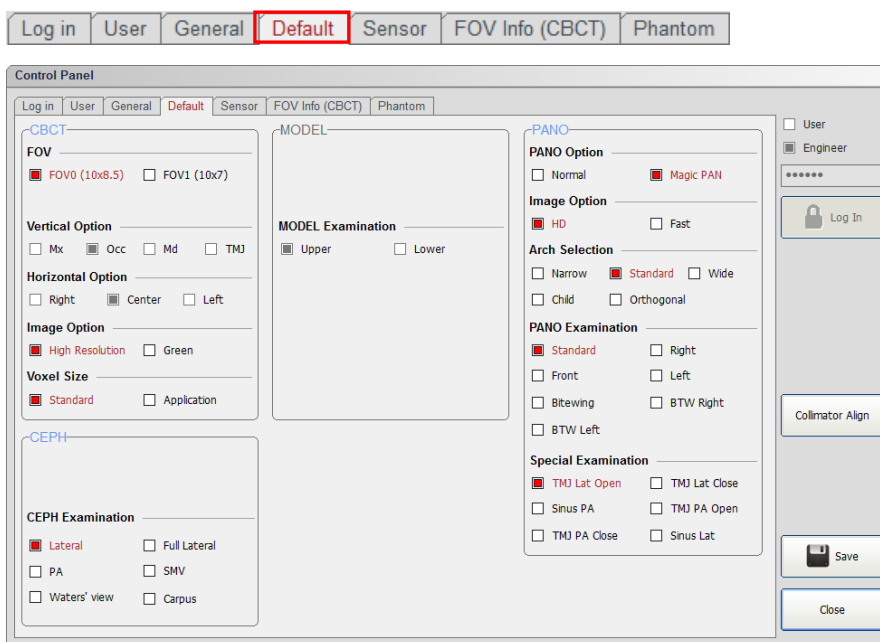
Link information setting

CT Link Type	SDK Link	
CT Save Path	C:\VCaptureSW\ImageOutput\CT\	...
CR Link Type	SDK Link	
CR Save Path	C:\VCaptureSW\ImageOutput\CR\	...
CR Save Name	Image	.DCM
Capture Message	Green Smart Captured	
Output File Path	C:\VCaptureSW\	...
Output File Name	Output.ini	

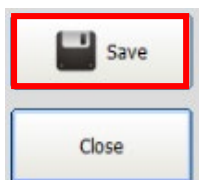
- Click on the **Default** tab and configure the user-defined parameters.

NOTICE

The default features can be modified according to the user's requirements.



- Click **Save** if changes occurred.



Disabling the Packing Mode

Smart Plus has a unique feature called “packing mode”, which is designed to protect the equipment during shipping. To ensure proper operation, disable the packing mode after installation.



While the packing mode is on, the equipment will not operate properly.

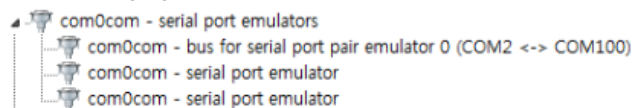
1. Click on the **General** tab on the Control Panel.
2. In the **Networking option**, enable the **Serial** checkbox and set **Serial port** and **Baud Rate** as below, and then click **Manager**.



NOTICE

If an error has occurred during connection, make sure the COM port setting is correct as follows:

1. Run the Device Manager.
2. Check the COM port assigned to “com0com” as shown in the following figure.

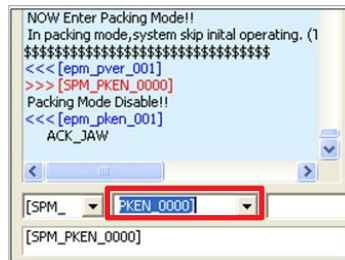


3. If it is not assigned correctly, change the COM port in the **Networking option** and click **Save**.

3. Enter the command **PVER]** to verify the current mode. Note that the equipment is now in packing mode.



4. Enter the command **PKEN_0000**] to exit the packing mode. Now note that the equipment is out of the packing mode.



NOTICE

Use the command **PKEN_0001**] to re-enter the packing mode.

5. Click **Exit** and terminate the Control Panel.
6. **(Important!) Exit the imaging program (main GUI).**
7. Reboot the system for the changes to take effect.

Selecting an Announcement Mode (Optional)

If selecting an announcement between music and beep is necessary, perform the following procedures.

Command specifications:

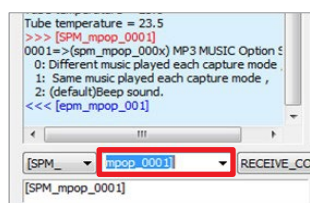
Command format: [SPM_MPOP_XXXX]			
XXXX	Imaging Modes	Announcement Mode	Division
0000	CT/PANO	Music	Different for each mode
0001	CT/PANO	Music	Same for each mode
0002 (Default)	CT/PANO	Beep	Same for each mode

1. Send the command following the command specification, as specified in the table above. Refer below for some examples.

Default mode: 0002(beep) for each imaging mode.

