

Model: HyperLight



# Hand-held Dental X-ray System USER MANUAL Changzhou Sifary Medical Technology Co.,Ltd.

Version: S01 IFU-7035001 Issued: 2021.6.1 Size:197mmX140mm

#### Content

1. Overview	4
1.1 Content	4
1.2 Packing list and coding	5
2. Symbol instruction	6
3. Foreword	7
3.1 Scope of application	7
3.2 Contraindications	7
4. Safety Precautions	9
4.1Radiation Safety	9
4.2 Leakage Dose	10
5. Installation	11
5.1 Plug in the charging cable	11
5.2 Install backscatter radiation shielding	11
6 Operation	12
6.1 Operation panel instructions	12
6.12 PowerOn/Off	
6.3 Screen instructions	14
6.4 Set interface	16
6.5 Use of exposure function	
6.5 Positioning Instructions	
6.5.1 Paralleling technique	
6.5.2 Bisected angle technique	19
6.5.3 Recommended angle and default exposure time for each tooth type	20
7 Cleaning	22
8 Maintenance	23
9 Troubleshooting	24
10 Technical Data	25
10.1 Main Body Technical Data	25
10.2 X-ray Tube Specifications and Characteristics	27
11 EMC Tables	29
12 Statement	34

# 1. Overview





- 2.Base
- 3. Power Adapter with removable power cord
- 4.Backscatter Radiation Shielding

# 1.2 Packing list and coding

HyperLight Main Body (1 pcs)	Base (1 pcs)	Power Adapter with removable power cord (1 pcs)
Backscatter Radiation Shielding (option)		

# 2. Symbol Instruction

	If the instructions are not followed properly, operation may lead to hazards for the product or the user/patient.	
NOTE	Additional information, explanation of operation and performance.	
SN	Serial number	
*	Type BF applied part	
$\sim$	Alternating current	
	Dispose of in accordance with the WEEE directive	
Ť	Keep dry	
-20°C	Temperature limitation	
20%	Humidity limitation	
70 kPa	Atmospheric pressure limitation	
REF	Catalogue number	
<b>***</b>	Manufacturer	
	Date of manufacture	
LOT	Lot of manufacture	
EC REP	Authorized Representative in the European Community	
	Manufacturer's LOGO	
	Follow instructions for use	
	Warning of ionizing radiation	
	External extension cord interface	

# 3. Foreword

### 3.1 Scope of application

The HyperLight Hand-held Dental X-ray System is indicated for use only by a trained and qualified dentist or dental technician for both adult and pediatric subjects as an extraoral diagnostic dental X-ray source to produce X-ray images using intraoral image receptors.

This device must only be used in hospital environments, clinics or dental offices by trained and qualified dental personnel and not used in the oxygenrich environment.

### 3.2 Contraindications

The device is designed for use with patients of any overall health status, as solely determined by the practitioner, with the following considerations for specific circumstances:

• Pregnant women. The medical practitioner must weigh the benefits conferred by use of the device against the potential hazard to the pregnant woman and fetus resulting from radiation exposure. If use of the device is considered justified, the practitioner must take the appropriate precautions, such as use of radiation safety garments, to limit radiation exposure beyond the maxillofacial complex.

• Pediatric. The medical practitioner must weigh the benefits conferred by use of the device against the potential hazard to the child resulting from radiation exposure, considering the maturity of the child's physical development. If use of the device is considered justified, the practitioner must take the appropriate precautions, such as use of radiation safety garments, to limit radiation exposure beyond the maxillofacial complex.

• Patients with medical conditions causing involuntary movements. For patients who experience seizures or who have been diagnosed with conditions such as Parkinson's Disease which can cause difficulty in controlling physical movements, the medical practitioner must weigh the benefits conferred by use of the device against the potential hazard to the patient resulting from additional radiation exposure due to a re-scan in the event that an involuntary movement renders an image unusable for diagnostic purposes.



Read the following warnings before use:

1. The device must not be placed in humid surroundings or anywhere where it can come into contact with any type of liquids.

2. Do not expose the device to direct or indirect heat sources. The device must be operated and stored in a safe environment.

3. The device requires special precautions with regard to electromagnetic compatibility (EMC) and must be installed and operated in strict compliance with the EMC information. In particular, do not use the device in the vicinity of fluorescent lamps, radio transmitters, remote controls and do not use this system near the active HF Surgical Equipment in the hospital. Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of Hand-held Dental X-ray System, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result. Do not charge, operate or store at high temperatures. Comply with the specified operating and storage conditions.

