UV-LED 4CH Spot Curing System

ULS 104C
USER'S MANUAL

CLEAN UP YOUR UNKNOWN CURIOSITY TioTek

- Read this manual carefully before operation.
- Observe all the procedures, safety warnings and cautions in this manual.
- Keep this manual readily accessible so that it can be consulted at any time.
- Specifications and appearances in this manual are subject to change for improvement without prior notice.

Table of Contents

1. Safety Precautions

Make sure to read these "Safety Precautions" carefully before starting to use the equipment and observe them during operation.

1-1. Classification of Symbols

Safety symbols in this manual and on labels are classified as described below.
As each word and symbol carry special meanings. Familiarize yourself with them and observe the instructions.

WARNING	This means that possible death/ serious injury to the operator or breakdown of the system may result if these instructions are ignored and the equipment handled incorrectly.
CAUTION	This means that injury to the operator or damage/ performance decline of the system may result if these instructions are ignored or the equipment handled incorrectly.

1-2. Safety Instructions

In order that this equipment is used properly and safely, be sure to observe these safety instructions. Use of this equipment in any way other than that described in this manual may hinder the protection function of this equipment. TIOTEK KOREA shall not be liable for any faulty conditions caused by such use against any of the said precautions.

WARNING

A. In case of occurrence of abnormal conditions such as smoking, abnormal smell or noise, turn off the power immediately and then disconnect the AC power cord from the AC outlet.
B. Do not cause damage to the power cable.
C. Do not allow liquid including water or a foreign object to enter the equipment.
D. Do not touch the power plug with wet hand.
E. Disassembly and modification is prohibited.

CAUTION

Power Connection

A. To prevent electrical shock, always ground this unit using the grounding terminal of the power cord.
B. Make sure that the power voltage in use complies with specification.

UV-LED Head Unit with Condenser Lens

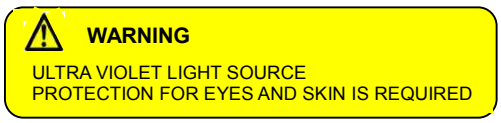
A. Use full care in handling the LED Head Unit Assembly.
As it has glass parts, a strong impact from dropping or the like may cause it to break or get maladjusted.
B. Do not directly touch by hand and contaminate the condenser lens surface.
C. Replace the LED Head Unit when the UV output intensity has deteriorated.

As the lighting time of UV-LED increases, UV output intensity is deteriorated. Measure the UV output intensity periodically and replace the LED Head Unit when the measured value is lower than the required level.

1-3. Warning Label Attaching Positions

These labels must be attached so that they are clearly visible all the time. If they come off or become dirty, replace them with new ones.

Located on Top Cover of the Controller



Located on UV-LED Head Unit

2. Product Overview

2-1 Appearance

This product is a light source for ultraviolet light output using UV-LED for the light output source. The UV-LED included in the LED Head Unit outputs the light which is then applied to any place as desired. This equipment consists of the optical system including UV-LED with exchangeable condenser lens and controller. UV output can be executed by using the control switches or external control signals.

2-2 Characteristics

- **LED Light Source**
  Different from the traditional UV Curing System. This equipment uses the LED, instead of the bulb as the light source.

- **Expanded Service Life**
  The expected service life is 20,000 hours, much longer than that of the bulb, which is approximately 2,000 hours. Therefore it greatly reduces the bulb replacement and related cost.

- **High and Adjustable UV Output Power**
  The UV output power can be adjusted from 1~100%, satisfying various curing requirements.

- **Reduction of Heat Damage**
  Different from the bulb-type light source, UV LED hardly damages the illuminated objects thermally because it only irradiates ultraviolet light except infrared light which brings thermal trouble.

- **Multiple LED Head Units Available**
  Two head units include different LEDs for 365nm and 385nm, can be available according to the UV curing agents. Also up to four head units can be connected to the controller according to the applications.

- **Multiple Condenser Lens Units Available**
  Four condenser lenses can be available according to the irradiation beam areas and UV-LED light intensity.

