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VAFU

LED Light Curing Device

OPERATION MANUAL

Manufacturer Name:Guilin Veirun Medical Technology Co., Ltd.
Address:No.D-07 Information Industry District,High-Tech Zone,
541004 Guilin, Guangxi , PEOPLE'S REPUBLIC OF CHINA
Tel:+86(773)5880619 Fax:+86(773)2260519
Web:www.veirun.com E-mail:info@veirun.com

EC REP

Shanghai International Holding Corp. GmbH (Europe)
Eiffestrasse 80, 20537 Hamburg, Germany
Tel:+49-40-2513175/+49 163 6233205
E-mail:shholding@hotmail.com

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Contents

1 Introduction

1.1 Preface

Guilin Veirun Medical Technology Co.,Ltd. is the professional dental equipment manufacturer ,which has strong sel–developing ability and completely quality control system.

1.2 Principle of operation

The device illuminates photosensitive resin to solidify it quickly based on the principle of light radiation.

1.3 Intended use

The device is intended to be used on a variety of dental compositions within the oral cavity.

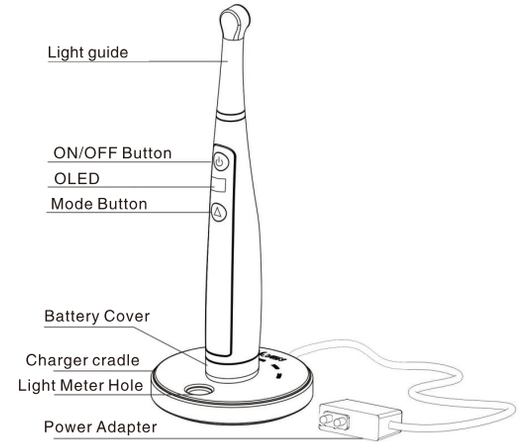
1.4 Features

- Stable output power guarantees constant light so that the solidification effect is not affected by the consumption of remaining power.
- Parallel light ensures more focused output energy and better solidification effect.
- Wireless charging corresponding to the standards of wireless charging protocol is vailable.
- Super capacity battery. A full charge can be used for more than 500 times continuously under 10s working of P2 mode,from full charge to low–battery alert.
- Ergonomics design, excellent and comfortable handle feel during the treatment.
- Aluminum alloy body, resistance to shatter and drop.
- Light source featuring 360° rotation to realize curing from all directions.
- Replaceable light source, 400 nm–420 nm light source with corresponding dental reagent enables detection of dental caries.
- A dedicated whitening roller, shooting teeth whitening gel with blue light to whiten teeth.

- Charger verifying radiation output of LED light curing device effective or not.
- Solidified lens fixed on light source,bonded with all–ceramic veneer and adhered to crown and fiber–reinforced composite root canal post to make solidification effect better.
- Replaceable Lithium battery, Auto power–off.

2 Structure and Components

The LED Light Curing Device consists of main unit, charger cradle, battery, light guide, shading plate and power adapter.



3 Technical Specifications

3.1 Dimensions: 33 mm x 27 mm x 206 mm.

3.2 Main unit net weight: 160 g.

3.3 Configurations: see the packing list for details.

3.4 Power supply:

- Power supply classification:

  Power supply by rechargeable lithium battery.

- Rechargeable lithium battery:

  Standard voltage: DC3.7 V, capacity: 2200 mAh, with protection for overvoltage, overcurrent and short–circuits.

● Power Adapter :

Input: 100V–240V～, 50/60 Hz, 0.4 A Max

Output : 5V ⎓ 1A

Fuse: T1AL250 V

3.5 Characteristics of LED lamp:

10 W high–power blue LED lamp.

Lamp classification group: Risk Group 2.

Wavelength: 385 nm~515 nm.

Inspection method: When the LED lamp emits during normal operation, the lamp is in good condition.

Radiation during continuous working: ⩾400 mW/cm^2 .

Optical effective area of light source: 75 mm^2 .

LED Light Curing Device is applicable to some common dental resinous materials in clinic, such as 3 M, Dentsply etc.