4. Gloves are compulsory during treatment.

5. If irregularities occur in the device during treatment, switch it off. Contact the agency.

6. Never open or repair the device yourself, otherwise, void the warranty.

# 4. Safety Precautions

### 4.1 Radiation Safety

The HyperLight was designed to be used in clinical settings (e.g., a dental office) and controlled settings where transportation or use of other X-ray devices might be prohibitive due to the device's size and/or mobility.



This X-ray unit may be dangerous to patient and operator unless safe exposure factors, operating instructions, and maintenance schedules are observed.

The HyperLight provides a high degree of protection from unnecessary radiation. However, no practical design can provide complete protection nor prevent operators from exposing themselves or others to unnecessary radiation. It is important to restrict use and follow all applicable government radiation protection regulations. Pregnant women should not be exposed to X-rays unless necessary. Proper safety precautions should be taken to minimize dose to the fetus.

Operators must be fully acquainted with industry safety recommendations, established maximum permissible doses, and local jurisdiction requirements for use.



This X-ray unit must only be operated by trained personnel in a controlled setting. Within such a setting, ensure that only the patient is in the direct beam of the x-ray, and that any ancillary personnel are a minimum of 6 feet away from the patient. If it is necessary for any ancillary personnel to be closer than 6 feet, these personnel should stay out of the direct beam and wear personal protective equipment, such as an apron and thyroid collar.



In implementing a radiation protection program, consult all applicable regulations governing radiation protection and the use of X-ray equipment, and ensure full compliance with any such regulations.

# 4.2 Leakage Dose

Leakage Dose	Permissive Range
65 kVp, 2.5 mA, 0.5 s (Max. Exposure Condition) At Focal Spot to Distance 1 m 1 : 30 Duty Cycle	< 0.25 mGy/h

# 5. Installation

## 5.1 Plug in the charging cable

First open the silicone cover, then plug one end of the charger into the machine and the other end into the socket. The charging icon will be displayed on the screen at this time.





# 6 Operation

### 6.1 Operation panel instructions





#### 6.2 Power On/Off 6.2.1 Power On

1. First press the power button and then let go, then the screen will enter the boot interface.



2. Make sure that the battery level is not lower than the figure below.



### Battery level 1

#### 6.2.2 Power Off

Long press the power button to shut down.



No.		Item	Description
		Bitewing	
		Lower Molar	
1		Upper Molar	Selects the tooth type.
		Canine	
		Incisor	
		Digital Sensor	Use the sensor to receive X- rays
2	Ρ	Phosphor Plate	Use the Phosphor Plate to receive X-rays
		Film	Use the Film to receive X-rays

	6 Operation					
3	9	Machine lock	The machine is locked and cannot be exposed.			
4		Remaining Battery Indicator	Indicates remaining battery level. When the indicator light starts to red glow, it means the battery needs to be charged.			
	4	Battery Charging Indicator	Indicates the battery charger is connected to the device.			
5	65kV 2.5mA	Tube Voltage/Curre nt Indicator	Indicates the tube voltage and tube current of the system.			
6	0.32 <sub>SEC</sub>	Time Display	Displays the X-ray exposure time.			
7	2	Adult/Child Selection	Indicates a patient type (adult or child).			

### 6 Operation

### 6 Operation



Display content	Meaning
Volume	Adjust the volume of the machine.
Receptor	Select the type of receptor.
Language	Choose a language.
Restore Factory Settings	Choose whether to restore factory settings.

# 6.5 Use of exposure function





# 6.5 Positioning Instructions

### 6.5.1 Paralleling technique

The sensor is placed in a holder which is used to align the sensor parallel to the long axis of the teeth.



#### 6.5.2 Bisected angle technique

The patient holds the sensor in place with his/her finger. The X-ray beam is directed perpendicularly towards an imaginary line, which bisects the angle between the sensor plane and the long axis of the tooth.



Position the tube head to the patient according to the accepted standard positioning procedures.

