UC SANTA BARBARA
OASIS *Protofab*

Panasonic UJ35 UV LED Spot Cure SOP#: OAS-PF-0120-00

User Responsibility, Training, and Consequences of Misuse

OASIS prototyping facility, Protofab, operates as a shared research and prototyping facility. All users are expected to follow this SOP, facility policies, and applicable safety guidelines to ensure safe operation, equipment longevity, and equitable access for all users.

This SOP is not a substitute for hands-on training or tool qualification. Refer to User's Manual and Guides for details.
Users must complete required Protofab training and receive authorization prior to independent tool use. In the event of misuse, unintentional error, or non-compliance, corrective actions will be educational, proportional, and focused on preventing recurrence, taking into account the user's experience level and the nature of the issue.

Corrective actions may include:

- Clarification or coaching on proper tool use
- Additional training or temporary supervision
- Temporary suspension of independent tool access
- Restriction to supervised use until competency is re-established

Users may be held responsible for repair, cleaning, or downtime costs only in cases of negligence or repeated misuse.

1. Purpose

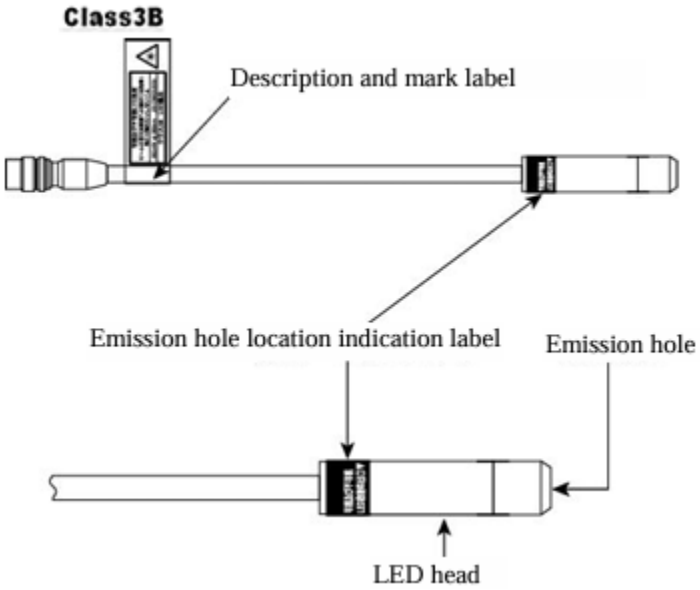
This Standard Operating Procedure (SOP) defines the safe and proper use of Panasonic Aicure UV LED spot cure system. This benchtop tool irradiates UV light to set (cure) UV curable material such as epoxies.

2. Scope

This SOP applies to standard methods of material curing and attachment. Non-standard methods and material are outside the scope of this SOP and require prior approval from Protofab staff.

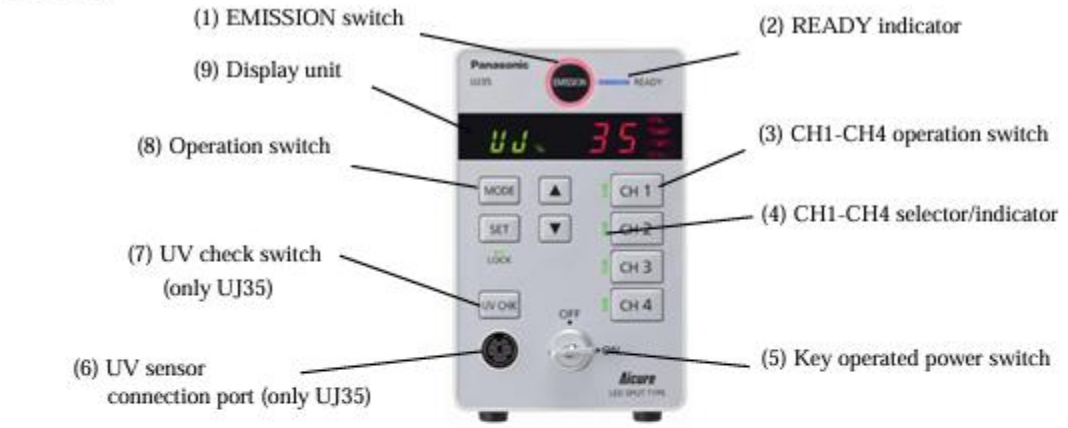
2. Safety & EHS

- This product is classified as Risk Group 3 (High Risk) under ANSI RP-27 and a Class 3B laser product although it is an LED product.
- **Eye Protection:** Always wear UV protective goggles specifically rated for the output wavelength (365nm, 385nm, or 405nm) to avoid severe inflammation or permanent injury.
- **Skin Protection:** Use protective gear, such as lab coats and gloves, to prevent direct or reflected radiation from touching the skin.
- The LED head can become very hot during irradiation. Do not touch the head directly with your hands during irradiation or immediately after.