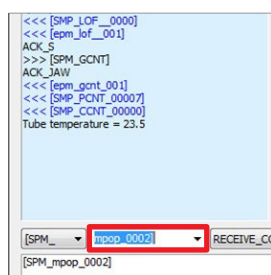
< When the same Music Announcement is desired for CT and PANO imaging modality >

Enter the command [SPM_MPOP_0001] in the command field.



< When the same Beep Announcement is desired for CT and PANO imaging modality >

Enter the command [SPM_MPOP_0002] in the command field.



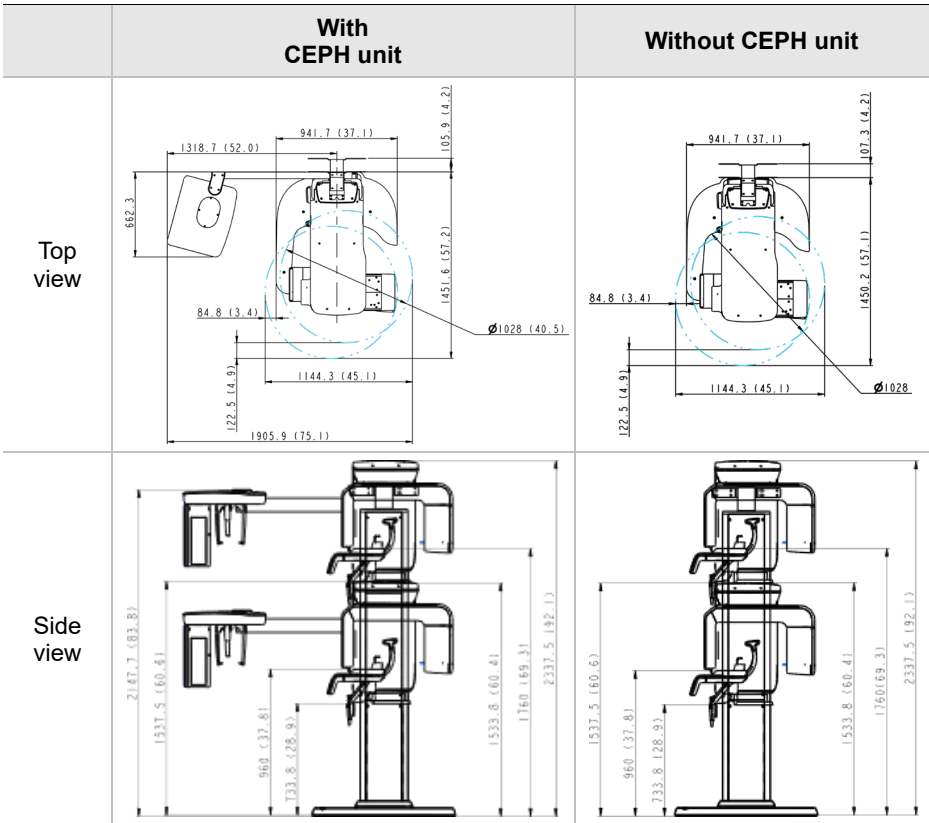
Finalizing the Console Software Settings

1. Click the **Exit** → **Close** button and terminate the control panel.
2. **(Important!) Exit the imaging program (main GUI) and restart the equipment to take the changes into effect.**

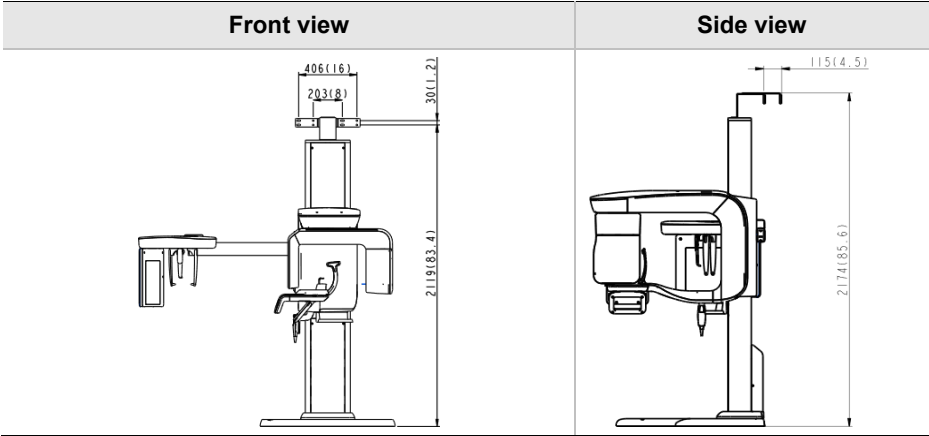
10. Technical Specifications

10.1 Mechanical Specifications

Dimensions (unit = mm)



