1. General Information

1.1. Equipment Overview

1.1.1. Indications for Use

Green18 (Model: PHT-65LHS) is intended to produce panoramic, cephalometric or 3D digital x-ray images. It provides diagnostic details of the dento-maxillofacial, ENT, sinus and TMJ for adult and pediatric patients. The system also utilizes carpal images for orthodontic treatment. The device is to be operated by healthcare professionals.

1.1.2. Main Features

Green 18 is an advanced 5-in-1 digital X-ray imaging system that incorporates PANO, CEPH (Optional), CBCT, 3D MODEL Scan and 3D PHOTO (Optional) imaging capabilities into a single system and its main features are as follows.

- Multi FOV support: Selectable FOV among 18x10, 13x10, 8x9, 5x5 (cm)
- Multi imaging solution for accurate diagnostics
- Conventional 2D (PANO, CEPH) image acquisition
- 3D scanning for Plaster Cast with FOV 8x9 (cm)
- Multi-purpose camera equipped for patient positioning and 3D PHOTO acquisition (Optional)
- Touch Screen implemented for easy use
- DICOM (Digital Imaging Communication in Medicine) format supported

1.2 Available Modes

Equipment	Available Modes
Green 18	PANO, CEPH (Optional), CBCT, 3D MODEL Scan, 3D PHOTO (Optional)

2. Functional Specifications

2.1. PANO Mode

2.1.1. Overview

PANO imaging software is classified into two levels as below.

Level	Examination Option	Optional Status	
		Domestic	Overseas
Normal	PANO Examination	Default	Default
	Special Examination	Default	Default
Magic PAN	Applies to entire PANO Examination programs	Default	Optional

2.1.2. Scan Time / Exposure Time

Examination Mode	Arch Type	ROI	High Resolution		Green	
			Scan Time (s)	Exposure Time (s)	Scan Time (s)	Exposure Time (s)
PANO Examination	Narrow	Standard	14.1	13.5	7.0	7.0
		Right	14.1	6.8	7.0	3.5
		Front	14.1	11.3	7.0	5.8
		Left	14.1	6.8	7.0	3.5
	Normal	Standard	14.1	13.5	7.0	7.0
		Right	14.1	6.8	7.0	3.5
		Front	14.1	11.3	7.0	5.8
		Left	14.1	6.8	7.0	3.5
	Wide	Standard	14.1	13.5	7.0	7.0
		Right	14.1	6.8	7.0	3.5
		Front	14.1	11.3	7.0	5.8
		Left	14.1	6.8	7.0	3.5
	Child	Standard	12.0	11.5	6.8	6.7
		Right	12.0	5.7	6.8	3.3
		Front	12.0	9.2	6.8	5.2
		Left	12.0	5.7	6.8	3.3
	Orthogonal	Standard	14.1	13.5	7.0	7.0
		Right	14.1	6.7	7.0	3.5
		Front	14.1	11.1	7.0	5.7
		Left	14.1	6.7	7.0	3.5
		Bitewing	14.1	9.2	7.0	5.0
		Bitewing Incisor (Optional)	14.1	2.8	7.0	1.4

Examination Mode	Arch Type	ROI	High Resolution		Green	
			Scan Time (s)	Exposure Time (s)	Scan Time (s)	Exposure Time (s)
		Bitewing Right	14.1	5.0	7.0	2.8
		Bitewing Left	14.1	5.0	7.0	2.8
SPECIAL Examination	N/A	TMJ LAT Open	14.1	6.7	14.1	6.7
		TMJ LAT Close				
		TMJPA Open (Optional)	10.0	6.1	10.0	6.1
		TMJPA Close (Optional)				
		Sinus LAT (Optional)	4.0	3.7	4	3.7
		Sinus PA	8.8	7.7	8.8	7.7

- *Scan Time: The actual time that the equipment shoots the patient except for the initial acceleration and late deceleration stages.*
- *Exposure Time: The actual time that the patient is exposed to the X-ray emission.*