3.6 Working environment

Environment temperature: 5 ℃~40℃.

Relative humidity: ⩽80%.

Atmosphere temperature: 75 kPa~106 kPa.

3.7 Equipment Safety classification

Operation mode: Short–time operation equipment.

Type of protection against electric shock: Class II equipment.

Degree of protection against electric shock: Type B application part.

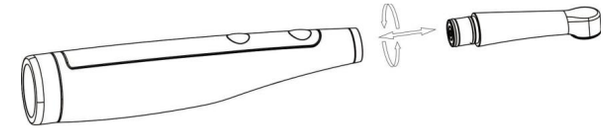
Degree of protection against ingress of water: Ordinary equipment(IPX0).

Degree of safety of application in the presence of a Flammable Anesthetic Mixture with air, Oxygen or Nitrous Oxide: Non–AP, APG type equipment.

4 Installation and disassembly

4.1 The top of the body unit featuring 360° rotation is replaceable.

As shown in figure.



4.2 Battery Replacement

Holding the front of the host and the battery compartment, screw it off counterclockwise, then remove the old battery from the battery, change a new battery, and then replace the battery storehouse on the host. The battery positive and negative can be normal used, no security risks.As shown in figure:

4.3 When the battery needs to be charged,connect the USB Type A jack into the plug of the adapter and connect the plug of the adapter into the AC100V–240V power supply. Then connect the Micro USB of the USB cable to plug of the pedestal. Put the main unit to the charging point of the pedestal, and the curing light starts charging.

5 Operating Instructions

5.1 Press button "Δ"for 1 second and release the button when the buzzer warns for once. Following three modes are available.

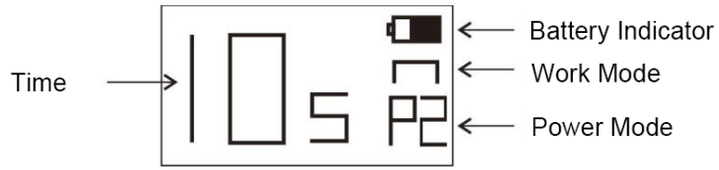
- Full Power Mode: The screen shows "Π", The output light intensity is full–power. (recommended mode for clinical).
- Progressive Mode: The screen shows "Л" , The output light intensity enhances gradually, power output is to maximum after 5 seconds.
- Pulsed Mode: The screen shows" п п ", The blue light works in pulse manner.

5.2 Press button "Δ"for 2 second and release the button when the buzzer warns for twice. Following three modes based on output of power density are available.

- Ultra High Power Density: The screen shows "P1",The power density is about 3000 mW/cm^2~3200m W/cm^2 .
- High Power Density: The screen shows "P2", The power density is about 2300 mW/cm^2 ~2500 mW/cm^2.
- Standard Power Density: The screen shows "P3", The power density is about 1600mW/cm^2 ~1800mW/cm^2 .

5.3 Tap button "Δ" to select working time interval.

- In"P3"mode, the time interval can be chose from 1,2,3,4,5,10,15,20, 25,30, 35, 40 second.
- In"P2"mode, the time interval can be chose from 1,2,3,4,5,10,15,20 second.
- In"P1"mode, the time interval can be chose from 1,2,3, second. Information on the screen is shown in the fiqure.



5.4 During the operation, put the disposable sleeve on the top of the main unit, aim the top at the correct position, press the ON/OFF button (" ")and the main unit will produce "Di"sound, the curing light radiates blue light and starts working according to the set modes. Meanwhile, it starts counting down from the set working time interval, it stops working when counting down to "0".The screen displays the set working time interval again.

5.5 Operation can be stopped by press the ON/OFF button (" ").

5.6 After a working cycle, operator can press the ON/OFF button (" ") to start another working cycle. Stop operating if the equipment is burning obviously, let equipment cool down before restarting. Suggest continous working cycle less than 5 times.

5.7 Battery Indicator: Low power detective circuit is fixed inside of the main unit.If battery indicator in the screen has only 1 bar left, please charge in time.