- **LCD Display**
  The operation conditions and system status are presented on an easy-to-read LCD display.

3. Getting Started

3-1 System Components

Unpack the system and accessories carefully and check whether the following items are included without missing.

Basic Items

A.	Controller	1 PC
B.	UV-LED Head Unit	up to 4 PCS
C.	Condenser Lens Unit	according to selected type and quantity (types for Spot Ø3, 4, 5, 6, 8, 10, and 12)
D.	Head Fixture	up to 4 PCS
E.	AC Power Cord	1 PC

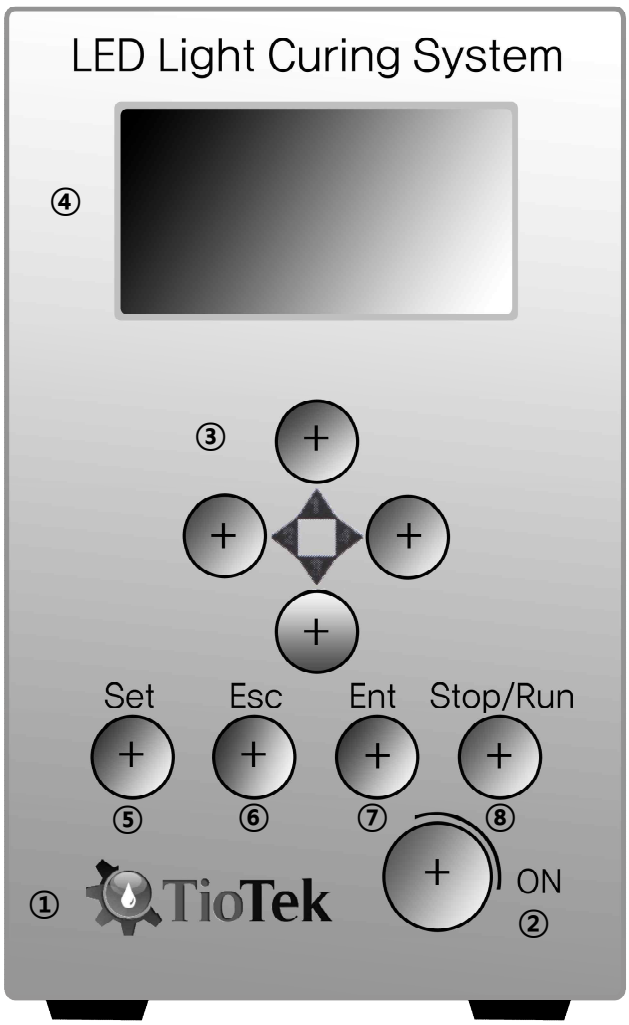
F. DC Power Cable (2m) up to 4 PCS
G. Plugs for External Control Switch 5 PCS
H. User's Manual 1 PC (this booklet)

※ B, C, D, F
The number of each item shall be determined according to ordered quantity of UV-LED Head Unit.