2.1.3. Exposure Condition

Examination Mode	Image Quality	Gender / Age group	X-ray Intensity	Tube Voltage (kVp)	Tube Current (mA)
PANO Examination	High Resolution	Man	Hard	75	12
			Normal	74	12
			Soft	73	12
		Woman	Hard	74	12
			Normal	73	12
			Soft	72	12
		Child	Hard	68	10
			Normal	67	10
			Soft	66	10
	Green	Man	Hard	75	14
			Normal	74	14
			Soft	73	14
		Woman	Hard	74	14
			Normal	73	14
			Soft	72	14
		Child	Hard	68	12
			Normal	67	12
			Soft	66	12
SPECIAL Examination	N/A	Man	Hard	75	14
			Normal	74	14

Examination Mode	Image Quality	Gender / Age group	X-ray Intensity	Tube Voltage (kVp)	Tube Current (mA)
			Soft	73	14
		Woman	Hard	74	14
			Normal	73	14
			Soft	72	14
		Child	Hard	68	12
			Normal	67	12
			Soft	66	12

- *Recommended exposure condition can be different from the values applied to the equipment.*

2.1.4. Sample Images

Item	Images
PANO Examination	 **<High Resolution/ Standard>**

2.2. CEPH Mode

2.2.1. Scan Time / Exposure Time

Examination Mode	High Resolution		Green	
	Scan Time (s)	Exposure Time (s)	Scan Time (s)	Exposure Time (s)
Lateral	3.9	3.9	1.9	1.9
Full Lateral	5.4	5.4	3.9	3.9
PA	4.9	4.9	2.4	2.4
SMV	4.9	4.9	2.4	2.4
Waters' view	4.9	4.9	2.4	2.4
Carpus	4.9	4.9	2.4	2.4

- *Scan Time: The actual time that the equipment shoots the patient except for the initial acceleration and late deceleration stages.*
- *Exposure Time: The actual time that the patient is exposed to the X-ray emission.*

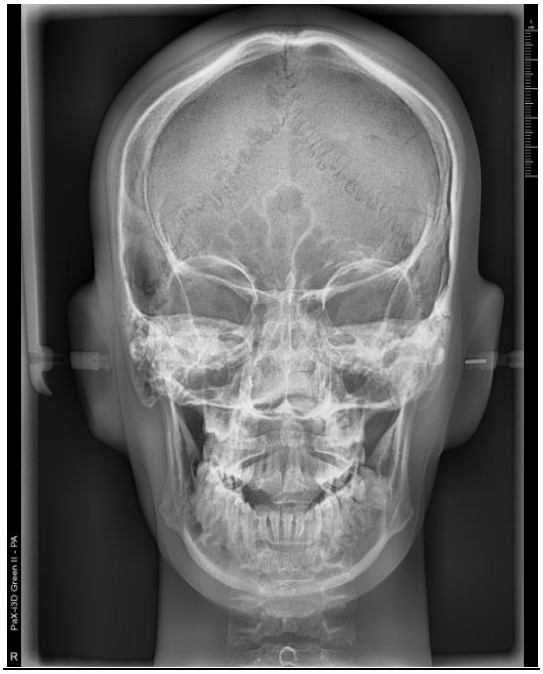
2.2.2. Exposure Condition

Examination Mode	Gender / Age group	X-ray Intensity	Tube Voltage (kVp)	Tube Current (mA)
Lateral (High Resolution)	Man	Hard	92	15.0
		Normal	90	15.0
		Soft	88	15.0
	Woman	Hard	90	15.0
		Normal	88	15.0
		Soft	86	15.0
	Child	Hard	88	15.0
		Normal	86	15.0
		Soft	84	15.0
Lateral (Green)	Man	Hard	92	16.0
		Normal	90	16.0
		Soft	88	16.0
	Woman	Hard	90	16.0
		Normal	88	16.0
		Soft	86	16.0
	Child	Hard	88	16.0
		Normal	86	16.0
		Soft	84	16.0
Full Lateral (High Resolution / Green)	Man	Hard	92	14.0
		Normal	90	14.0
		Soft	88	14.0
	Woman	Hard	90	14.0
		Normal	88	14.0

