

# HDS-500 Digital Imaging Plate Scanner User Manual



# Contents

1. Product Overview	I
1.1 Appearance	l
1.2 Unit Description	l
1.3 Classification, Parameters and Warnings of a Laser Product	2
1.4 Principles of Image Processing	3
1.5 Intended Use	3
1.6 Scope of application	3
2. Safety Instruction	ł
2.1 Product Safety Classification	1
2.2 Symbols Description	1
2.3 Warnings and Precautions	5
2.3.1 Cautions	5
2.3.2 Warnings	3
2.4 Work Environment	7
2.4.1 Operating Conditions	7
2.4.2 Transportation and Storage Conditions	7
2.5 Label and Laser Label Position	7
3. Specifications	7
3.1 Scanner Specifications	7
3.2 Computer Configuration Requirements	3
3.3 Network Security	)
3.4 Exposure Requirements of Dental X-ray Generator10	)
4. Software Installation Instructions10	)
<ul> <li>4.1 Driver Installation</li></ul>	
4.2 Software instanation	
4.3.1 Dentist Software Registry13	
4.3.2 Server Registry	
5 Software Operation	
6. Digital Imaging Plate Scanner Operation Guidelines	

	6.1	Working Sketch Map	26
	6.2	Scanner Operation Guidelines	27
7.	Clea	ning and Disinfection	29
8.	Care	e and Maintenance	29
	8.1	Scanner Care and Maintenance	29
	8.2	Damaged or Nonfunctional Scanner	30
9.	Trou	ıbleshooting	30
	9.1	Faulty Image	30
	9.2	Fault State Information	31
10	). Wa	rranty	32
		oduct Components	
Α	nnex	A. EMC table	.33

### 1. Product Overview

This product consists of imaging plate scan unit, power adapter, USB cable and HandyDentist dental image management software.

The unit should work with a imaging plate (IP is equipped by the user own self, not be provided together with the product). When the IP is exposed to X-rays, the phosphor layer in the plate stores the image. As the IP being read by the scanner, a focused laser releases the stored image in the form of visible light photons. These photons are collected and amplified by the scanner, converted to a digital signal and then transferred to a computer for processing and display.

The unit is powered by power adapter, instead of batteries or any charging system.

The computer and other external devices(like monitor, printer, etc.) that work with this product are equipped by the user own self. For the suggested computer configuration, please refer to '3.2 Computer Configuration Requirements'.

#### 1.1 Appearance



#### 1.2 Unit Description

The unit is used to read out the latent image on the IP by stimulating it with a laser beam, to collect information and convert into digital data, and then transferred to a computer for processing and display.

LED indicator light				A
Imaging Plate Tray	Power switch	•	Power port	$\langle \rangle$
			USB port	

Name	Description
Touch Button	Open/Close the door
LED indicator light	Status of be powered and work mode
IP tray	Hold the imaging plate
Power switch	Main switch of the unit
Power port	DC12V power port
USB port	USB data transmission port

#### 1.3 Classification, Parameters and Warnings of a Laser Product

The unit is a class I laser product.

Items	Value	
wavelength	660nm	
Horizontal irradiation angle	38°	
Vertical irradiation angle	45°	
Laser type	Continuous CW	
Maximum output power	<40mW	
Maximum allowable averaging	cornea 10 w/m <sup>2</sup> (duration time 10 <sup>3</sup> ~3×10 <sup>4</sup> )	
Maximum allowable exposure	skin 2000 w/m <sup>2</sup> (duration time 10 <sup>3</sup> ~3×10 <sup>4</sup> )	

# Warning A:

- This product is defined as class I laser product during normal use.
- Keep your eyes away from closely look inside the plate tray during normal use.
- When disassembled, the unit is a class III B laser product. Do not take the unit apart by non-professionals around, contact your dealer or the manufacturer to carry out repair of the unit.

1	Stimulated by red light on sensitive side	
2	Emit blue light from the plate to release the stored X-ray info	
3	The emitted blue light perform optical collection pixel by pixel (light by light), and measured with an extremely sensitive light detector	
4	A digital image is formed according to the changes of measured optical density	Y2016CF46

#### 1.4 Principles of Image Processing

#### 1.5 Intended Use

Work with dental X-ray generator, to achieve the purpose of digital image viewing / saving / transferring.

#### **1.6 Scope of application**

Used to read latent image information saved on imaging plate and then convert to digital image, for viewing / saving / transferring.

# 2. Safety Instruction

This chapter provides important safety information for the use of digital imaging plate scanner.