Optional Accessories

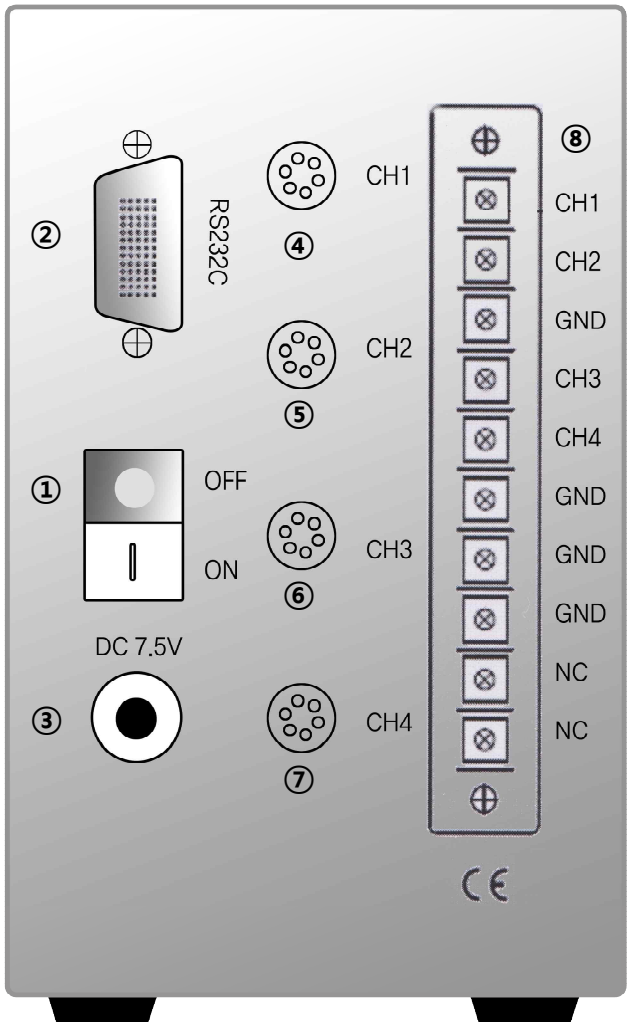
A. Interchangeable Condenser Lens Unit (for Spot Ø3, 4, 5, 6, 7, 8, 10, and 12)
B. DC Power Cable (Extension, 2m)
C. Foot Switch
D. Handle

3-2 Front Panel



① LOGO
② ON/OFF Key SW
③ Each Channels Irradiation Run/Stop Button
④ LCD Screen
⑤ SET key Switches to the setting mode.
⑥ ESC key. Exit or Stop with it.
⑦ LED indicator or power on
⑧ Irradiation Run/Stop Button

3-3 Rear Panel



① Switch Power
② Remote RS-232C
③ Power Cable
④ UV-LED Output Port (No. 1Ch)
⑤ UV-LED Output Port (No. 2Ch)
⑥ UV-LED Output Port (No. 3Ch)
⑦ UV-LED Output Port (No. 4Ch)
⑧ Foot SW Connector (1~4)

4. Installation Procedures

4-1 Installing the Controller

WARNING

Before connecting/disconnecting the related devices to the system, make sure that the controller is turned off. The controller may break down, if it is connected or disconnected while the power is on.

- Avoid a place with high temperature or humidity.
- Maintain proper space around the equipment for ventilation.
- Place the equipment horizontally.

4-2 Installing the UV-LED Head Unit and Condenser Lens Unit

WARNING

A. Never look at the UV output port directly.
B. Never allow light to come into contact with skin.
C. Always wear safety glasses, gloves and other appropriate protective gear when operating this equipment.
D. Before replacing the Condenser Lens Unit, confirm that UV is not output, turn off the power switch and wait until the LED head unit cools off.

CAUTION

Screws may be damaged if excessive torque is applied when screw-in the Condenser Lens Unit.

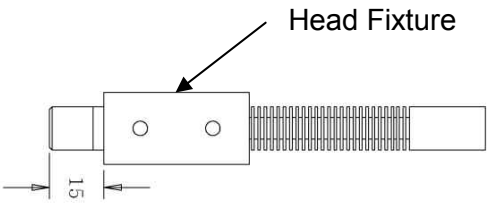
- Screw-in the Condenser Lens Unit to the UV-LED Head Unit.
- Plug-in connectors of DC Output Cable to UV-LED Head Unit and to LED Output connector on the rear panel of the controller.

4-3 Combining the UV-LED Head Unit with Head Fixture

CAUTION

For a better cooling performance of the UV-LED Head Unit, combine UV-LED Head Unit with Head Fixture.

- Insert the UV-LED Head Unit into the Head Fixture and fix it with two screws.
- Fix the Head Fixture to the jig.



4-4 Connecting the External Devices

WARNING

Before connecting/disconnecting the related devices to the system, make sure that the controller is turned off. The controller may break down, if it is connected or disconnected while the power is on.

- Connect the foot switch to FOOT SW connector on the rear panel of the controller.
- Connect the I/O signals to Remote RS-232C Port (D-Sub 9 Pin connector) on the rear panel of the controller.