Examination Mode	Gender / Age group	X-ray Intensity	Tube Voltage (kVp)	Tube Current (mA)
PA SMV Waters' view (High Resolution)	Child	Soft	86	14.0
		Hard	88	14.0
		Normal	86	14.0
		Soft	84	14.0
	Man	Hard	92	14.0
		Normal	90	14.0
		Soft	88	14.0
	Woman	Hard	90	14.0
		Normal	88	14.0
		Soft	86	14.0
	Child	Hard	88	14.0
		Normal	86	14.0
		Soft	84	14.0
PA SMV Waters' view (Green)	Man	Hard	92	15.0
		Normal	90	15.0
		Soft	88	15.0
	Woman	Hard	90	15.0
		Normal	88	15.0
		Soft	86	15.0
	Child	Hard	88	15.0
		Normal	86	15.0
		Soft	84	15.0
Carpus (High Resolution / Green)	Man	Hard	90	6.0
		Normal	88	6.0
		Soft	86	6.0
	Woman	Hard	88	6.0
		Normal	86	6.0
		Soft	84	6.0
	Child	Hard	86	6.0
		Normal	84	6.0
		Soft	82	6.0

- *Recommended exposure condition can be different from the values applied to the equipment.*

2.2.3. Sample Images

Item	Images
Lateral	 **<Green>**
PA	 **<Green>**

2.3. CBCT Mode

2.3.1. Exposure Area

FOV (cm)	Vertical Position	Horizontal Position		
		Right	Center	Left
18x10	Occlusion	X	O	X
13x10	Occlusion	X	O	X
	TMJ	O	X	O
	Airway	X	O	X
8x9	Occlusion	O	O	O
	TMJ	O	X	O
5x5	Maxilla / Mandible	Right Molar / Right / Incisor / Left / Left Molar		

2.3.2. Scan Time / Exposure Time

FOV (cm)	Scan Time (s) (High Resolution / Green)	Exposure Time (s) (High Resolution / Green)
18x10	9.0	9.0
13x10	9.0	9.0
8x9	4.9	4.9
5x5	4.9	4.9

- *Scan Time: The actual time that the equipment shoots the patient except for the initial acceleration and late deceleration stages.*
- *Exposure Time: The actual time that the patient is exposed to the X-ray emission.*

2.3.3. Exposure Condition

FOV (cm)	Image Quality	Gender / Age Group	X-ray Intensity	Tube Voltage (kVp)	Tube Current (mA)
18x10 / 13x10	High Resolution	Man	Hard	95	8.0
			Normal	94	8.0
			Soft	93	8.0
		Woman	Hard	95	7.7
			Normal	94	7.7
			Soft	93	7.7
		Child	Hard	95	7.4
			Normal	94	7.4
			Soft	93	7.4
	Green	Man	Hard	88	6.1
			Normal	87	6.1
			Soft	86	6.1
		Woman	Hard	88	5.8
			Normal	87	5.8

FOV (cm)	Image Quality	Gender / Age Group	X-ray Intensity	Tube Voltage (kVp)	Tube Current (mA)
8x9 / 5x5	High Resolution	Child	Soft	86	5.8
			Hard	88	5.5
			Normal	87	5.5
			Soft	86	5.5
		Man	Hard	95	8.0
			Normal	94	8.0
			Soft	93	8.0
		Woman	Hard	95	7.7
			Normal	94	7.7
			Soft	93	7.7
		Child	Hard	95	7.4
			Normal	94	7.4
			Soft	93	7.4
	Green	Man	Hard	88	6.1
			Normal	87	6.1
			Soft	86	6.1
		Woman	Hard	88	5.8
			Normal	87	5.8
			Soft	86	5.8
		Child	Hard	88	5.5
			Normal	87	5.5
			Soft	86	5.5

- *Recommended exposure condition can be different from the values applied to the equipment.*

2.3.4. Reconstruction Time / File Size

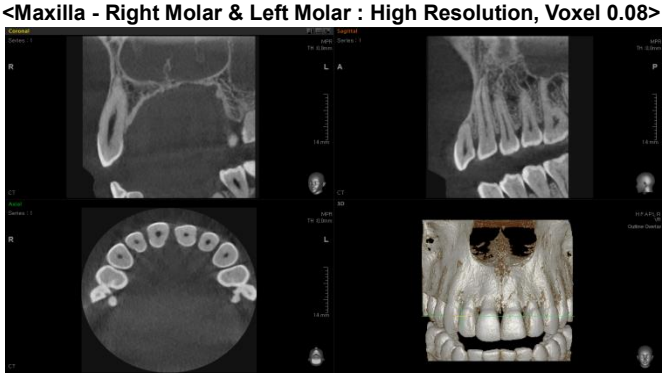
FOV(cm)	Voxel Size (mm)	Reconstruction Time (s)	File Size (MB)
18x10	0.2	320	779
	0.3	144	228
13x10	0.2	170	410
	0.3	101	122
8x9	0.12	220	635
	0.2	76	138
5x5	0.08	141	478
	0.12	51	411