#### 2.1 Product Safety Classification

Tpye of Protection Against Electric Shock: Class II
Degree of Protection Against Electric Shock: Type B
Laser Safety Classification: Class I laser products GB7247.1-2012
Operation Mode: Continuous Operation
Waterproofing Grade:IPX0
Rated Voltage:AC220V/50Hz
Working Voltage:DC12V 1A
Input Power:12W
Non-AP type equipment: Non-APG type equipment
No application for protection against defibrillation discharge effect
Non-permanent installation equipment

#### 2.2 Symbols Description

Symbol	Description
$\triangle$	Caution, refer to accompanying documentation
[]i	Refer to the user manual
2	Do not reuse
	Class II Device
$\checkmark$	Laser radiation
SN	Manufacturer serial number
_	Fragile
Ţ	Contests of the transport package are fragile Therefore it shall be handled with care
tt	This way up
<u> </u>	Indicates correct upright position of the transport package.
*	Keep away from rain
J	Transport package shall be kept away from rain.
<b>A</b>	Antiroll
X	Temperature limit
<u>(%)</u>	Humidity limit
<b>6.6</b>	Air pressure limit
	Manufacturer
	Name and address of the manufacturer

#### 2.3 Warnings and Precautions

#### 2.3.1 Cautions

- Check whether the scanner surface is with visible physical damage before each usage, the surface should be smooth, without any crack or damage. Please contact our after-sales team once any damage occurred
- As with other electronic equipment, the scanner is susceptible to electrostatic discharge (ESD), particularly when the device is used in or around carpeted areas or low humidity environments. During cable moved, when scanner contacts are exposed, it is especially important to protect the device from potential ESD damage. Touching a metal surface prior to moving the cable will reduce the risk of components damage caused by accidental static discharge. The use of anti-static floor mats or floor treatments will also help eliminate static build-up in your office.
- When the scanner is in use, avoid touching exposed connectors on non-medical electrical equipment (like computer peripherals) and the patient at the same time. The human body is capable of conducting electrical current and may cause a shock hazard to patients if appropriate safety practices are not observed.
- The scanner has been determined to be in accordance with international safety standards and is deemed suitable for use within 5ft (1.5m) away from the patient. To comply with these standards, do not operate non-standard equipment within the patient area. Within the patient area, the presence of approved medical grade equipment and Listed / Approved / GB9706.1(IEC60601-1), YY0505(IEC60601-1-2) certified computer equipment is acceptable. Outside the patient area, the presence of approved non-medical grade equipment and Listed / Approved / GB4943(IEC60950) certified computer equipment is acceptable. The whole medical electrical system should compliant with medical system requirements GB9706.15(IEC60601-1-2). The person connect the product to the host computer shall ensure its compliance. Also, to keep optimal performance, ensure that all software programs residing on the workstation are virus-free and have been adequately tested so they will not impact imaging applications after installation
- If the power cable of the system is lost or damaged, please use the one specified by our company and compliance with local standards.
- Portable and mobile radio frequency communication equipment may affect medical electrical equipment performance.
- To avoid damaging the product and degrading the image quality, please don't use it in the following environments:

1	Environment with direct sunlight and strong lamp light
2	Environment with drastic temperature changes
3	Environment with full of dusty
4	Near the heat source
5	High Humidity environment

#### 2.3.2 Warnings

- Non-following the user manual probably endanger the patient. The manufacture of the product bear no compensation liability for any damage caused by improper operation.
- Only installers authorized by the manufacturer are allowed to install this product. Do not turn on the power supply until all cables are correctly installed and confirmed.
- The product must be used by a trained personnel in accordance with the user manual carefully.
- The unit is a class I laser product. Non-following the user manual may result in hazardous laser radiation exposure or other accidents.
- No waterproofing on this product. Do not position the product where it could be splashed with liquids.
- Power off at once when malfunction occurred, and contact us or the authorized dealer.
- Do not move or knock the device while in working state.
- This product is not used for treatment, all images are for doctor's reference only.
- Only professional technician / trained staff can operate this product.
- Only the manufacturer's authorized service personnel are authorized to carry out maintenance and repair of the unit.
- Use with caution in epilepsy / psychosis patients and children.
- Do not work with or approach toward other equipment. If must to work with or approach toward other equipment, please observe and verify that it can work normally under the existing configuration.
- All connecting cables of the product are sold as spare parts. The use of unspecified cables may result in an increase in the x-ray emission or a reduction in the disturbance immunity of this product.
- Portable and mobile radio frequency communication equipment probably impact the use of this product. Do not cross the recommended isolation distance to close to any part of the product.

#### 2.4 Work Environment

#### 2.4.1 Operating Conditions

Environment Temperature	<b>10℃~40℃</b>
Relative Humidity	30%~75%
Air Pressure	700hPa $\sim$ 1060hPa

#### 2.4.2 Transportation and Storage Conditions

Environment Temperature	<b>-20</b> °C∼ <b>+55</b> °C
Relative humidity	10%~90%
Air pressure	700hPa $\sim$ 1060hPa

#### 2.5 Label and Laser Label Position



# 3. Specifications

#### 3.1 Scanner Specifications

Product Name	Digital Imaging Plate Scanner
Model	
Rated voltage	AC220V/50Hz
Working voltage	DC12V
Working current	≤1.0A
Power	≤12W

consumption	
Pixel size	35um
Bit depth	14 位
Resolution	≥7lp/mm
Connection	USB port
Firmware version	1.00 or higher
Software	HandyDentist Dental Image Management software
Software version	3

#### 3.2 Computer Configuration Requirements

Note	: Suggested minimum configuration for the computer, it's equipped by the user own
self.	