(Wall bracket dimensions)



Item		Description
Weight	Without CEPH unit	137 kg (302.0 lbs. – without Base)
		190 kg (418.9 lbs. – with Base)
	With CEPH unit	162 kg (357.1 lbs. – without Base)
		215 kg (474.0 lbs. – with Base)
Total Height	Without Base	Max. 2306.0 mm (90.8”)
	With Base	Max. 2337.5 mm (92.1”)
Dimensions during operation (Length x Width x Height)	Without CEPH unit	1144.3 (L) x 1557.5 (W) x 2306 (H) (mm, without Base)
		45.1 (L) x 61.4 (W) x 90.8 (H) (inch, without Base)
		1144.3 (L) x 1557.5 (W) x 2337.5 (H) (mm, with Base)
		45.1 (L) x 61.4 (W) x 92.1 (H) (inch, without Base)
	With CEPH unit	1905.9 (L) x 1557.5 (W) x 2306 mm (H) (mm, without Base)
		75.1 (L) x 61.4 (W) x 90.8 (H) (inch, without Base)
		1905.9 (L) x 1557.5 (W) x 2337.5 (H) (mm, with Base)
		75.1 (L) x 61.4 (W) x 92.1 (H) (inch, with Base)
Rotating Unit Vertical Movement		Max. 803.7 mm (31.7”)
Installation Type		Base Stand/Wall Mount (Default: Wall Mount type)
Packing Box Organization		Main Box, CEPH Box (Optional), Base Box (Optional)

10.2 Environmental Specifications

Item		Description
During Operation	Temperature	10 ~ 35 °C
	Relative humidity	30 ~ 75 %
	Atmospheric pressure	860 ~ 1060 hPa
Transport and Storage	Temperature	-10 ~ 60 °C
	Relative humidity	10 ~ 75 %
	Atmospheric pressure	860 ~ 1060 hPa

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Appendix

A. Installing the Warning Lamp and Door Interlock Switch

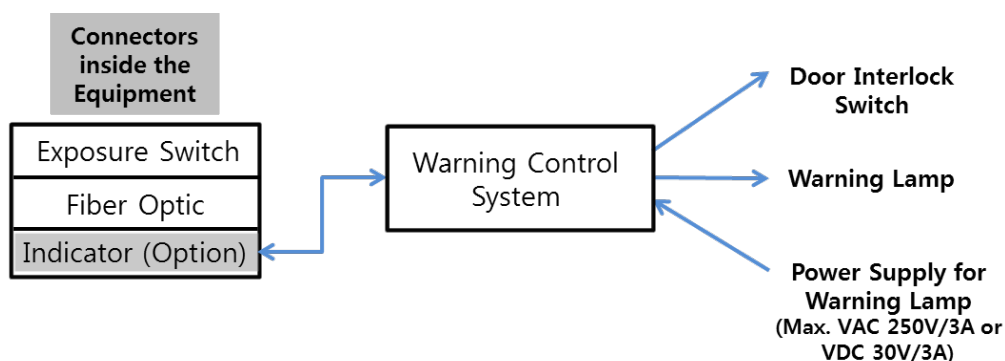
Requirement

1. The warning control system shall be connected to the ERB (earth reference bar) of the room that it is associated with.
2. The switching arrangements, location, height, and the number of illuminated warning signs shall be agreed with the local radiation protection advisor (RPA). (customer)
3. A fluorescent lamp shall not be used in the 'X-rays on' sign.
4. The customer shall be responsible for the proper installations for the warning control system, including the lamp and door interlock switch, based on the MEIGaN guideline.

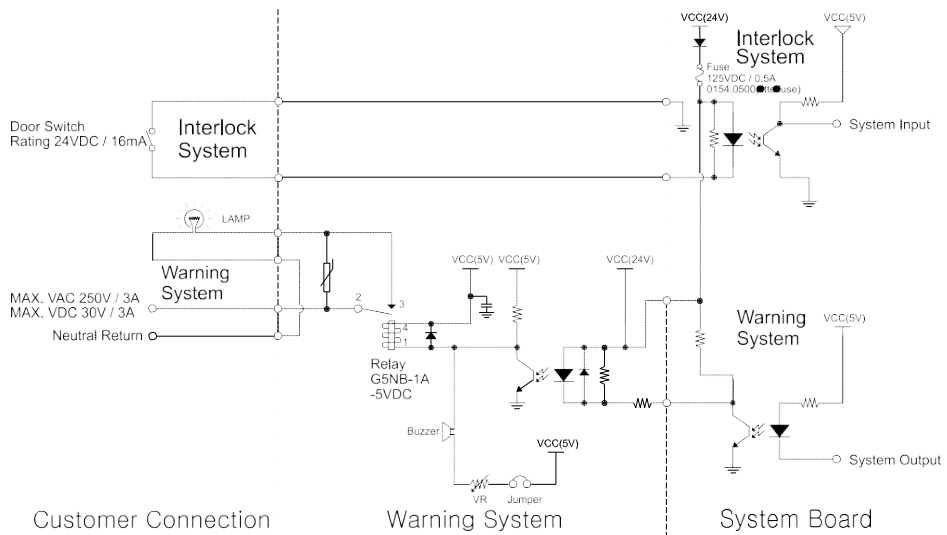
MEIGaN: Medical Electrical Installation Guidance Notes