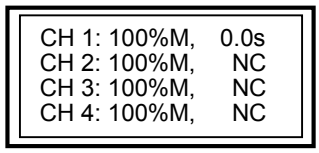
5. Operations

<Step 1> Connect the Electric Power by using the AC Power Cord

<Step 2> Power On

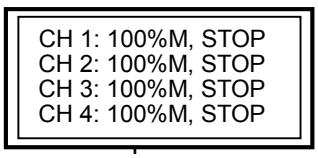
Insert the Key to the Key Holder and rotate it clockwise.
Then LCD will show basic display as follows and LED Indicating Lamp

named "POWER" will be turned on.



< Basic Display >

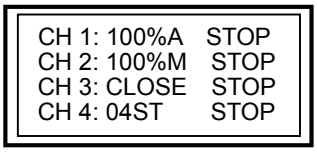
No. CH 1 is connected to the controller.
NC means "None Connected"



Press "Stop/Run" Switch to the Stop/Run Mode

<Step 3> Set the UV Light Intensity and Irradiation Time

In "STOP" staus, Pressing "Set" Switch, system enter setting mode



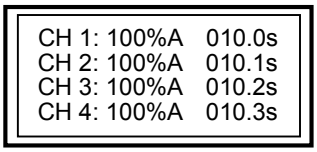
< Basic Display >

<Example>

CH1 to 4	:	Indicates the channel connection, irradiation operation
%	:	Display indicates the UV intensity level from 0~100%
A	:	Auto Mode
M	:	Manual Mode
CLOSE	:	Close Mode
04ST	:	Step Mode
STOP	:	Stop status of main unit

<Step 4> Set the UV Light Intensity and Irradiation Time in AUTO mode

1. Irradiation by pressing ch1~ch4 channel key on controller or external input signal. If the channel indicator stays on, Pressing the "ch1~ch4" switch will start Auto mode irradiation. Irradiation will stop when all channels have completed their irradiation time.
2. Press ch1~ch4 channel key again during irradiation. To immediately stop irradiation of all channels.



In "STOP" staus, Pressing "Set" Switch,
Using ①②③④ button to move cursor to where irradiation mode. Press ②④ button, until "A" is on

① , ③ button : "↑+"and"↓-'

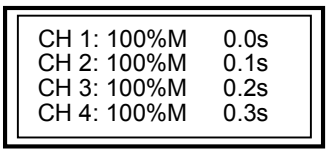
② , ④ button : "←"and"→"

<Example>

CH1 to 4	:	Indicates the channel connection, irradiation operation
s	:	Auto Irradiation time 0s ~999.9s

<Step 5> Set the UV Light Intensity and Irradiation Time in Manual mode

1. Irradiation by pressing ch1~ch4 channel key on controller or external input signal. If the channel indicator stays on, Pressing the "ch1~ch4" switch will start Manual mode irradiation, and the controller will record the irradiation time.util pressing the ch1~ch4 channel key again.
2. Press ch1~ch4 channel key again during irradiation. To immediately stop irradiation of all channels.



In "STOP" staus, Pressing "Set" Switch,
Using ①②③④ button to move cursor to where irradiation mode. Press ②④ button, until "M" is on

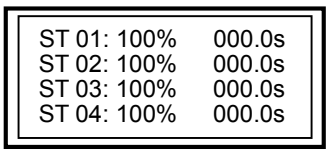
① , ③ button : "↑+"and"↓-'

② , ④ button : "←"and"→"

<Example>

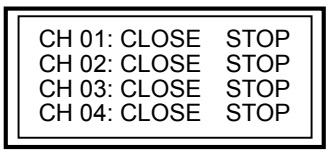
CH1 to 4 : Indicates the channel connection, irradiation operation
M: Manual Mode
s : Irradiation time 0s ~999.9s

<Step 6> Step mode



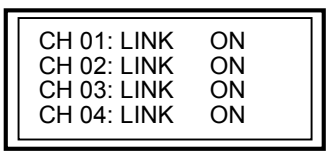
In "stop" status, press "set" switch ,Using "②" and "④" button to move cursor to where irradiation mode , then press "③+"and"④-' until M is on.
Settings of details (intensity and time of irradiation) please reference other mode.