R	eceptor	Patie nt	Teeth		Angle of inclination ( The patient sits in a chair vertically. )	Exposure time(s)	
				Bitewing	+5°∼ +8°	0.4	
				Lower Molar	-5°	0.2	
		Adult		Upper Molar	+30°	0.32	
				Canine	Maxilla: +45° Mandible: -20°	0.25	
	Digital			Incisor	Maxilla: +45° Mandible: -25 °	0.16	
	Sensor			Bitewing	+5°∼ +8°	0.32	
					Lower Molar	-5°	0.13
		Child		Upper Molar	+30°	0.2	
				Canine	Maxilla: +45° Mandible: -20°	0.1	
				Incisor	Maxilla: +45° Mandible: -25°	0.08	
				Bitewing	+5°∼ +8°	0.5	
Ρ	Phosphor Plate	Adult		Lower Molar	-5°	0.25	
			8	Upper Molar	+30°	0.4	

# 6.5.3 Recommended angle and default exposure time for each tooth type

-			6 (	Operation		
				Canine	Maxilla: +45° Mandible: -20°	0.32
				Incisor	Maxilla: +45° Mandible: -25°	0.2
				Bitewing	+5°~ +8°	0.4
				Lower Molar	-5°	0.16
		Child	$\mathbf{e}$	Upper Molar	+30°	0.25
				Canine	Maxilla: +45° Mandible: -20°	0.13
				Incisor	Maxilla: +45° Mandible: -25°	0.1
	Adult			Bitewing	+5°~ +8°	0.8
			Lower Molar	-5°	0.4	
		Adult		Upper Molar	+30°	0.63
				Canine	Maxilla: +45° Mandible: -20°	0.5
	Film			Incisor	Maxilla: +45° Mandible: -25°	0.32
R R	1 1111			Bitewing	+5°~ +8°	0.63
				Lower Molar	-5°	0.25
	Child	8	Upper Molar	+30°	0.4	
				Canine	Maxilla: +45° Mandible: -20°	0.2
				Incisor	Maxilla: +45° Mandible: -25°	0.16

# 7 Cleaning

1. Use medical alcohol (Ethanol 70 to 80 vol%) to wipe the surface of the HyperLight ,charger,base and Backscatter Radiation Shielding. Do not use cleaning agents other than ethanol,since certain chemical combinations may deteriorate the HyperLight plastic prematurely.

2. Unplug the charging cradle before cleaning.



The HyperLight, the base, the charging cradle, and the AC power supply are not designed to be subjected to any kind of sterilization procedure.

## 8 Maintenance

If you do not use the machine for a long time, you need to charge the machine every 6 months.

# 9 Troubleshooting

When trouble is found, check the following points before contacting your distributor. If none of these are applicable or the trouble is not remedied even after action has been taken, the product may have failed. Contact your distributor.

Malfunction	Causes	es Methods	
	Insufficient charge	Use the charger to charge the machine.	
overheating!	The machine temperature is too high.	Let stand for more than half an hour.	
(Abnormal exposure time!)	Abnormal exposure time	During the exposure process, the finger released the exposure button, causing the exposure to be forcibly terminated.	
Drop detected!	Drop detected	A fall of the machine is detected, which may cause damage to the machine.	
Check the battery	Check the battery	Frequent use of the machine for a long time causes the battery temperature to be too high.	

# **10 Technical Data**

## 10.1 Main Body Technical Data

Manufacturer	Changzhou Sifary Medical Technology Co., Ltd.
Model	HyperLight
Package Dimensions	489mm×367.5mm×219mm (±10%)
Total Weight	4kg±20%
Charger power supply	~100-240V 50/60Hz
Power supply	Lithium ion battery: 14.8V, 2500mAh
	+10%
Charger power output	24V 1.5A
Ray type	X Ray
X-ray tube model	KL11-0.4-70
Tube voltage	65kV(±10%)
Tube Current	2.5mA (±20%)
Exposure time adjustment	0.02-2S
range	0.02-23
Nominal power	162.5W nominal at 65kV, 2.5mA
Inherent Filtration	0.8mmAl
Total Filtration	1.8mmAl
Duty Cycle	1:30
Minimum source to skin	>20cm (from focal spot to cone tip)
distance	
Nominal dose output at cone tip	3mGy/sec.
X-ray field size and	57mm diameter circle
configuration	
Applied part	BF
Electrical safety class	Class IIb
IPX specification	IPX0; do not operate under wet
	conditions
Mode of operation	Intermittent operation
	2S ON/60S OFF
	Use: in enclosed spaces
Ambient conditions	Ambient temperature: 10°C ~ 40°C
	Relative humidity: <80%; non-
	condensing at 0°