5. Pre-installation planning is crucial to the successful installation of these devices.
6. For further details, refer to the accompanying volume: Specification for Electrical Installation

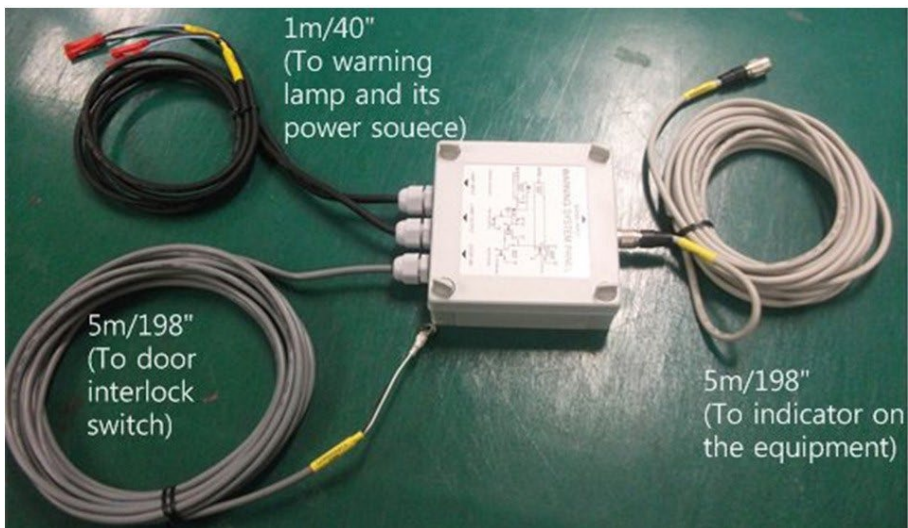
Block Diagram



Schematic Diagram



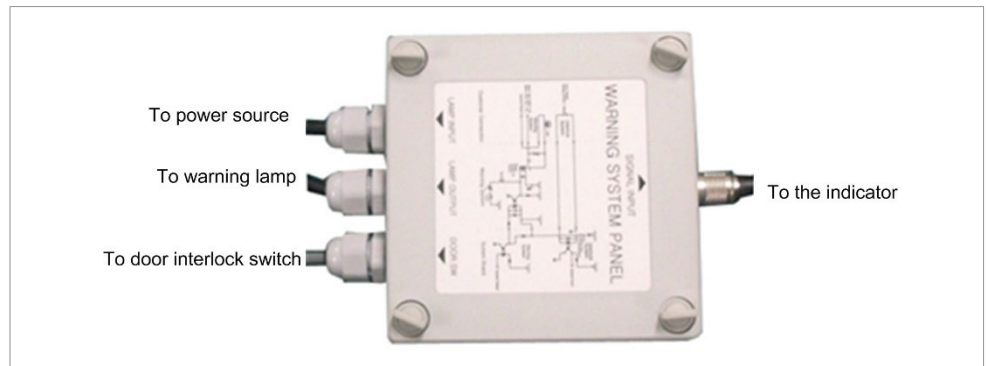
Components Supplied



Procedures

<The individual cable length>

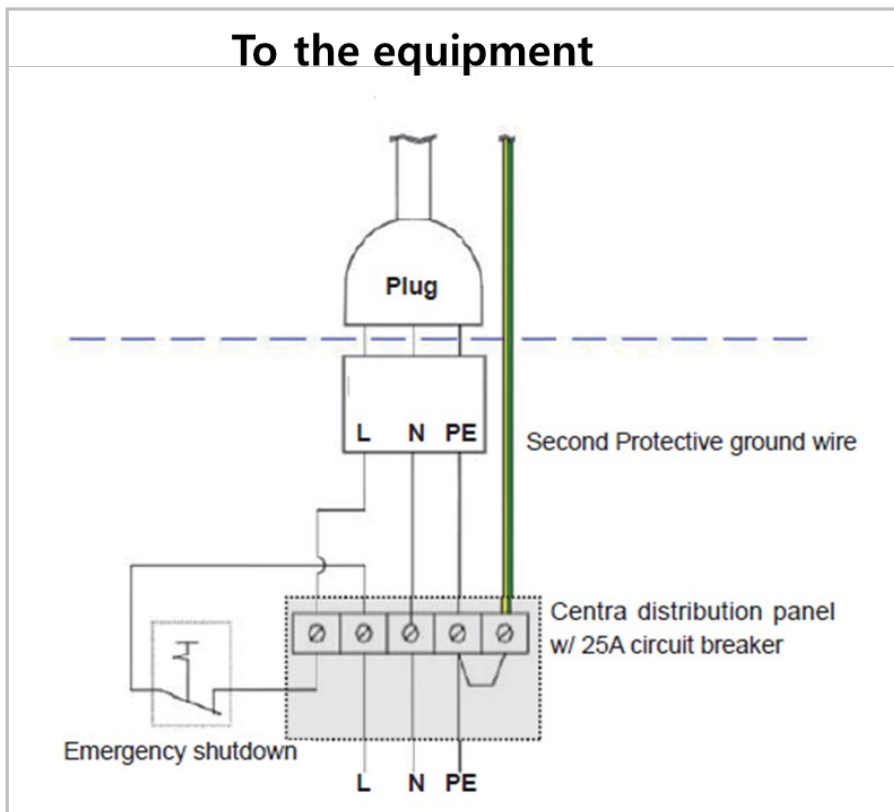
- Signal Cable: 5 m / 198"
- Door interlock cable: 5 m / 198"
- Warning lamp: 1 m / 40"
- Power source cable: 1 m / 40"



1. Prepare the Warning System Panel (Part No. 28)
2. Install the Warning System Panel at the proper height after taking each cable length into account.
3. Connect the warning lamp (not provided).
4. Connect the door interlock switch (not provided).
5. Connect the power source for the warning lamp.

B. Installing the Emergency Stop Switch

- Install the **Emergency Stop Switch** on the power cable line.