<Step 6> Close mode



In "stop" status, press "set" switch ,Using "②" and "④" button to move cursor to where irradiation mode , then press "③+"and"④-' until M is on.
In this mode, irradiation is disable for every channels

<Step 7> Function Setting



In "stop" status, press "set" switch for 3 seconds, display as left;

LINK	ON	All channels are selected simultaneously start irradiation
	OFF	Indivdully irradiation
BUZZ	ON	When the irradiation time is out, buzzer alarm
	OFF	No BUZZER alarm
START	pulse	When the signal is on, starting irradiation, it is on again, stop irradiation;
	low	When the signal is on--off, irradiation is starting--stop
000000H00M00S		Total time of irradiation

※ Non-Use Channel

If some of channels are not used, please set OFF at SET TIME STAGE of each channel. Otherwise this situation causes fake error conditions.

CAUTION

Optimized UV Light Intensity and Irradiation Time
In order to increase lifetime of the UV-LED, it is desirable to set the values for the light intensity and irradiation time properly and not too much.

<Step 8> Curing Operations

Local Control
Press the "RUN/STOP" button once, then UV light from each channel shall be emitted in accordance with pre-set UV intensity power and irradiation time. During the UV light irradiation, the LCD will show remaining each time to be emitted and the system will stop each irradiation at each set time. Also during the irradiation, if the "RUN/STOP" button is pressed again, then the all UV light irradiation will be stopped promptly and the system will be stand-by in the pre-set values for intensity and time.
During the irradiation, LED indication lamp named "RUN" will be turned on. To start the next work cycle again with the same power and time set, simply press "RUN/STOP" button to repeat the process. This is also applied to a situation that the controller is being waked-up. The last irradiation set values are stored.

Remote Control by Foot Switch
Remote Run/Stop control can be also realized by using foot switches. In this case each channel is controlled by connected foot switch separately.

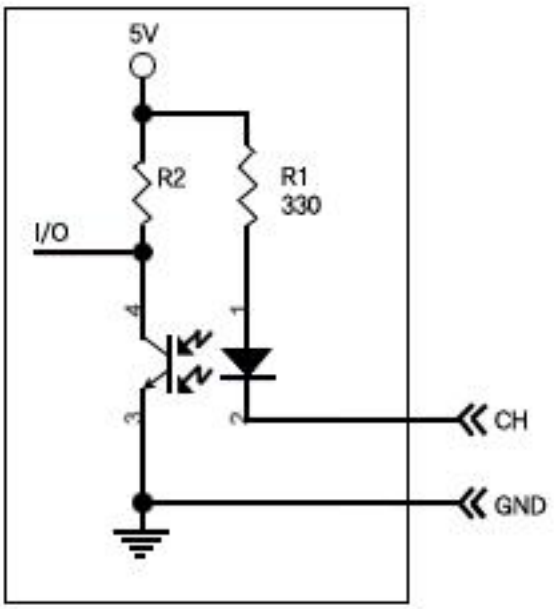
Remote Control by RS-232C Communication
Please refer to Chapter 6.

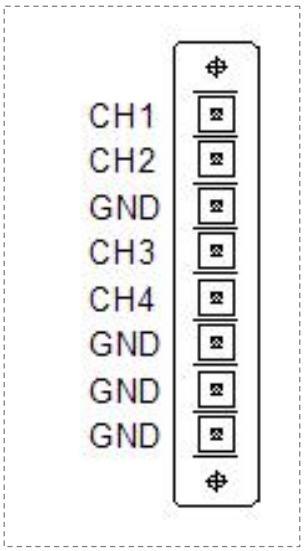
<Step 9> Power Off

After the operation stops, rotate the key switch counter-clockwise and pull out the AC Power Cord. Properly keep the UV LED Head Units with Condenser Lens Units in order to prevent it from being damaged.