### 10 Technical Data

	Operating altitude < 3000m above sea level
Transport and storage conditions	<ul> <li>Ambient temperature: -20 °C ~ +55 °C</li> <li>Relative humidity: 20% - 80 %, non-condensing at &gt; 40 °C</li> <li>Atmospheric pressure: 70 kPa - 106 kPa</li> </ul>

# **10.2 X-ray Tube Specifications and Characteristics**

Filament voltage	2.4-3.0V
Maximum filament current	2.9A
Nominal tube voltage	70kV
X-ray source assembly maximum heat content	4500J
Maximum anode cooling rate	110W
Nominal anode input power	600W
Target material	Tungsten
Minimum target angle	12°
Filament voltage (at maximum filament current 2.9A)	2.4~ 3.0V
Minimum permanent filtration (IEC 60522:1999)	0.8mm/75kV
Nominal focal spot (IEC 60336:1993)	0.4mm

Emission & Filament Characteristics (Half Wave Self-Rectified)



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#### Guidance and manufacturer's declaration - electromagnetic emissions

The HyperLight is intended for use in the electromagnetic environment specified below. The customer or the user of the HyperLight should assure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The HyperLight 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 CISPR 11	Class B	The Hyport ight is suitable for use is all
Harmonic emissions IEC61000-3-2	Class A	The HyperLight is suitable for use in all establishments, including domestic
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.

Guidance and manufacturer's declaration – electromagnetic immunity		
The HyperLight is intended for use in the electromagnetic environment specified below.		
The customer or the user of the HyperLight should assure that it is used in such an		

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance	
Electrostatic Discharge (ESD) IEC 61000-4-2	+/-8 kV contact +/-15kV air	+/-2, 4, 6 & 8kV contact +/-2, 4, 8, & 15 kV air	Floors should be wood, concrete or ceramic tile. If floors are synthetic, the r/h should be at least 30%	
Electrical fast Transient/burst IEC 61000-4-4	+/-2 kV for power supply lines +/-1 kV for input/ output lines	+/-0.5, 1 & 2 kV for power supply lines +/-0.5 & 1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.	

Surge IEC 61000-4-5	+/-1 kV differential mode +/-2 kV common mode	+/-0.5 & 1 kV differential mode +/-0.5, 1 & 2 kV	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	100 % Dip; for 0,5 cycles At 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315° 60% Dip for 1 Cycle 30% Dip for 25 Cycles 100% Dip for 5 Seconds	100 % Dip for 0,5 cycles At 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315° 60% Dip for 1 Cycle 30% Dip for 25 Cycles 100% Dip for 5 Seconds	Mains power quality should be that of a typical commercial or hospital environment. If the user of the <b>HyperLight</b> requires continued operation during power mains interruptions, it is recommended that the <b>HyperLight</b> be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	30A/m	3 & 30A/m	Power frequency magnetic fields should be that of a typical commercial or hospital environment.

Guidance and Manufacturer's Declaration – Electromagnetic Emissions						
The HyperLight is intended for use in the electromagnetic environment specified below. The customer or user of the HyperLight should ensure that it is used in such an environment.						
Immunity testIEC 60601 test levelCompliance levelElectromagnetic environment - guidance						

			-
Conducted RF IEC 61000-4- 6	3 Vrms 150 kHz to 80 MHz	(V1)=3Vrms	Portable and mobile communications equipment should be separated from the HyperLight by no less than the distances calculated/listed below:
	6Vrms in ISM bands between 0,15 MHz and 80 MHz	(E1)= 6Vrms in ISM bands	D=(3.5/V1)(Sqrt P) 150kHz to 80MHz
Radiated RF IEC 61000-4-	3 V/m 80 MHz to 2,7	(E1)=3V/m	D=(3.5/E1)(Sqrt P) 80 to 800 MHz
3	GHz		D=(7/E1)(Sqrt P) 800 MHz to 2.5 GHz
			where P is the max power in watts and D is the recommended separation distance in meters.
			Field strengths from fixed transmitters, as determined by an electromagnetic site survey, should be less than the compliance levels (V1 and E1).
			Interference may occur in the vicinity of equipment containing a transmitter.
			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).