Table of Minimum Computer Configuration Requirements:

Items	Minimum Requirements
PC processor	Intel 1.5GHz chip or above
Memory	Above 4G
Hard disk	Above 40G (1GB for software installation,40GB for software operation)
Video card	32M or above
Display	Resolution 1024 × 768 (15") or above 32-bit color mode
USB	At least 2 available USB2.0/USB3.0 ports (If used desktop computer, 2 available USB ports must be have at the back of computer)
Operating System	Win7/Win10 (32bit&64bit)
Backup Medium	USB flash drive / Mobile disk (using mobile disk to avoid loss of patient data, some case like PC disk is corrupt/full, PC is attacked by virus,etc.)

Note /!

Λ

- Computers and external devices (like monitors/printers, etc.) must meet the GB4943 (or IEC60950) standard and approved with 3C (or CE).
- The computer and other external devices (like monitor, printer, etc.) are equipped by the user own self.
- The requirement form above is the suggested minimum configuration for the

computer, and the product performance might be affected if those above are not reached.

- Prohibit the use of computer non-comply with GB4943(or IEC60950), like some kind of unauthorized assembly computer may incur potential safety hazards.
- Prohibit the use of computer unapproved with 3C(or CE).

#### 3.3 Network Security

Enable to link several computers via LAN to have the database sharing.

- Connect the computer to the local area network (Router/Switch) with an ethernet cable.
- Consult a network administrator to set up a LAN if needed.
- The computer can automatically obtain an IP address (DHCP) or set it manually (static IP).

Note

- Select one computer as a database server carrier.
- Make sure HandyDentist software is installed on all computers.
- Keep the Server installed computer always running, when sub-computer is in use.

Network requirements	
Network connection setting	Ethernet TCP/IP protocol
Security coffwore	Anti-virus software
Security software	Firewall
^	



When used multiple users version, images will unable to be saved to the Server if disconnect from the net during transferring. In this case, repair the network, when the network back to normal, re-transmit.

#### 3.4 Exposure Requirements of Dental X-ray Generator

# Note : Dental X-ray generator is equipped by the user own self.

As with traditional radiology equipment, the exposure time depends on the performance of the generator, the shape of the patient and the tooth being irradiated. The recommended exposure time of x-ray generator for reference under the value of 70kV/7mA showed in below table. Reset a special value according to your practical experience to make the radiograph more clear.

Tooth Position	Recommended Exposure Time(Unit:s)
Upper	0.18
incisor/canine	
Upper premolar	0.24
Upper molar	0.35~0.45
Lower	0.12
incisor/canine	
Lower premolar	0.18
Lower molar	0.25

Note /!\

- Dental X-ray generator tube voltage range should be: 60~70kV.
- The X-ray generator is with DC power supply, if it with AC power supply, please increase the exposure time by 10~30%.

## 4. Software Installation Instructions

#### 4.1 Driver Installation

We provide a USB flash drive together with the scanner in package. Open the 'Driver folder' on the USB flash drive, double click the file named 'HDS Scanner Driver 2.x.x.(xxxxxxxxx)' to complete the installation by following install-shield wizard. (The

Driver name might change with update version, please refer to the actual using name)

#### 4.2 Software Installation

#### 4.2.1 Single user version

Open Software folder on USB drive, double click the file "HandyDentist\_3.xx.xx(xxxxxxxx)" to launch the installer. (The Software name might change with update version, please refer to the actual using name)

elect Components	
Which components should be installed?	
Select the components you want to install; dea install. Click Next when you are ready to contin	
Custom Instal	<u> </u>
🖂 client	30.4 M
server	2.2 M
Current selection requires at least 31.5 MB of d	lisk space.

1. Choose the 'client' option, click 'Next'

Select Se	tup Language	$\times$
i P	Select the language to use during the installation:	
	English	~
	OK Cano	el

2. Chose your language, click ' OK'

3. Select the installation path you want: default path is 'D:\HandyDentist', or change it by click 'Browse' button



4. Click 'Next', and then complete the installation by following install-shield wizard.

#### 4.2.2 Multiple users version

To satisfy the needs of data sharing among several computers run under the same LAN, a Server program is required to be installed in one of them. (Note: Server program needs to be purchased separately, please consult your sales if needed)

#### Server installation:



1. Choose the 'server' option at the step of 4.2.1

6

2. Click 'Next', and then complete the installation by following install-shield wizard.



Double click the icon to run the program, work window is as below:

3. Reset the 'Database connect' in each HandyDentist Software on each computer:
Click 'Tools' - 'Options' - 'Databases' to open the setting window.
(Note: For HandyDentist Software operation, please check Chapter 5)

w Tools Or O	THelp(H) ptions(O)		
			US R 1 2 3 32 31 30
Options     General	Connect Col Database @ Renote Database		×
3	🔘 Server Hostname	XieJiang-PC	
Display	Server IP:	192 . 168 . 1 . 19	
Database	Server Port:	7781	
Template Dicom	Inage Cache Clear Now		
			OK Cancel

Fill in the correct Server Host Name or Server IP, the same as be showed in Server program work window (Host: Xiejiang-PC; IP:192.168.1.19)

#### 4.3 Registry & Activation

All copyright, trademark, patent, trade secret and other intellectual property rights of the software are protected by the P.R.China laws and rules, as well as the corresponding international treaties. It's restricted to use as any other form without permission, otherwise he will be investigated for legal responsibility according to law. To protect your legitimate rights and interests, please activate the software as required.

#### 4.3.1 HandyDentist Software Registry

(Note: For HandyDentist Software operation, please check Chapter 5)

After 30 days since the date of software installed, the trial version will be locked, and ask for an activation code, as well the registration window will be showed automatically for your side to proceed with register. (To avoid software be locked, please activate in advance by following the instructions)

If the registration window disappear, please follow the below steps:

1) Run the software, click Help(H) button in menu bar, and select Register(R)

2) Fill in the blank of the user information: Company/Email/Address/Phone, in which the Company and Email information is required;

Register				×
	чпря			
Send the regi	istration information to s	proper information which w software supplier to acquire r re been registered.\n(*) are	egistration key. You'll	tware.
Company:	l			*
Email:				*
Address:				
Phone:				
	Generate QR	Export req file	Email Send	
Active Key:	2 4	9 6 — 1	D 3 3	*

3) Click Export req file... button after the user information is be finished, save it on your computer desktop, a file suffixed with '.req' will be generated, then send this request file to your local distributor or directly to our after-sales support: support@handycreate.com;.

Handy Medical-HandyDentist.req

4) We will reply you an activation file suffixed with '.act', to activate your software by import this file into registration window directly (No need to open this file);

Handy Medical-HandyDentist.act

5) Click Import act file.. button to import the activation file you received;

6) Successful registration information will appear to remind you your software has been activated;



#### 4.3.2 HandyServer Registry

Double click the icon to run the program

Han	dyServer				_		>
ost:	DESKTOP-V 192.168.56.	9UV9V4 I,192.168.4.122			No acti	3.20.01(2 ve. click-to	
Data Stop	base Server		7781	File server Stop			816
Ш	andyServe	Ê					>
) Ha	andyServe	r					>
	andyServe	r					>
	npany:	r					>
Con Ema	npany:	r					>
Con Ema Add	npany: ail: dress:	r					>
Con Ema	npany: ail: dress:	r					
Con Ema Add	npany: ail: dress:	r		Generate QR	Export	t req file	
Con Ema Add Pho	npany: ail: dress:	r		Generate QR	Export	: req file	> 

There is a 30days trial period, please activate your program within 30days by following the below steps:

1) Click No active, click-to-activate button;

2) Fill in the blank of the user information: Company/Email/Address/Phone,in which the Company and Email information is required;

3) Click Export req file... button after the user information is be finished, save it on your computer desktop, a file suffixed with 'HandyServer.req' will be generated, then send this request file to your local distributor or directly to our after-sales support: support@handycreate.com;

0651029944-HandyServer.req

4) We will reply you an activation file suffixed with '.act', to activate your software by import this file into registration window directly (No need to open this file);

0651029944-HandyServer.dat

5) Click Import act file.. button to import the activation file you received;

6) Successful registration information will appear to remind you your software has been activated;

HandyServe	r			×
Company:	Handy Medi	lyServer	×	
Email:	support@ha			
Address:	Bldg No.11,I	Activated!	i,Baoshan Dis	strict,
Phone:	86-21-56766			
		确定	Export req fil	e
Active Key:	1A2E6DB56E78E06B	41B83FFF995B1611		
0651029944	Activated!	Key Active	Import act fi	le

# 5 Software Operation

### 5.1 Login

Double click the icon ito run the software

Login				×
	Name:	Admin	~	
	Password:			
		Auto Login		



Password: NULL (no password by default, click 'Login' directly)

Hom	e screen	
	**** Instant for Trans, Manga 2/↓↑ 88 ⊙ Z2 ∰ 55 ᠿ _ @ @ ⊕ ⊕ ⊙ ₹ ⊜	- • ×
Bacart Hittory (1)	0020000000000000000000000000000000000	
	E MARTINE M	Reaching Control of Co
		1

Generate your password or correct the name in the setting window (click the 'Menu bar' - 'Tools' - 'Options' - 'General').