5.8 When the battery needs to be charged, plug USB Type A jack in USB Type A plug of power adapter, and connect the plug of power adapter into the AC100V–240V power supply, and connect Micro USB of USB cable into charge indicator in charge. The blue indicator light on charger indicates charger on standby. Put the main unit to the charging point of the charger, and the indicator light turns green, main unit is detected.Meanwhile.the indicator light at the bottom of main unit turn green, the curing light starts charging. When charging finished. the indicator light at the bottom of main unit turn blue.

5.9 After operating, take off the disposable sleeve and throw away, avoid reusing. Power output will be decreased by 5–10% if using the disposable sleeve.

5.10 The product will turn off automatically if there is no operations within 2 minutes. Turn it on by pressing any button.

5.11 The depth of solidification of dental resin composite is no less than 4mm per 10 second. The recommended separation distance between luminous point and solidifying point is 2mm.

6 Precautions

Warning: It's our duty to provide users correct usage rules and safety notices.

6.1 Using the product according to the instruction manual,other tasks are out of support.

6.2 Please charge the battery at least 4 hours before first time usage.

6.3 In order to prevent cross–infection, it is forbidden to reuse the disposable sleeve.

6.4 The top of the main unit can be turned by 360 degree and it is demountable and replaceable.

6.5 VAFU LED light curing device only Used by professionally trained people.

6.6 Please put it away from the touch of kids.

6.7 During operation, the light should be aimed straightly at the dental resin composite to ensure the effect of solidification.

6.8 Avoid aiming the light at eyes, please use brake sack or protective goggles supplied by our company to protect your eyes.

6.9 Please use the power adapter which is designed and supplied by our company. It may cause potential dangers to lithium and control circuit by using the power adapter designed or supplied by other manufacturers.

6.10 It is forbidden to put metal on the charger because it may burn the internal circuit. Unplug the plug of charger when not charging.

6.11 Please charge the battery in cool and ventilated room.

6.12 The product should not be used more than rated working time set in the instruction manual to avoid damaging teeth for the high temperature. Shut down and cool the product when it is used for 5 times continuously.

6.13 It is forbidden to extrude, shake or rock the battery. It is forbidden to self–taking apart the battery, in order not to result in short–circuit or leakage and it is forbidden to put the battery with metal.

6.14 Long time do not use the product, please take the lithium battery apartform the main unit. It is recommended that the product should be installed at the medical site where there are no high frequency high voltage equipments within 5 meters to ensure the product work properly.

7 Contraindications and applicable groups

7.1 People suffered ophthalmic surgeries or sensitive to light, pregnant women, children and the heart disease patients should not use the product.

7.2 Patients with retinal diseases should be cautious to use the product.

7.3 Patients with photosensitization and solar dermatitis or using photosensitive drugs should not use the product.

Applicable to all groups except contraindications.

8 Maintenance

8.1 This product does not consist of the self–maintainable spare parts. The maintenance of this product should be taken by the appointed professional or special repair shop.

8.2 Users can change brake sack, light source and lithium battery. Please use accessory which is designed and supplied by our company.contact with the local dealer or our company if you want to buy. It may cause potential dangers to curing light or other damages which is designed and supplied by other manufacturers.

8.3 The accessory of the product should be cleaned by clean water or neutral sterilized liquid. Do not soak. Do not use highly volatile and diffluent solvent to clean this product, which can cause the signs on the control pane to fade.

8.4 Please check whether there are any remains on luminous point and clean the top of the main unit with 75% alcohol tampon after using to avoid pollute and ensure solidified effect.

8.5 Please charge in time when battery level is low; get lithium battery out for safe–keeping when not using the product for a long time.

9 Troubleshooting

Faulty	Possible cause	Solutions
No indication, no responsefour	1.Battery is out of power. 2.Faulty of battery. 3.The main unit battery protection system works	1.Charge the product/change battery 2.Change battery 3.Place the main unit on the charge for activation

"Er"shown on the screen.	Faulty of main unit.	Send to after–sale service for repair.
Wink shown on the screen.	Not mount or wrong mount light source.	Mount light source properly Send to after–sale service for repair.
Light intensity is weak.	There is resin on the top of the main unit.	Clear the resin.
The equipment is not charging when the adapter is connected.	1.The adapter is not connected well. 2.Faulty from adapter or incompatible. 3. The charger is out of order.	1.Reconnect. 2.Change th adapter 3.Send to after–sale service for repair.
Usage time shortened on a single full charge.	Smaller battery capacity.	Change battery.