- Install this switch so that it is easy to reach in the emergency case but cannot be pushed by mistake.
- The switch shall be a type of mistake-proof.
- The switch is not supplied.]
- The switch shall be installed at a height of 1.2 to 1.5 meters (47 to 60").



1. The cable sizes: N, L, and PE \geq 12 AWG (3 x 4 mm²).
2. The cable to **Emergency Stop Switch** shall be the same size as the power cable itself.
3. Install the socket connector terminal for the 2nd protective ground wire.

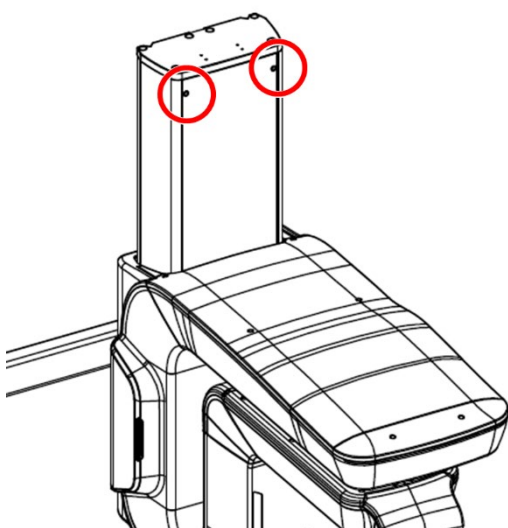
C. Limiting the Column Height

This section explains how to limit the column height within the permissible range.

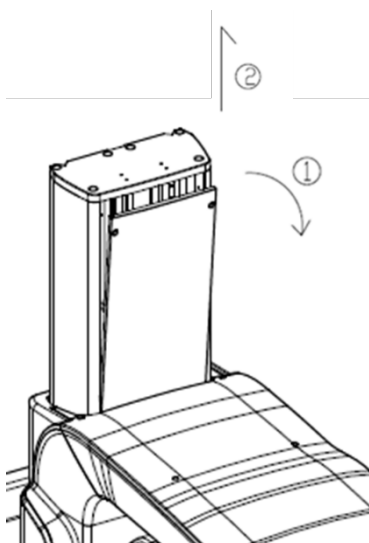
1. Measure the ceiling height in the X-ray shield room: H_{ceiling}

< Removing the column covers >

2. Remove two Fixing Bolts as shown in the figure.



3. Remove the Column Rear-Top Cover as shown in the figure.



Determining the Height

Determine the screw height using the following formula.