User Access Control:

Admin	All menu function be available		
Guest	Access Denied:		
	<ul> <li>Tool —— Option - Database</li> </ul>		
	● Help —— Registry		
	Basic Operation — Delete Patient		
	● Image Processing — — Delete		
	Images		

### 5.2 Functions Introducing



Home Screen	Functions
1. Title Bar	Remind of unregistered or be registered state
2. Menu Bar	All operation functions included
3. Tool Bar	Visible operation button
4. Teeth Location	Display the teeth location
5. Case List	Display recent history
6. Target Frame	Display teeth images when the patient be selected
7. Image Information	Information for a single image

Main Menu	Functions		Icon	Description		
	New patient		$(\pm)$	Create a new patient or a new case		
	Delete patient			$\bigcirc$	Delete a patient or a case	
Basic Operation	Searc	ch patient		Q	Search a patient	
S	Edit p	Edit patient			Edit patient name or patient No.	
	Refre	Refresh image			Refresh the cases shared by net	
	Tile			88	Press and hold down "Ctrl" key, left-click to select several pictures at the same time (the maximum quantity is 6), then release "Ctrl" key, click this icon to pave together	
	Play			$\bigcirc$	All images will be played one by one in a loop	
	Edit Image				Edit images as required	
		Edit	Reload	C	Click to bring back original image	
			Undo	•	Click to withdraw the previous operation	
Image			Redo	*	Click to repeat previous operation	
Operation s			Partition		Click to choose the display mode you want,drag a image from left list into black square for comparison	
	Edit		Relocation	C	Click to rotate image	
			Magnifier		Q	Click to zoom up part of the image
			Draw	J	Click to mark the image	
			Scale	1	Click to do measurement	
			Save	H	Click to save the edited image	
		Functio n	Color Adjust	1	Move the slider to adjust color	

Main	Functions		Icon	Description	
Menu	T unctions	1		Description	
	Area	Bright/Contras t	1	Move the slider to adjust brightnes / contrast	
		Image Process	1	Smart contrast, Smart sharpen, Negative, Colorize, Embossment, Normalize, Denoise, Soft	
		Simulation Diagnosis	/	Saprodontia, Root canal, Periodontal, Crown, Diagnosis	
	Delete Image			Delete image	
	File import			Import an image	
	Export image		Ê	Export an image	
	Сору		/	Copy an image	
	Paste		/	Paste an image	
	Refresh image		$\square$	Refresh the images on the home page	
	Print Image			Print image	
	Open image path Pre-processing		/	Open the image location	
			/	Only apply to the class I product (Intraoral Camera)	
	Preset Image editor		/	Preset parameters for some algorithm in image editing	
	Intraoral Camera		<u>(</u>	Only apply to the class I product (Intraoral Camera)	
	Digital Dental	Calibration		Includes dark field calibration, flat field calibration, bad spot bad line repair	
Image Sources	Xray Imaging System	Advanced Settings		Pre-process the image	
	Digital Imaging Plate Scanner	Advanced Settings	[0]	Pre-process the image	
	(TWAIN)		W	Use with a device that supports the Twain protocol	

Main Menu	Function		Description	
	Tool bar		Show/Hide toolbar	
	Status bar		Show/Hide the status bar	
View	Show information		Show/Hide image information	
	Show Teeth location		Show/Hide tooth position	
	Reset view		Restore the default window layout	
	Options	General	General settings for user login,etc	
Tools		Display	Multilingual, name display, teeth location, print font	
		Database	Select single user or multiple users version	
		Template	Template of image annotation	
Holp	Registry		Software registration	
Help	About		About the software version info	

#### 5.3 Create new patient

Click the icon to create a new patient before image acquisition at the first time of visit.

not	he following item was selecte it will create new exam for the second s	d ,it will create a new the current patient .	v patient case ,if
Patient Info			
Last Name:			
First Name:			ОК
Patient ID:	20210613_093507	🔽 Auto	Cancel
Select Series			
E Contal		<u>^</u>	
	2		
	+ 1 p-FMX		
L			
Study Comment	t		

Fill in the patient name, select picture series you'd like, write study comment in the bottom side blank, and then click 'Ok' button to go back to home screen automatically, meanwhile the new patient will be displayed in 'Recent History' area with the state of being selected.

#### 5.4 Search patient



Patient ID/	Last Name/ First N	ame: handy			Search
Search on	Study Level	From: To:	2019/ 7/ 9 2019/ 7/ 9	•	Records:
.ast Name	First Name	Patient ID	Create Date	Comment	
Handy	汉缔	0001	2016-02-18 17:26:02		

Search for the registry patient by use his case No. or the name. An accurate searching is based on the exam date. Double click the target patient, searching window will be closed and go back to home screen automatically, the patient will be displayed in 'Recent History' area with the state of being selected.

#### 5.5 Image Acquisition

1. Directly click the icon for select 'Image Source'/ 'Intraoral Plate Scanner'/ 'HDS-500' in drop-down menu by right-click a null frame, to bring up the scanning window. On the second time use, simply double-click a null frame to quickly bring up.



Working box with green blinking means the scanner connection is normal and waiting for acquiring x-ray, at the same time its IP tray will be pop out.