6. Remote Control & Monitoring

6-1 Connection with Foot Switches





7. Error Conditions

If the following conditions happen, the electric power to the UV-LED will be blocked promptly, LED Indication Lamp named "ERROR" will be turned and the Controller will beep for three seconds. The error status on LED indication lamp and LCD will be maintained until reset of the system.

Error Condition	LCD Display	Countermeasure
Open Circuit *1	TRIP : OPEN CH1 CH2 CH3 CH4 CHECK SYSTEM	Check DC Output Cable & UV-LED
Emergency Stop Circuit Activated	TRIP : E-STOP CHECK SYSTEM	Check the all situation related with the system
Over Current *1	TRIP : OVER CUR. CH1 CH2 CH3 CH4 CHECK SYSTEM	Turn off the power and contact your TIOTEK KOREA representative.

8. Technical Specification

8-1 Controller

Parameter	Description / Value
Connectable Heads	Up to 4
Operation	Local + Remote (RS-232C, Foot SW, Interlock)

Display	LCD & LED Indicating
Power Input	100 ~ 240 VAC, Single Phase, 50/60 Hz
Power Consumption	< 50 VA max.
Intensity / Irradiation Control	Digital intensity and irradiation control Manual/timer control (0.1 to 999 sec.)
Cooling Method	Natural Air Cooling / Fan Air Cooling
Ambient Temperature/Humidity Range	5 ~ 35℃, 85% max. (no condensation)
Storage Temperature/Humidity Range	-10 ~ 60℃, 85% max. (no condensation)
Dimensions	W80 X D146 X H120 (excluding protrusions)
Weight	Approx. 1.0Kg

8-2 UV-LED Head Unit

Parameter	Description / Value	
	UH-365	UH-385
Radiant Wavelength Range (nm)	365±5	385±5
Light Source	Class 3B LED Product	
Expected LED Lifetime	20,000 hours	
Dimensions (mm)	Ø12 X H580 *1 (excluding protrusions)	
Weight (g)	Approx. 30 *1	
Ambient Temperature/Humidity Range	5 ~ 35℃, 85% max. (no condensation)	
Storage Temperature/Humidity Range	-10 ~ 60℃, 85% max. (no condensation)	