Note: If such solutions are completed, the product still cannot work normally, please contact with the distributor or our company.

10 Storage and Transportation

10.1 The product should be handled carefully and lightly. Be sure that it is far from the vibration, and installed or kept in a cool, dry and ventilated place.

10.2 Do not store the product together with the combustible, poisonous , caustic or explosive goods.

10.3 The product shall be stored at the location as follow:

① Relative humidity: ≤90 %,

② Atmospheric pressure: 75 kPa~106 kPa

③ Temperature: –20 ℃~55 ℃.

10.4 During transportation, excessive shock and vibration shall be prevented, and handled carefully and lightly. Keep it away from sunlight, snow or rain. It shall not be packed with dangerous goods.

11 After–sale Service

From the date this product has been sold, base on the warranty card, we will repair this equipment free of charge if it has quality problems, please refer to the warranty card for the warranty period.

12 Environmental Protection

There is not any harmful element in our product. It can be disposed according to the local law.

13 Symbol Instructions

VRN Manufacturer's logo	Type B applied part	Refer to instruction manual/ booklet	EC REP Authorised Representative in the European Community
Environment–friendly use period	Manufacturer	Battery charging condition	Use by date
SN Serial number	Do not dispose of the product into the ordinary municipal waste or garbage system	MD Medical Device	UDI Unique device identifier
Caution,consult accompanying documents	Atmospheric pressure limitation		
Fragile; handle with care	Rotating plug		
Humidity limitation	Temperature limitation		
This way up	CE marking		
Keep away from rain	Class II equipment		
Direct current	Alternating current		
Full Power Mode	Progressive Mode		
Pulsed Mode	Battery Indicator		
P1 Ultra High PowerMode	P2 High Power Mode		
P3 Standard Power Mode	Stand–by		
Mode Button	Date of manufacture		

14 Statement

All rights of modifying industrial design, inner structure, instruction manual, etc, of the product are reserved to the manufacturer without further notice. The pictures are only for reference. The final interpretation rights belong to Guilin Veirun Medical Technology Co.,Ltd..

15 Attachment Lists

No.	Attachment Name	Pcs
1	Shading plate	1
2	Light guide(options available)	1
3	Charger cradle with one USB cable	1
4	Power adapter	1
5	Rechargeable lithium battery	1
6	400~415nm light source (options available)	1
7	440~480nm light source	1
8	Disposable sleeves	50

NOTE: The exactly specifications of accessories are not been shown detailedly in this operation instrument. See the attached page and packing list for more information.

16 EMC

Note:

(1) Unauthorized changes or modifications without the affirmative consent of Guilin Veirun Medical Technology Co.,Ltd. may cause EMC problems to the product or other equipment.

(2) The VAFU LED light curing device has been tested and homologated in accordance with operating procedures related to EMC

16.1 Requirements of cable installation

Cable Name	Cable Type	Cable Length
Powre supply output line.	Unshielded parallel line.	1 meter.

16.2 Key parts of EMC

Key parts of EMC of the product are LED driver chip and the power adapter. Using or replacing accessories which are not designed and supplied by our company would result in performancedegradation of electromagnetic emissions and electromagnetic immunity. Therefore, do not replace parts of the product without permission.