$$H_{\text{screw height}} = 100 \text{ mm} - d$$

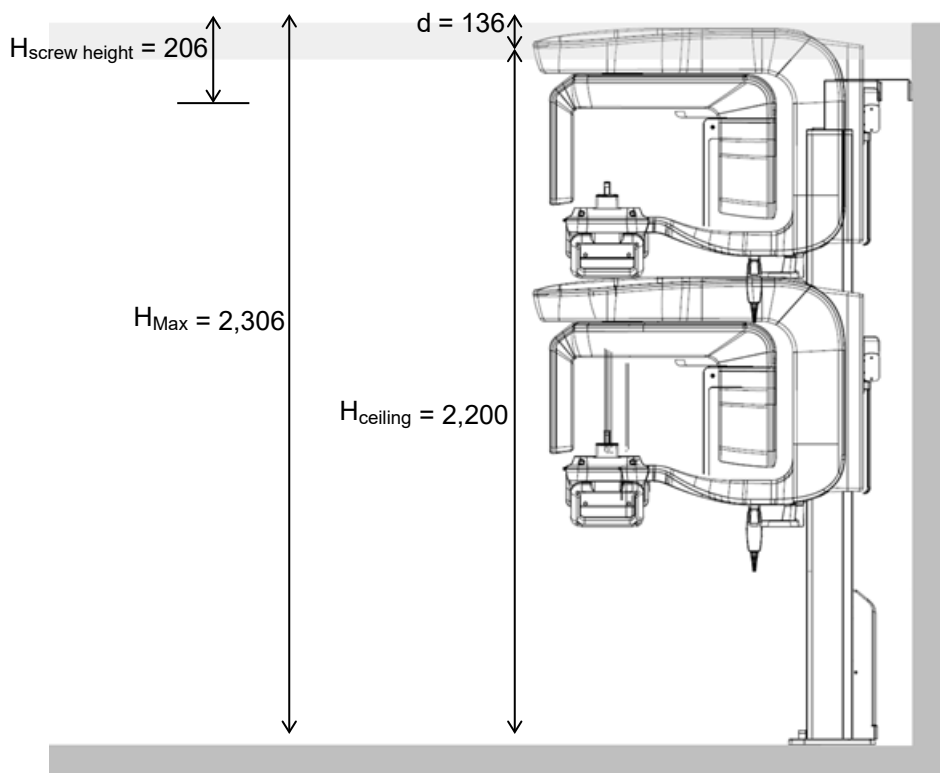
- 100 mm: the minimum desired distance between the ceiling and the top of the equipment when the column is fully extended.
- $d = H_{\text{ceiling}} - H_{\text{Max}} = H_{\text{ceiling}} - 2306 \text{ mm}$ (Example height: The height of the equipment without Base)

Ex) If H_{ceiling} is 2200 mm, $H_{\text{screw height}}$ value is calculated as follows:

$$d = H_{\text{ceiling}} - H_{\text{Max}} = 2200 \text{ mm} - 2306 \text{ mm} = -106 \text{ mm}$$

$$H_{\text{screw height}} = 100 \text{ mm} - d = 100 \text{ mm} + 106 \text{ mm} = 206 \text{ mm}$$

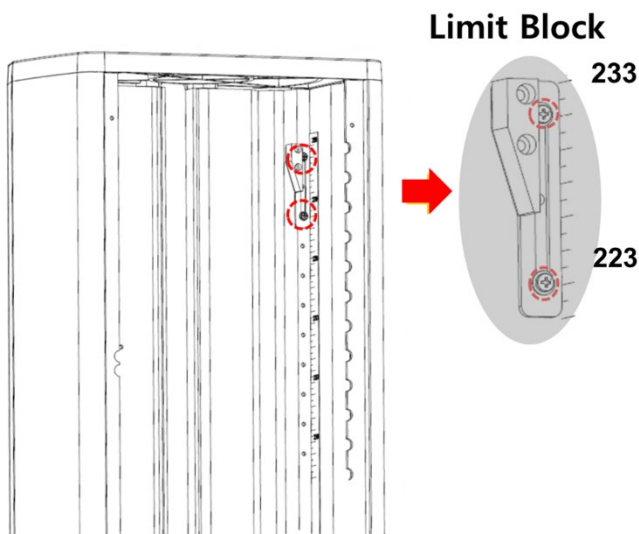
(If d is more than 100 mm, the column height limit is not necessary.)



Adjusting the Screw Height

We know the $H_{\text{screw height}}$ is 236 mm from the previous example. So, we will move the screw from the default (current) position to the new one.

1. Loosen two bolts halfway (**important!**).

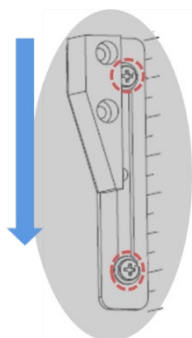


IMPORTANT

DO NOT unscrew completely the bolt. If not, it could drop into the column and may cause big trouble to retrieve it out.

2. Looking up the scale, slide the Limit Block down to a new location ($H_{\text{screw height}} = 236$ mm) and fix it back.