- *The above data is obtained from a computer system which is based on HP Workstation Z440 and NVIDIA Geforce GTX1060 D5 6GB*

- *Image reconstruction time varies depending on computer specifications and/or working conditions.*

2.3.5. Sample Images

FOV (cm)	Images
18x10	 **<High Resolution, Voxel 0.2>**
13x10	 **<High Resolution, Voxel 0.2>**
8x9	 **< High Resolution , Voxel 0.12>**

FOV (cm)	Images
5x5	 <Maxilla - Right Molar & Left Molar : High Resolution, Voxel 0.08>  <Maxilla - Incisor : High Resolution, Voxel 0.08>  <Maxilla – Right & Left : High Resolution, Voxel 0.08>

2.4. 3D MODEL Scan Mode

2.4.1. Exposure Area

FOV (cm)	MODEL Type	Horizontal Position		
		Right	Center	Left
8x9	Upper (Maxilla)	X	O	X
	Lower (Mandible)	X	O	X

2.4.2. Scan Time / Exposure Time

FOV (cm)	Scan Time (s)	Exposure Time (s)
8x9	9.0	9.0

- *Scan Time: The actual time that the equipment shoots the patient except for the initial acceleration and late deceleration stages.*
- *Exposure Time: The actual time that the patient is exposed to the X-ray emission.*

2.4.3. Exposure Condition

FOV (cm)	Gender / Age Group	X-ray Intensity	Tube Voltage (kVp)	Tube Current (mA)
8x9	Man / Woman / Child	Hard / Normal / Soft	95	8.0

- *Recommended exposure condition can be different from the values applied to the equipment*

2.4.4. Reconstruction Time / File Size

FOV(cm)	Voxel Size (mm)	Reconstruction Time (s)	File Size (MB)
8x9	0.12	314	706

- *The above data is obtained from a computer system which is based on HP Workstation Z440 and NVIDIA Geforce GTX1060 D5 6GB*
- *Image reconstruction time varies depending on computer specifications and/or working conditions.*

The 3D MODEL Scan modality is not available for EasyDent / Ez3D Plus users.