HDS ID:119283711	×
开始扫描	
高级设置	
于位:	
言息	

Red color means an abnormal connection, the scanner is unable to be detected:

🕒 Intraoral Plate Scanner		×
Scan		
Advanced Settings		
Teeth Locaton:		
Information		
		Save

Click the 'Advanced Settings', show below:

Show Original Picts Save Original Picts			
Auto Contrast 🔇		>	0.0
Sensitometry <	i.	>	0.8
Contrast Pro		● Low ○ Medium	OHigh
Smart Sharpen		●Low ○ Medium	⊖High
Denoise Soft		Negative	
Radius 3		Threshold	6

The function is used to preset parameters for some algorithms in image editing.

Function	Description
Display the original	Display the original image and the preprocessed image at the same
image at the same time	time after exposure
Save the original image	Select this function when only the original picture is confirmed to be
by default	saved
Contrast	Adjust the image contrast, same as the contrast function in 'Image Edit'
Sonaitamatru	Correct the sensitometry value of the image, same as the brightness
Sensitometry	function in 'Image Edit'
Contrast Pro	Select 'Low', 'Medium' and 'High' for different levels of contrast
	enhancement
Smart Sharpen	Select 'Low', 'Medium' and 'High'for different levels of sharpen
Negative	Negative processing
Denoise	Image denoise processing
Soft	Soften the image
Radius	Set the radius for soft processing
Threshold	Set a threshold for soft processing

2. Taking an exposure (see 'Operation Guidelines' for the details)

3. Position the exposed imaging plate in the scanner tray, sensitive side face up, non-sensitive side face down. Click 'Scan' button to start scanning, the working box color turn to yellow. See below:

HDS ID:119283711	×
Scan	
Advanced Settings	
eeth Location:	
formation	
formation	

4. After scanning completed, the acquired image will appear on the right side, the IP tray will pop out automatically, and then pick up the imaging plate.

HDS ID:119283711		3
开始扫描	H	
高级设置		
牙位:	Lan	
信息		1
托盘正在移动	Y20180375	保存

5. Close the scanning window directly after complete image acquisition, the image will be loaded into corresponding image frame automatically.

Control Contro	/ ↓1 88 ⊙ 2 8 5 ± Amin (   A A A   A A A A Max (   A A A A   A A A A A	95 17 3 4 5 6 7 8 9 10 10 10 10 10 10 10 10 10 10 10 10 10	# Insent	
	Intraced Plate scarrow	1400		

Note A:

• Close the scanning window when not in use, the IP tray will be retracted automatically.

#### 5.6 Image Editing

Double click a image required to edit, or directly click the icon <sup>1</sup>, to bring up the edit window



Three parts of the image editing

- 1. Photo list: Display all the images required to edit.
- 2. Tool bar:
- Reload: Click to bring back original image.
- Undo: Click to withdraw the previous operation.
- Redo: Click to repeat previous operation.
- Partition: Click to choose the display mode you want, drag a image from left list into black square for comparison.
- Relocation: Click to rotate image.
- Magnifier: Click to zoom up part of the image.
- Draw: Click to mark the image.
- Scale: Click to do measurement.
- Save: Click to save a edited image.
- 3. Function Area
- Color Adjust: Move the slider to adjust color.
- Bright/Contrast: Move the slider to adjust brightnes / contrast
- Sensitometry: Correct the sensitometry value to adjust brightnes / contrast
- Image Process: Smart contrast, Smart sharpen, Negative, Colorize, Embossment, Normalize, Denoise, Soft
- Simulation Diagnosis: Saprodontia, Root canal, Periodontal, Crown, Diagnosis

- All the function buttons change the characteristics of the images instead of itself. The doctor must make a diagnosis based on the actual clinical situation.
- Since the X-ray image is a two-dimensional image of a three-dimensional object, the measurement results will have an error of ±0.1mm. This function is just as an assistant tool for doctor.

Backup and recovery the software: Copy the whole HandyDentist folder by manual to backup and recovery the software (default path: 'D:\HandyDentist').

# 6. Digital Imaging Plate Scanner Operation Guidelines

#### 6.1 Working Sketch Map



1	x-ray source
2	Tooth
3	Place the exposed imaging plate in the scanner tray
4	Scanning
5	Digital image transferred to computer via USB cable
6	Image acquisition in software

nner Operation Guidelines				
Decription	Picture			
Plug in the power, turn on power switch				
Connect the scanner to the computer via a USB cable				

#### 6.2 Sca

No.

1

2

4

3	Bring up the scanning window and make sure that the IP tray pop out	/
		6

Insert the IP (IP is not provided together with the unit, please purchase the approved IP separately) with the protective cover and disposable sheath into patient's mouth, like using a dental film.