Limit Block



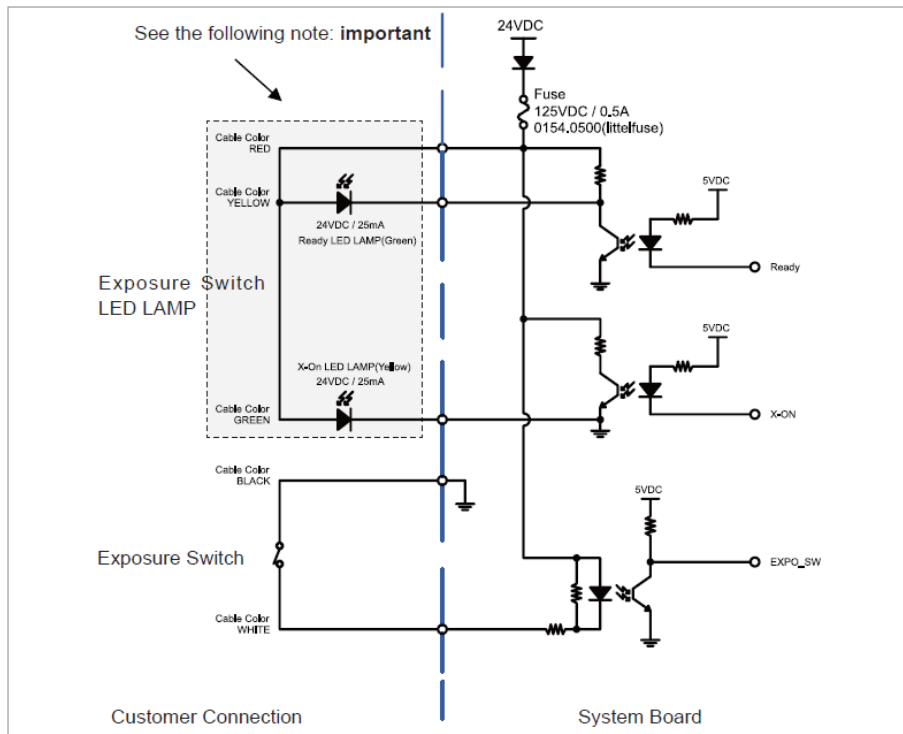
3. Put the covers back in reverse order and fix them with the bolts.

D. Connecting the 3rd party Exposure Switch (Optional)

This section explains how to connect the third-party **Exposure Switch** with the equipment from **VATECH**.

< How to >

1. Cut the **Exposure Switch** cable provided with the equipment.
2. According to the following schematic diagram, rewire the cables.
3. Double-check the wiring before use.



NOTICE

Tape the end of each unused wire to prevent the wires from causing an inadvertent short circuit

E. Checking PC BIOS Settings

< HP PC BIOS Setup >

PC Model: HP Z4

PC BIOS default			
Main Menu	Sub1 Menu	Sub2 Menu	Setup Value
Advanced	Power Options	Runtime Power Management	[Disable]
Advanced	Power Options	Idle Power Savings	[Normal]
Advanced	Power Options	Enhanced Halt State (C1E)	[Disable]

F. Installation Checklist

1. General Information:

Customer

Information about the Equipment Purchaser	
Name of Clinic or Hospital	
Address	
Phone	
E-Mail	
Website	

Dealer

Information about the Equipment Seller	
Name of Dealer	
Address	
Phone	
E-Mail	
Website	

2. Installation Information:

Address of Installation Site	
Names of Installers	
Scheduled Date of Installation	
Date of installation	
Model	
Serial No.	

3. System Delivery to Site:

	Yes	No
Did you review and identify the delivery route and method for equipment in advance?	<input type="checkbox"/>	<input type="checkbox"/>
Is the freight elevator available?	<input type="checkbox"/>	<input type="checkbox"/>
Is the security guard, if any, notified of the installation in advance?	<input type="checkbox"/>	<input type="checkbox"/>
Are two installers, including the helpers, available to move and unload the equipment?	<input type="checkbox"/>	<input type="checkbox"/>

4. Before Installation:

Site Check List

	Yes	No
Is the room large enough? At minimum, with CEPH unit: 2,044.3 mm (L) x 2,457.5 mm (W) x 2,437.5 mm (H) Without CEPH unit: 2,805.9 mm (L) x 2,457.5 mm (W) x 2,437.5 mm (H)	<input type="checkbox"/>	<input type="checkbox"/>
Is the door entrance wider than 800mm (32")?	<input type="checkbox"/>	<input type="checkbox"/>
Is a radiation protection plan in place?	<input type="checkbox"/>	<input type="checkbox"/>
Do equipment and PC use the same dedicated circuit?	<input type="checkbox"/>	<input type="checkbox"/>
Does the electrical input condition to the installation site meet the MEIGaN requirements?	<input type="checkbox"/>	<input type="checkbox"/>
Is the local Network IP address of clinic 192.168.33.xx?	<input type="checkbox"/>	<input type="checkbox"/>
Is a compressor or air conditioner suction located right next to X-ray Room?	<input type="checkbox"/>	<input type="checkbox"/>
Is the floor flat and level?	<input type="checkbox"/>	<input type="checkbox"/>
Is the carpet on the floor? If so, remove it.	<input type="checkbox"/>	<input type="checkbox"/>