3. PC Specification (Recommended)

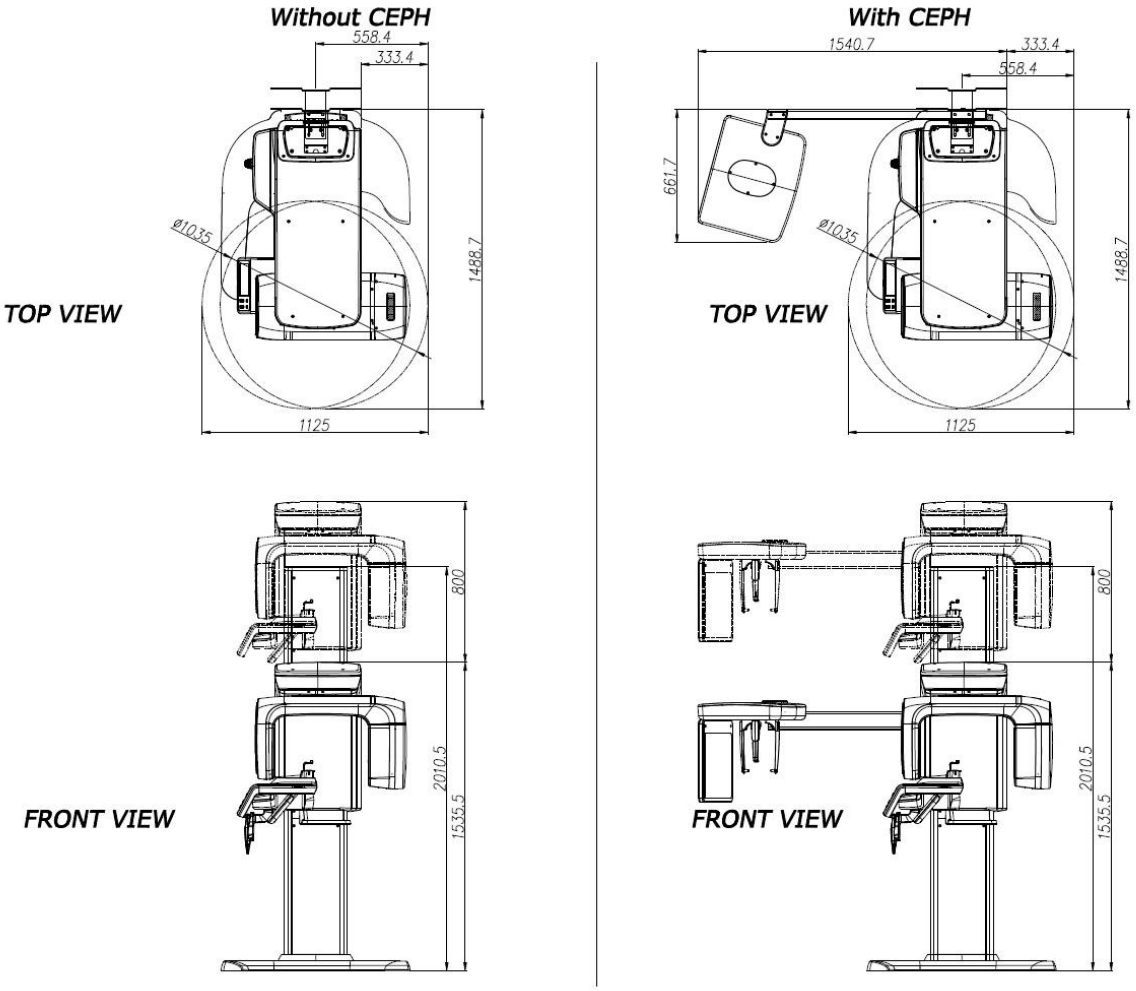
Item	Specification
CPU	Intel Xeon E5-1620v3 3.5GHz 2133 4C
RAM	16GB DDR4-2133 Registered RAM or larger
Hard disk drive	1TB SATA 1st HDD
Graphic board	NVIDIA Geforce GTX1060 D5 6GB or greater
Ethernet interface	Integrated Intel I218LM PCIe GbE
Serial Port (RS232)	HP Serial Port Adapter kit
Power supply	≥ 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 Slot
CD/DVD drive	DVD-ROM, DVD+/-RW, Blu-Ray
Monitor	19” 1280x1024 screen resolution
Operating system	Windows 10
Recommended system	HP Z440

- *Recommended PC specification can be changed without prior notice.*

4. Mechanical Specification

4.1. Equipment Dimensions

[Unit: mm]



Item		Description
Weight	Without CEPH unit	134 kg (295.4 lbs. – without base)
		187 kg (412.3 lbs. – with base)
	With CEPH unit	159 kg (350.5 lbs. - without base)
		212 kg (467.4 lbs. - with base)
Total Height	Without base	Max. 2304 mm
	With base	Max. 2335.5mm
Dimensions during operation (Length x Width x Height)	Without CEPH unit	1488.7 mm (L) x 1125 mm (W) x 2304 mm (H) (without base)
		1488.7 mm (L) x1125 mm (W) x 2335.5 mm (H) (with base)
	With CEPH unit	1488.7 mm (L) x 1874.1 mm (W) x 2304 mm (H) (without base)
		1488.7 mm (L) x 1874.1 mm (W) x 2335.5 mm (H) (with base)
Rotating Unit Vertical Movement		Max. 800 mm

Item	Description
Installation type	Base Stand / Wall Mount (Default: Wall Mount type)
Packing Box Organization	Main Box, CEPH Box (Optional), Base Box (Optional)

4.2. Image Magnification

Mode	FDD (mm)	FOD (mm)	ODD (mm)	Magnification
PANO	600	477.7	122.3	1 : 1.25
CEPH	1745	1524	221	1 : 1.14
CBCT	600	428.6	171.4	1 : 1.4

** FDD : Focal Spot to Detector Distance*
** FOD : Focal Spot to Object Distance*
** ODD : Object to Detector Distance (ODD = FDD – FOD)*
** Magnification = FDD / FOD*