Guidance and Manufacturer's Declaration – Electromagnetic Emissions					
The HyperLight is intended for use in the electromagnetic environment specified below. The customer or user of the HyperLight should ensure that it is used in such an environment.					
Immunity         IEC 60601 Test         Compliance         Electromagnetic Environment -           Test         Level         Guidance					

				Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range. Interference may occur in the vicinity of equipment marked with the following symbol:
		Iz and 800 MHz, the h		ectromagnetic propagation is
		ption and reflection fro		
2.	<ul> <li>Field strengt (cellular/cord broadcast ar the electrom survey shoul Model 005 is should be ob additional mo 005.</li> <li>Over the free V/m.</li> <li>The ISM (inc 6.765 MHz to 40.66 MHz to 1.8 MHz to 2 MHz to 10.15</li> </ul>	hs from fixed transmit fless) telephones and ad TV broadcast canno agnetic environment of be considered. If the s used exceeds the ap oserved to verify norm- easures may be neces quency range 150 kHz dustrial, scientific and i b 6.795 MHz; 13.553 I b 40.70 MHz. The am 2.0 MHz, 3.5 MHz to 4 5 MHz, 14 MHz to 14. MHz to 24.99 MHz, 28	ters, such as base st land mobile radios, a ot be predicted theore use to fixed RF transr e measured field stre plicable RF complian al operation. If abnorn ssary, such as re-orie to 80 MHz, field stree medical) bands betww MHz to 13.567 MHz; ateur radio bands betww MHz to 13.567 MHz; 0 MHz, 5.3 MHz to 5 2 MHz, 18.07 MHz to 8.0 MHz to 29.7 MHz	ations for radio mateur radio, AM and FM radio etically with accuracy. To assess nitters, an electromagnetic site ngth in the location in which the ice level above, the Model 005 mal performance is observed, enting or relocating the Model engths should be less than 1 een 0.15 MHz and 80 MHz are 26.957 MHz to 27.283 MHz; and ween 0.15 MHz and 80 MHz are 6.4 MHz, 7 MHz to 7.3 MHz, 10.1 18.17 MHz, 21.0 MHz to 21.4 and 50.0 MHz to 54.0 MHz.
	Portable		d Separation Distanc	es Between nt and the HyperLight device
	The HyperLight disturbances and electromagnetic mobile RF Com	t is intended for use in re controlled. The cust c interference by main	the electromagnetic comer or user of the H taining a minimum di ent and the HyperLigh	environment in which radiated lyperLight can help prevent stance between portable and nt recommended below, according
ŀ	Immunity	IEC 60601 Test	Compliance	Electromagnetic Environment –
	Test	Level	Level	Guidance
		Separation D	istance According to	Frequency of Transmitter

11 EMC Tables

	-	I LIVIC Idoles	
		m	
Rated Maximum Output Power (Watts)	Separation (m) 150kHz to 80MHz D=(3.5/V1)(Sqrt P)	Separation (m) 80 to 800MHz D=(3.5/E1)(Sqrt P)	Separation (m) 800MHz to 2.5GHz D=(7/E1)(Sqrt P)
0.01	0.117	0.117	0.233
0.1	0.369	0.369	0.738
1	1.167	1.167	2.333
10	3.689	3.689	7.379
100	11.667	11.667	23.333

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be determined 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 The ISM (industrial, scientific and medical) bands between 150 kHz and 80 MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; and 40.66 MHz to 40.70 MHz.



 Use of accessories and cables other than those specified or provided by the manufacturer of HyperLight could result in increased electromagnetic emissions or decreased electromagnetic immunity of HyperLight and result in improper operation.

Cable information:

Cable Name	Cable Length (m)	Shielded or not	Remark
Power Adapter	1.2	NO	/
Power Adapter	1.4	NO	/
removable power cord	1.4	NO	/

2. Use of HyperLight adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, HyperLight and the other equipment should be observed to verify that they are operating normally

### 12 Statement

#### Service Life

The service life of HyperLight series products is 5 years.

#### Maintenance

MANUFACTURE will provide circuit diagrams, component part lists, descriptions, calibration instructions to assist to SERVICE PERSONNEL in parts repair.

#### Disposal

The package should be recycled. Metal parts of the device are disposed as scrap metal. Synthetic materials, electrical components, and printed circuit boards are disposed as electrical scrap. Please deal with them according to the local environmental protection laws and regulation.

#### Rights

All rights of modifying the product are reserved to the manufacturer without further notice. The pictures are only for reference. The final interpretation rights belong to CHANGZHOU SIFARY MEDICAL TECHNOLOGY CO., LTD. The industrial design, inner structure, etc, have claimed for several patents by SIFARY, any copy or fake product must take legal responsibilities.



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