Before Opening Boxes

	Yes	No
Did the delivery company carry and handle with caution?	<input type="checkbox"/>	<input type="checkbox"/>
Did the installers take pictures of boxes before opening them?	<input type="checkbox"/>	<input type="checkbox"/>
Did the installer make sure there are not any suspicious holes or scratches on the box?	<input type="checkbox"/>	<input type="checkbox"/>
Is the ShockWatch indicator red?	<input type="checkbox"/>	<input type="checkbox"/>
Is the TiltWatch indicator red?	<input type="checkbox"/>	<input type="checkbox"/>

After Opening Boxes

	Yes	No
Did the installers make sure there are not any scratches or broken surface equipment?	<input type="checkbox"/>	<input type="checkbox"/>
Are all accessories and cases included in the box?	<input type="checkbox"/>	<input type="checkbox"/>
Have you read the installation manual out in its entirety before starting the installation?	<input type="checkbox"/>	<input type="checkbox"/>
Did the installer take pictures after opening the boxes?	<input type="checkbox"/>	<input type="checkbox"/>
Did the installer make sure there are not any suspicious holes or scratches on the box after opening?	<input type="checkbox"/>	<input type="checkbox"/>

5. While Installing Equipment

	Yes	No
Are installers careful with any sensitive parts while carrying equipment?	<input type="checkbox"/>	<input type="checkbox"/>
Did the installers make sure that various cables, especially optic cables, are not coiled too much?	<input type="checkbox"/>	<input type="checkbox"/>
Did the installers perform installations, according to the manual?	<input type="checkbox"/>	<input type="checkbox"/>
Did the installers do not touch or place pressure on sensors while installing?	<input type="checkbox"/>	<input type="checkbox"/>
Did the installer make sure the harness and equipment are well connected and not damaged?	<input type="checkbox"/>	<input type="checkbox"/>
Did the installers check if the emergency button (switch) is working properly?	<input type="checkbox"/>	<input type="checkbox"/>
Did the equipment be well balanced?	<input type="checkbox"/>	<input type="checkbox"/>

6. After Installation

	Yes	No
Does the chin rest successfully initialize after turning on the system?	<input type="checkbox"/>	<input type="checkbox"/>
Are the cables organized well?	<input type="checkbox"/>	<input type="checkbox"/>
Is it OK after checking visually the equipment?	<input type="checkbox"/>	<input type="checkbox"/>
Is the normal voice message audible during system initialization after turning on the system?	<input type="checkbox"/>	<input type="checkbox"/>
Does the LED on the front of the equipment turn green?	<input type="checkbox"/>	<input type="checkbox"/>
Do the equipment Up/Down switch works properly?	<input type="checkbox"/>	<input type="checkbox"/>

7. Software Compatibility

	Yes	No
Anti-virus software installed?	<input type="checkbox"/>	<input type="checkbox"/>
A firewall installed? If yes, indicate software or hardware.	<input type="checkbox"/>	<input type="checkbox"/>
	Type:	
Is the 3 rd party software installed? If yes, indicate the name(s) and versions.	<input type="checkbox"/>	<input type="checkbox"/>
Are they compatible with software from Vatech® ? If No, indicate the name(s) and versions.	Version:	

8. Electrical Requirements:

	Yes	No
Is the circuit breaker installed and evaluated in the distribution panel for over-current protection w/ 20A?	<input type="checkbox"/>	<input type="checkbox"/>
Is internal line impedance checked? ($Z_{input} \leq 0.5\Omega$)	<input type="checkbox"/>	<input type="checkbox"/>
Do equipment and PC use the same dedicated circuit?	<input type="checkbox"/>	<input type="checkbox"/>

9. Network Configuration:

	Yes	No
Is a network configured with 1 Gbit/s of CAT5?	<input type="checkbox"/>	<input type="checkbox"/>
Is the equipment connected to the network?	<input type="checkbox"/>	<input type="checkbox"/>
Is the network installation company identified?	<input type="checkbox"/>	<input type="checkbox"/>
What is the TCP/IP address assigned?	Address:	
What is the subnet masking address?	Address:	
Is there a DHCP server?	<input type="checkbox"/>	<input type="checkbox"/>

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The CE symbol grants this product compliance to the European Directive for Medical Devices 93/42/EEC as amended by 2007/47/EC as a class IIb device.

Smart PlusTM

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ZIP Code : 18449

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