5. Technical Specification

5.1. X-ray Generator

Item			Description
Generator	Model		DG-07E22T2
	Rated output power		1.6 kW
	Inverter model name		INV-22
	Type		Inverter
	Normal/ Pulse	kVp	60 kV ~ 99 kV (1 kV increment)
		mA	4 mA ~ 16 mA mA increment for CBCT, 1 mA increment for PANO and CEPH)
	Cooling		Cooling Protect (Optional fan cooling ≥60℃)
	Total filtration		Min. 2.5 mm Al
	Default filtration		1.0 mm Al
	Added filtration		1.5 mm Al (Fixed) / PANO and CEPH mode 1.5 mm Al (Fixed) + 3.0 mm Al (Automatically added) / CBCT mode
Tube	Manufacturer		Toshiba
	Model		D-052SB (Stationary Anode type)
	Focal spot size		0.5 mm (IEC60336)
	Target Angle		5 degree
	Inherent Filtration		At least 0.8mm Al equivalent at 50kV
	X- ray Coverage		95 mm x380mm at SID 550mm
	Anode Heat Content		35 kJ
	Duty Cycle		1:60 or more (Exposure time : Interval time)

- **Test Condition**

Mode	Tube Voltage (kVp)	Tube Current (mA)	Exposure Time (s)
PANO	60 ~ 90	4 ~ 14	13.5
	60 ~ 90	4 ~ 14	11.5
	60 ~ 90	4 ~ 14	11.3
	60 ~ 90	4 ~ 14	11.1
	60 ~ 90	4 ~ 14	9.2
	60 ~ 90	4 ~ 14	7.7
	60 ~ 90	4 ~ 14	7.0
	60 ~ 90	4 ~ 14	6.8
	60 ~ 90	4 ~ 14	6.7
	60 ~ 90	4 ~ 14	6.1
	60 ~ 90	4 ~ 14	5.8
	60 ~ 90	4 ~ 14	5.7
	60 ~ 90	4 ~ 14	5.2
	60 ~ 90	4 ~ 14	5.0
	60 ~ 90	4 ~ 14	3.7
	60 ~ 90	4 ~ 14	3.5
	60 ~ 90	4 ~ 14	3.3
	60 ~ 90	4 ~ 14	2.8
	60 ~ 90	4 ~ 14	1.4
CEPH	60 ~ 99	4 ~ 16	1.9
	60 ~ 99	4 ~ 15	2.4
	60 ~ 99	4 ~ 15	3.9
	60 ~ 99	4 ~ 14	4.9
	60 ~ 99	4 ~ 14	5.4
CBCT	60 ~ 99	4 ~ 12	9.0
	60 ~ 99	4 ~ 12	4.9

5.2. Detector Specifications

Item	Descriptions	
	PANO &CBCT	**CEPH**
Model	Xmaru1515CF	Xmaru2602CF
Detector Type	CMOS photodiode array	
Pixel Size	198 μm @ 4X4 binning (49.5 μm @ no binning)	200 μm @ 2x2 binning (100 μm @ no binning)
Active Area	CBCT - 155.2 mm X 145.7 mm PANO - 5.9 mm X 135.8 mm	15.6 mm x 259 mm
Frame Rate	~95 Hz @ 4X4 binning	~330 Hz @ 2x2 binning
Analogue-Digital Conversion	14 bits	
Operating Condition	10 ~ 35 ℃ (Temperature) 10~75 % (Humidity)	
Storage Condition	-10 ~ 60 ℃ (Temperature) 10 ~ 75 % (Humidity)	
Sensor Size	188mm (L) x 247mm (W) x 32.5mm (H)	110 mm (L) x 279 mm (W) x 20 mm (H)
Sensor Weight	1830 g	1050 g
Converter	CsI:Ti	
Energy Range	50 - 120 kVp	
Readout	Charge amplifier array	
Video Output	Optic	
MTF	52.3% @ 1 lp/mm 13.5 % @ 2.5 lp/mm	44.1 % @ 1 lp/mm 9.2% @ 2.5 lp/mm
DQE	66.5 % @ ~ 0 lp/mm	80.5 % @ ~ 0 lp/mm
Dynamic Range	81.2dB	71.5 dB

6. Electrical Specifications

Item	Descriptions
Power supply voltage	100 - 240 V ~
Frequency	50/60 Hz
Power rating	2.0 kV
Accuracy	kVp ± 10 %, Ma ± 20 %, sec ± (5 % + 50 ms)