16.3 Guidance and Manufacturer's Declaration––Electromagnetic Emissions

Guidance and Manufacturer's Declaration––Electromagnetic Emissions.		
The VAFU LED light curing device is indicated for use in the electromagnetic environment specified below. The customer or the use of the models VAFU LED light curing device should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment ––guidance.
RF emissions GB 4824	Group 1	The models VAFU LED light curing device use 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 GB 4824	Group B	The models VAFU LED light curing device are suitable for used in domestic establishment and in establishment directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

Harmonic emissions GB 17625.1	Not applicable	
Voltage fluctuations /flicker emissions GB 17625.2	Applicable	

16.4 Guide and Manufacturer's Statement––Electromagnetic Immunity.

Guide and Manufacturer's Statement––Electromagnetic Immunity			
The VAFU LED light curing device is indicated for use in the electro–magnetic environment specified below. The customer or the use of the models VAFU LED light curing device should assure that it is used in such an environment.			
Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment–– Guidance.
Electrostatic discharge(ESD) GB/T 17626.2	± 6 kV contact ± 6 kV contact	± 6 kV contact ± 6 kV contact	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 GB/T 17626.4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines ± 1 kV for interconnec ting cable	Mains powerquality should be that of a typicalcommercial or hospital environment.

Surge GB/T17626.5	± 1 kV line to line ± 2 kV line to earth	± 1kV line to line	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 GB/T 17626.11	<5%U_T (> 95% dip in U_T) for 0.5 cycle 40% U_T(60% dip in U_T) for 5 cycles 70% U_T(30% dip in U_T) for 25 cycles <5%U_T (95% dip in U_T) for 5 sec.	<5%U_T (> 95% dip in U_T) for 0.5 cycle 40% U_T(60% dip in U_T) for 5 cycles 70% U_T(30% dip in U_T) for 25 cycles <5%U_T (95% dip in U_T) for 5 sec.	Mains power quality should be that of a typical commercial or hospital environment. If the user of the models VAFU LED light curing device require continued operation during power mains interrup tions,it is recom mended that the models VAFU LED light curing device be powered from an nonnot rruptible powersupply or a battery.
Power frequency (50/60 Hz) magnetic field GB/T17626.8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Note:U_T is the a.c. Mains voltage prior to application of the test level.			

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Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment––Guidance
Conducted RF GB/T17626.6	3 Vrms 150 kH~ 80 MHz	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the models VAFU LED light curing device, including cables,than the recom mended separation distance calculated from the frequence of the transmitter. Recommended Separation Distance. $d = [\frac{3.5}{V_1}]\sqrt{p}$ $d = [\frac{3.5}{E_1}]\sqrt{p}$ 80MHz~ 800MHz $d = [\frac{7}{E_1}]\sqrt{p}$ 800MHz~ 2.5GHz 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)
Radiated RF GB/T17626.3	3 V/m 80 MHZ~ 2.5 GHz	3 V/m	

			Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,a should be less than the compliance level in each frequency range.b Interference may occur in the vicinity of equipment marked with the following symbol: 

Note1: At 80 MHz and 800 MHz, the higher frequency range applies.

Note2: These quidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

[a] Field strengths from fixed transmitters, such as base stations for radio(cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted. 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 the models VAFU LED light curing device are used exceeds the applicable RF compliance ove, the model VAFU LED light curing device level abshould be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the models VAFU LED light curing device.

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

16.6 Recommended separation distances between portable and mobile RF communications equipment and the models VAFU LED lingt curing device.

Recommended separation distances between portable and mobile RF communications equipment and the models VAFU LED light curing device.

The models VAFU LED are intended for use in electromagnetic environment in which radiated RF disturbances is controlled. The customer or the user of the models VAFU LED can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment(transmitters) and the models VAFU LED are recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter/W.	Separation distance according to frequency of transmitter/m.		
	150 kHz~ 80 MHz $d = [\frac{3.5}{V_1}]\sqrt{p}$	80 MHz~800 MHz $d = [\frac{3.5}{E_1}]\sqrt{p}$	800 MHz~2.5 GHz $d = [\frac{7}{E_1}]\sqrt{p}$
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 transmitter 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) accordable to the transmitter manufacturer.

Note1: At 80 MHz and 800 MHz, the higher frequency rangeapplies.

Note2: These guidelines may not apply in all situations.Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

The VAFU LED light curing device has passed tests according IEC 60601–1–2, but it is no guarantee of immunity from electromagnetic interference. Avoid using The VAFU LED light curing device in high electromagnetic environment.