3. System Overview

●Front



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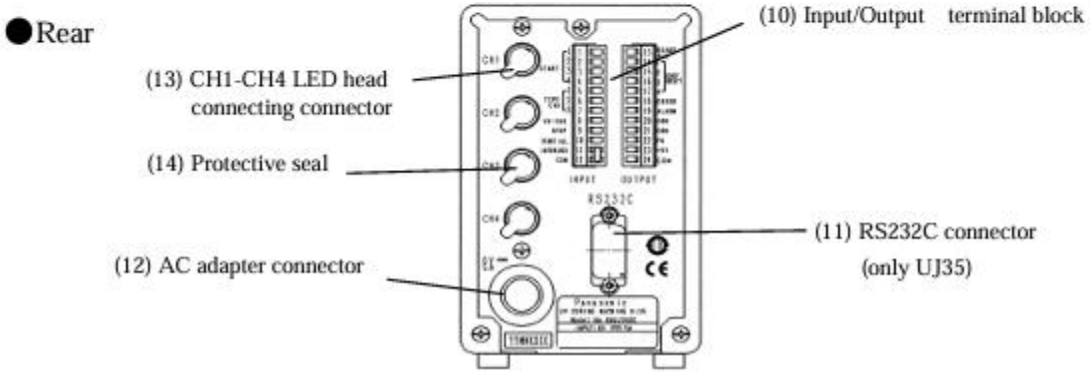


1. EMISSION Switch: UV is irradiated and stopped by selected irradiating CH head. Red lap is turned on during UV irradiation.
2. READY indicator: Indicated that UV irradiation is enabled (ready to start).
3. CH1-CH4 operation switch: Selects the LED head channels for irradiation.
4. CH1-CH4 selector/indicator: Red=irradiation, green=standby & yellow=error.
5. Key operated power switch: Commences or finishes operations of the controller.
6. UV sensor connection port: Connects the special UV sensor.
7. UV check button: Views/calibrates values measured by the special UV sensor.
8. Operation unit switch: Specifies irradiation conditions (intensity and time), replacement time settings, and initial values, and switches the display.
9. Display unit: Displays irradiation conditions (intensity and time), replacement time settings, head temperature, and initial values.
10. Input/output terminal block: Connects a PLC, foot switch, or other external device.
11. RS232C connector: Connects a PC, PLC, or other external device with RS232C.
12. AC adapter connector: Connects the special AC adapter.
13. CH1-CH4 head connecting connector: Connects LED heads.
14. Protective seal: Protects connectors.

4. General Guidelines for irradiation distance and UV intensity

In UV curing, dosage (also known as energy density) is the total amount of ultraviolet energy delivered to a specific surface area during exposure. It is the cumulative result of how intense the light is and how long it stays on the material.

Dosage is calculated by multiplying Irradiance (the "power" or intensity of the light) by Exposure Time. **Dosage (mJ/cm^2) = Irradiance (mW/cm^2) x Time (seconds)**

1. Fix the LED head to a jig at the appropriate distance from the workpiece, according to the size of the area to be irradiated (irradiation diameter). Data below.
2. Extract dosage or UV intensity from material datasheet or the recipe.
3. Extract UV intensity vs work distance (WD) from below per LED type (ANUJ6186 or ANUJ6180) and Lens Combination.
4. Calculate the duration of the irradiance. Note that thick material may need more time.