***1** : Under the following condition : combination of UV-LED Head Unit and Condenser Lens Unit

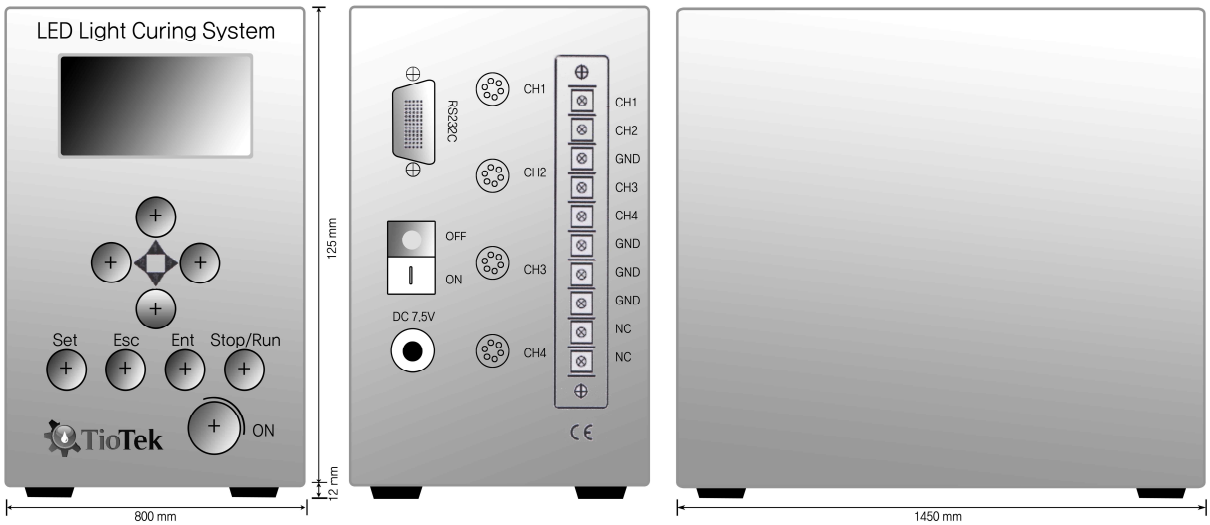
8-3 Condenser Lens Unit

Parameter		Description / Value		
		TUL-3	TUL-4	TUL-6
Spot Diameter (mm)		3	4	6
Recommended Working Distance (mm)		10	14	18
Peak UV Irradiation Intensity (mW/㎠) *1	with UH-365	9,000	6,000	4,800
	with UH-385	9,000	7,000	4,500

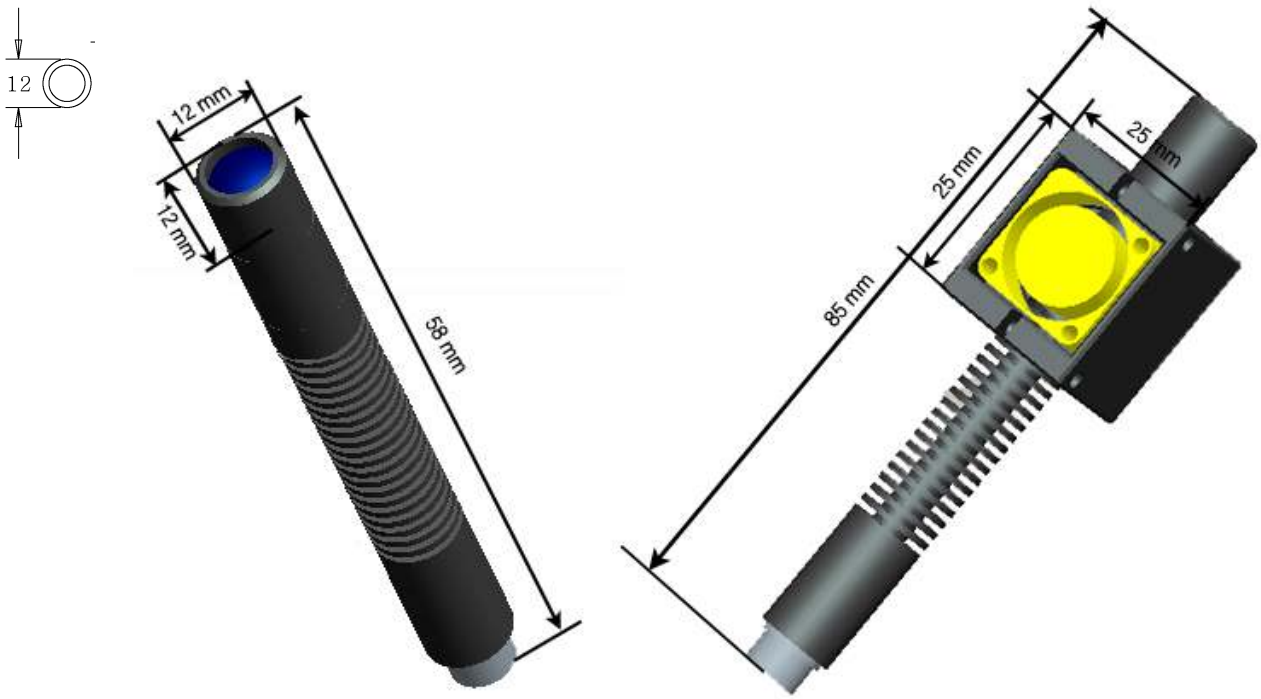
***1** : Under the following conditions : 100% illumination, 25℃ room temperature and with Head Fixture.
Values for reference only.