Select appropriate exposure values 5

000 00 TOF







No.	Decription	Picture
6	Position the X-ray generator and then take shooting	
7	Peel off the disposable sheath and remove the protective plate	
8	Place the exposed IP in the scanner tray, and gently touch the button to close the door	
9	Click the 'Scan' button to start scanning	Company (and a set of the set of
10	Refer to section 5.5 and 5.6 for details of image acquisition	

 Do not position the scanner in directly sunlight or lamp light,etc. Avoid exposure to the UV-C

light.

- Do not position and use the scanner in dusty area.
- Do not use the scanner near the strong magnetic equipment.
- Do not operate with wet hands.

# 7. Cleaning and Disinfection

Do not keep immersing this product in any liquids, avoid disinfecting with liquids. Wipe the scanner surfaces with a little bit ethanol to do regularly clean, other disinfectants may cause damage to the scanner.

### 8. Care and Maintenance

As with all kinds of electronic equipment, this product requires not only proper operation, but also visual inspection and routine check at regular intervals. These precautions can ensure the product with accurate, safe and high-efficient running.

Before each usage, the operator should check for whether there is any physical damage or malfunction. Contact our after-sales team for more guidance if happened.

#### 8.1 Scanner Care and Maintenance

Position the scanner on a dry and well-ventilated place, avoid placing on a dusty and damp place. Check the below items prior each usage:

- The labels are with intact, readable, and adhere well on the surface.
- No damage on the unit cable.

- No damage on the product surface which could incur safely issue.
- The indicator lights and software both are in normal status after installed by following the user manual correctly.

#### 8.2 Damaged or Nonfunctional Scanner

Stop using and contact your local dealer immediately once the scanner occur visible physical damage or abnormal working state.

Do not disassemble the scanner to take repair without permission.

Please consult the manufacture for more technical information if needed.

## 9. Troubleshooting

#### 9.1 Faulty Image

Faulty image	Causes and Solution
White lines or ripples on the images	<ul> <li>Check whether the X-ray exposure conditions are met;</li> <li>Check whether the imaging plate is scratched;</li> <li>There may be dust inside, contact after-sales team for support.</li> </ul>
Images are too pale with grainy	<ul> <li>·Refer to section 3.4 'Suggested Exposure Time' to reset x-ray exposure values;</li> <li>·Under the chosen X-ray dose, generator is too far away from the patient, please position closer;</li> <li>·Check your monitor brightness/contrast setting, make sure there is no reflects light on the screen;</li> <li>·The X-ray generator tube voltage is too low, inspect the X-ray generator;</li> <li>· Remove dust on IP sensitive side.</li> </ul>
Images are too dark	·Excessive of exposure time, please decline exposure time;

Images are blurred	<ul> <li>The patient moved at the moment of x-ray exposure;</li> <li>X-ray generator work state is unstable;</li> <li>Increase the Contrast Pro value in scanning window</li> <li>Advanced Setting';</li> </ul>
Incomplete image	<ul> <li>Check whether the X-ray generator is completely aligned with the IP;</li> <li>Make sure the X-ray generator can generate X-rays;</li> <li>Restart the scanner by following the user manual;</li> </ul>

#### 9.2 Fault State Information

Fault	Causes and Solution		
Working box color is red instead of green blinking	<ul> <li>Correct image Source option 'Intraoral Plate Scanner'/ 'HDS-500';</li> <li>Check the connection state with the computer, make sure they are well connected;</li> <li>Re-install the Driver;</li> <li>Switch to the case back side USB port, make sure USB interface is 2.0 or above. If a laptop is used, please connect to power supply, avoid selecting energy saving mode which may result in USB port voltage unstable;</li> </ul>		
Working box turn to red color during scanning	<ul> <li>Check whether the USB connection is loose;</li> <li>Check whether the power adapter is connected or the main switch is turned on;</li> <li>Restart the scanner by following the user manual;</li> </ul>		
No images acquired after X-ray emission	<ul> <li>·Make sure the scanning windows is launched, normal working state with green blinking;</li> <li>·Make sure the X-ray generator faces to the sensitive side of IP;</li> <li>.Make sure the IP is not be exposed to strong light or UV-C;</li> <li>·Make sure the X-ray generator exposure values are correct;</li> <li>·Re-install the Driver and switch to the case back side USB port, make sure USB interface is 2.0 or above, and increase the exposure time appropriately;</li> </ul>		

Unable to open scanning window	·Close the antivirus program and reinstall the software;
The scanner makes an abnormal noise	·Check if the startup sequence is wrong; ·Restart the scanner by following the user manual;
Click the software, the scanner does not respond	·Check whether the power adapter is connected and the main switch is turned on; ·Restart the scanner by following the user manual;
Unable to use the software after 30 days trial, remind of registration	·Refer to section 4.3 Registry & Activation;

Note 4

- Try the above solutions if the same failure occurs.;
- Please contact our after-sales team for support on the condition of failure persists or even more serious.

# 10. Warranty

We guarantee that the product functions are correct and that there is no failure in raw materials and workmanship within 12 months starting from the release date. Please contact your local distributor in case of malfunction occurred, by according to the below condition:

We would responsible for free of the maintenance charge against the product's abnormal working state due to quality problem within 12 months start from the date of delivery.