- *The input line voltage depends on the local electrical distribution system.*
- *Allowable input voltage fluctuation requirement : ±10%*

7. Environmental Specification

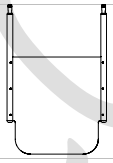
Item		Descriptions
During Operation	Temperature	10 ~ 35 ℃
	Relative humidity	30 ~ 75 %
	Atmospheric pressure	860 ~ 1060 hPa
During Transport and Storage	Temperature	-10 ~ 60 ℃
	Relative humidity	10 ~ 75 %
	Atmospheric pressure	860 ~ 1060 hPa

8. Software Information

Item	Model name	Interworking	Version for domestic market	Version for overseas market
Console Program	VCaptureSW	O	1.0.0.2	1.0.0.2
LCD Program	LCDSW	O	1.0.0.2	1.0.0.2
2D Viewer / Patient information management Program	Easydent	O	4.5.2	4.1.5
	EzDent-i	O	2.2	2.2
3D Viewer	Ez3D-i	O	4.3	4.3
	Ez3D Plus	O	1.2.6.	1.2.6.

- *SDK method has been applied for 3rd party programs.*

9. Enclosed Components

Components	Name and Function	Materials
	Normal Bite : For PANO and CBCT normal patients	PC (Polycarbonate)
	Special Bite A : For PANO TMJ and Sinus modes& For CBCT TMJ patients	PC (Polycarbonate)
	Special Bite B : For PANO edentulous patients	PC (Polycarbonate)
	Normal Chinrest : For Normal Bite	ABS (Acrylonitrile butadiene styrene) copolymer
	Special Chinrest : For Special Bite A & Special Bite B	ABS (Acrylonitrile butadiene styrene) copolymer
	Temple Supports (1 set)	PC (Polycarbonate)
	Ear Rods (1 set)	Silicone
	Nasal Positioner Cover : For CEPH	Silicone
	Carpus Plate	PC (Polycarbonate)
	Sanitary Vinyl Covers (disposable) for the Bite	LDPE (Low-density polyethylene)
	Protractor (1 set) : For positioning the patient's body in CEPH mode.	PC (Polycarbonate)
	Model Scan Jig	ABS (Acrylonitrile butadiene styrene) copolymer

10. Standards and Regulations

10.1. Standards

Green 18 is designed and developed to comply with the following international standards and regulations.

- IEC 60601-1, IEC/EN 60601-1-2, IEC 60601-1-3, IEC 60601-1-6, IEC 60601-2-63
- CAN/CSA-C22.2 No. 60601-1:14, CAN/CSA-C22.2 No. 60601-1-3:09, CAN/CSA-C22.2 No. 60601-1-6:11, CAN/CSA-C22.2 No. 60601-2-63:15, CAN/CSA-IEC 62366:15
- ANSI/AAMI ES60601-1:2005 / (R)2012, AND A1:2012, A2:2010 / (R)2012 (Consolidated text - edition 3.1)
- 21 CFR 1020.30, 31, 33
- NEMA Standard publication PS 3.1-3.18, 2008

CE 2460	This is Class IIb equipment and obtained CE marking in April, 2007 for regulations compliance in accordance with the revised European Union's MDD (Medical Devices Directive) 93/42 EEC.
C SA US 266436	This equipment received the CSA certification mark in accordance with CAN/CSA C22.2 No.601.1 regulations.

10.2. Classifications (IEC 60601-1 6.1)

- Degree of protection against water ingress: Ordinary Equipment: IPX0
- Degree of protection against electric shock: Class 1 equipment, Type B Applied Parts: Temple Supports, Chinrests and Bites.

11. Additional Information

For further information for Green18, please contact us at:

VATECH Co., Ltd.

Tel: +82-1588-9510

Website: www.vatech.co.kr

Headquarters: 13, Samsung 1-ro 2-gil, Hwaseong-si, Gyeonggi-do, 18449, Korea

Factory: 13, Samsung 1-ro 2-gil, Hwaseong-si, Gyeonggi-do, 18449, Korea

※ Due to a constant technological improvement, the contents of this Product Data may not contain the most updated information, subjecting to change without prior notice to the persons concerned.