8-4 External Dimensions (mm)

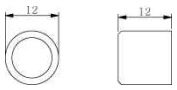
Controller



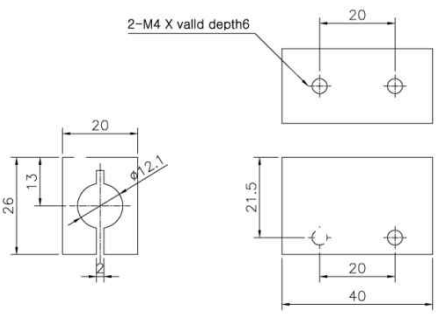
UV-LED Head Unit + Condenser Lens Unit



Condenser Lens Unit (Only)



Clamp



9. Troubleshooting

Please investigate the following points before requesting repair.

Malfunctions	Possible Causes & Corrections
Power cannot be on.	• The emergency stop circuit is activated. → Check the related connector, wiring and components. → Contact your TIOTEK KOREA representative.
UV Output intensity is low.	• The lens surface of Condenser Lens Unit is contaminated. → Clean it with a soft cloth. (dampened with alcohol)
	• The set value of UV Output intensity is low. → Adjust the set value properly.
	• The effective service life of UV LED has had it. → Check the accumulated LED turn-on time on. → Replace the LED Head Unit with a new one. → Contact your TIOTEK KOREA representative.
UV-LED doesn't light.	• The connectors of the DC Output Cable are not docked perfectly or the cable is damaged. (short/open circuit) → Check the connector and DC Output Cable.
	• The set value of UV Irradiation Time is OFF. → Adjust the set value properly.
	• There is a short circuit in the DC output cable or LED. → Contact your TIOTEK KOREA representative.

10. Maintenance of Condenser Lens

10-1 Cleaning the Condenser Lens Unit

CAUTION

A. Contamination on the lens surface decreases the UV-LED light intensity.
B. Care shall be taken when cleaning the lens because improper handling and cleaning may bring scratches or remove protective coating on the lens surface.

C. Do not remove the lens from the housing of Condenser Lens Unit.

- Remove the contamination on the lens surface periodically using a soft cloth moistened ethanol.

10-2 Replacing the Condenser Lens Unit

TioTek 4ch UV LED series provides 4 kinds of Condenser Lens Units (sold separately, one as basic and the others as option) whose irradiation beam diameters differ. Replace the proper Condenser Lens Unit according to the irradiation area and UV-LED light intensity.

WARNING

Turn off the electric power before replacing the Condenser Lens Unit.

- Turn the Condenser Lens Unit counterclockwise in order to take it out from the UV-LED Head Unit.
- Turn the replacement Condenser Lens Unit clockwise in order to install it to the UV-LED Head Unit.

11. Warranty

TIOTEK KOREA Co., LTD. (hereafter referred to TIOTEK KOREA) warrants that this product that it manufactures and sells will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If this product proves defective during its warranty period, TIOTEK KOREA, at its option, will either repair the defective product without charge for parts and labor, or provide a replacement in exchange for the defective product.
In order to obtain service under this warranty, Customer must provide the applicable office of TIOTEK KOREA or its authorized representative with notice of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by TIOTEK KOREA or its representative, with shipping charges prepaid. TIOTEK KOREA or its representative shall pay for the return of the product to Customer. Customer shall be responsible for paying any associated taxes or duties.

However if any of the following conditions applies, the cost of repair or replacement required to correct the trouble shall be charged to the customer even if it is within the warranty period.

- a trouble was caused by usage non-confirming to the instruction manual or negligent operation.
- a trouble was caused by disassembly or repair by the customer without any permission.
- a trouble was caused by an unauthorized electric or mechanical modification by the customer.
- a trouble was caused or induced by a natural calamity, earthquake, fire or otherwise irresistible force.
- a trouble was caused by a failure of the equipment or the like that is connected to or located near this equipment.

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TioTek Korea Co.,

Bucheon DaeWoo Technopark C-605 187-7
Dodang-dong, Wonmi-gu, Bucheon-si, Gyeonggi-do,
South Korea
Post : 420-806

TEL) 82 2 703 9917
82 32 670 7797
FAX) 82 32 670 7798
http://www.TioTek.kr
http://www.tiotek.co.kr
e-mail : sales@TioTek.kr