If any of the following situation happened, maintenance charge would be attracted:

• Damage caused by improper operation / maintenance / storage against the instructions in

the manual or by user's carelessness;

- Damage caused by unauthorized disassembly;
- Damage caused by irresistible factors;
- The warranty period has expired;

Regarding a reasonable complain about the product failure or delivery, we would provide replacement or maintenance. We reserve the right to take repair, include some kind of natural or special damage, which is only under the compliance with legal provisions to avoid default/ malfeasance / wilful misconduct.

Please contact your local distributor for the maintenance executed by our company in case of malfunction occurred. Please do not disassemble the product without permission, and we will not be held responsible for any damage due to unauthorized disassemble by customer or a third-party.

If the scanner is operated under normal conditions, the expectant lifetime of the product is 5 years. Calculation method is as below:

The	number	of	the	usage	calculated based on an average of 10000 scans
scans			time		3
50000			5 ye	ars	per year.

# **11. Product Components**

NO.	Name	Qty
1	HDS-500 unit	1pc
2	Power Adapter	1pc
3	USB cable	1pc
4	HandyDentist Dental Image Management Software (U Disk)	1pc
5	User Manual	1pc
6	Product warranty and certificate	1pc

# Annex A. EMC table

The following tables provide HDS-500 compliance information of electromagnetic compatibility (EMC) and electromagnetic immunity (EMI) standards. To ensure conformance, the user must operate HDS-500 in environments that are consistent with these standards.

Table 1. Guidance and Manufacturer's Declaration - Electromagnetic EmissionsHDS-500 is intended for use in the electromagnetic environment specified below. Thepurchaser or the user of HDS-500 must ensure that it is used in such an environment:

Emissions Test	Compliance	Guidance	
RF emissions CISPR11	Group 1	HDS-500 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.	
RF emissions CISPR11	Class A		
Harmonic emissions IEC 61000-3-2	N/A	HDS-500 is suitable for use in all establishment including domestic and those directly connected the public low voltage power supply network whic supplies buildings used for domestic purposes.	
Voltage fluctuations/flicker emissions EN 61000-3-3	N/A		

Table 2. Guidance and Manufacturer's Declaration - Electromagnetic ImmunityHDS-500 is intended for use in the electromagnetic environment specified below. Thepurchaser or the user of HDS-500 must ensure that it is used in such an environment:

Immunity Test	IEC 60601 Test Level	Compliance level	Electromagnetic Environment Guidance
Electrostatic discharge (ESD) EN 61000-4-2	±8 kV contact ±15 kV air	±8 kV contact ±15 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst EN 610004-4	±2 kV for power supply lines	N/A	Mains power quality should be that of a typical commercial or hospital environment.
Surge EN 61000-4-5	± 1 kV differential mode	N/A	Mains power quality should be that of a typical commercial or hospital environment.

Immunity Test	IEC 60601 Test Level	Compliance level	Electromagnetic Environment Guidance
Voltage dips, short interruptions and voltage variations on power supply input lines EN 61000-4-11	0 % UT ; 0.5 cycle At 0°,45°,90°,135°, 180°,225°,270°and 315° 0 % UT; 1 cycle and 70 % UT; 25/30 cycles Single phase: at 0° 0 % UT; 250/300 cycle	N/A	Mains power quality should be that of a typical commercial or hospital environment. If the user of HDS-500 requires continued operation during power mains interruptions, it is recommended that HDS-500 be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) magnetic fields EN 61000-4-8	30A/m	30A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Conducted RF EN 61000-4-6	3 V rms 150 kHz to 80 MHz 6 V in ISM bands between 0,15 MHz and 80 MHz	3 V	Portable and mobile RF communication equipment should not be used close to any part of HDS-500 within the recommended separation distance, including its cables. This separation distance is calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance: $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ $80 \text{ MHz} \sim 800 \text{ MHz}$ $d = 2.3\sqrt{P}$ 800 MHz ~ 2.5 GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, <sup>a</sup> should be less than the compliance level in each frequency range. <sup>b</sup> Interference may occur in the
			level in each frequency range. <sup>b</sup>

Radiated RF	10 V/m 80 MHz to 2.7	10 V/m 80	
EN 61000-4-3	GHz	MHz to 2.7	
		GHz	
NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies.			

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

<sup>a</sup> Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy.

To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which HDS-500 is used exceeds the applicable RF compliance above, HDS-500 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating HDS-500.

<sup>b</sup> Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 10 V/m

Table 3. Recommended Separation Distance between Portable and Mobile RFCommunications Equipment and HDS-500

PLEASE NOTE: HDS-500 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The purchaser or the user of HDS-500 can help prevent electromagnetic interference by maintaining a minimum distance between portable, mobile RF communications equipment (transmitters) and HDS-500 as recommended below, according to the maximum output power of the communications equipment.

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

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

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

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