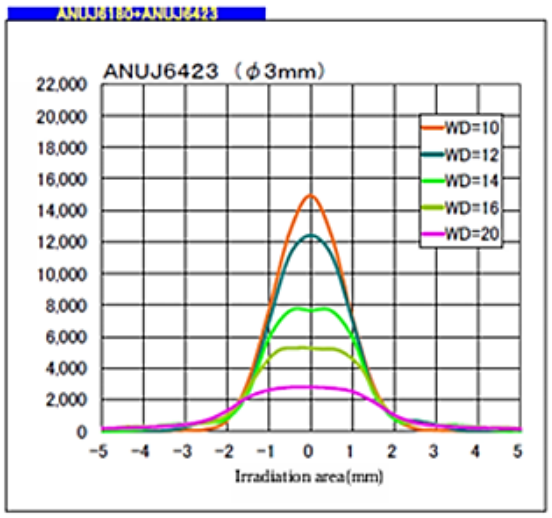
Standard head

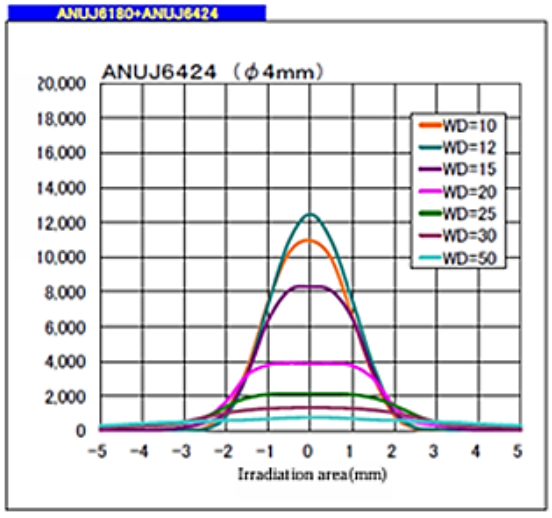
Item		ANUJ6180				
Lenses	Spot diameter	ϕ 3mm	ϕ 4mm	ϕ 6mm	ϕ 8mm	ϕ 10mm
	Lens model	ANUJ6423	ANUJ6424	ANUJ6426	ANUJ6428	ANUJ6420
UV intensity (mW/cm^2) *1		12500*2	10600*2	4720	2500	580
Working distance		10mm	12mm	20mm	25mm	30mm
Light source		Max. output: 990 mW, wavelength: 365±5 nm, Class 3B, LED				
Operating temperature/humidity range		+5 to +35°C, 30 to 85% RH (at 25°C, no condensation)				
Storage temperature/humidity range		–10 to +60°C, 30 to 85% RH (at 25°C, no condensation)				

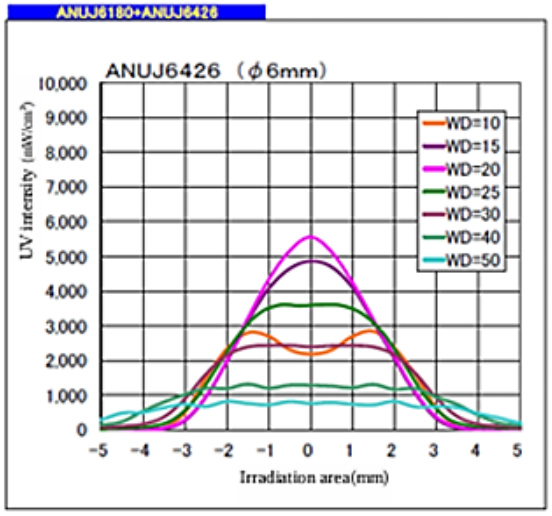
Smart head

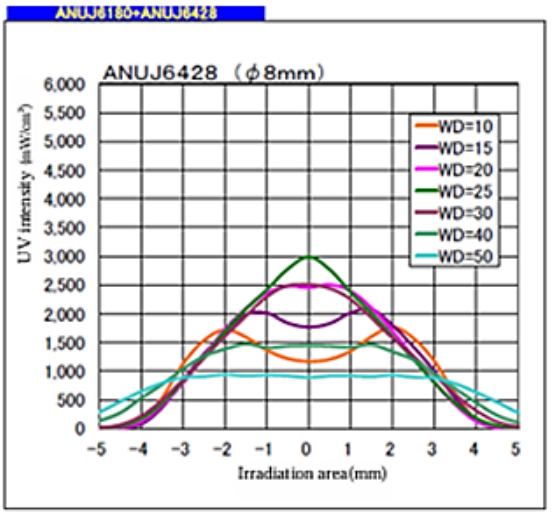
Item		ANUJ6186				
Lenses	Spot diameter	ϕ 3mm	ϕ 4mm	ϕ 6mm	ϕ 8mm	ϕ 10mm
	Lens model	ANUJ6423	ANUJ6424	ANUJ6426	ANUJ6428	ANUJ6420
UV intensity (mW/cm^2) *1		17200*2	14940*2	7560	4450	1360
Working distance		8mm	10mm	15mm	20mm	30mm
Light source		Max. output: 990 mW, wavelength: 365±5 nm, Class 3B, LED				
Operating temperature/humidity range		+5 to +35°C, 30 to 85% RH (at 25°C, no condensation)				
Storage temperature/humidity range		–10 to +60°C, 30 to 85% RH (at 25°C, no condensation)				

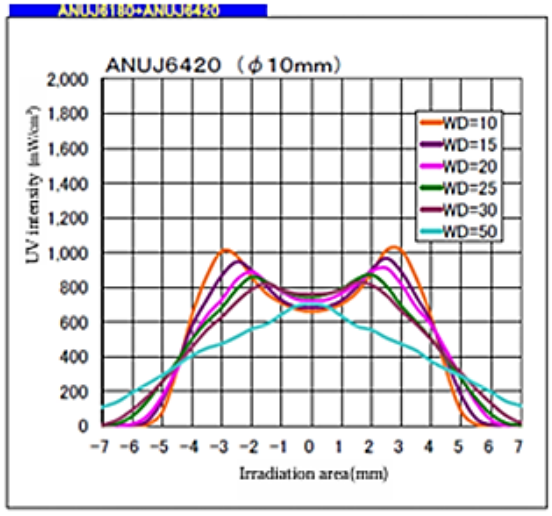
LED head(ANUJ6180)

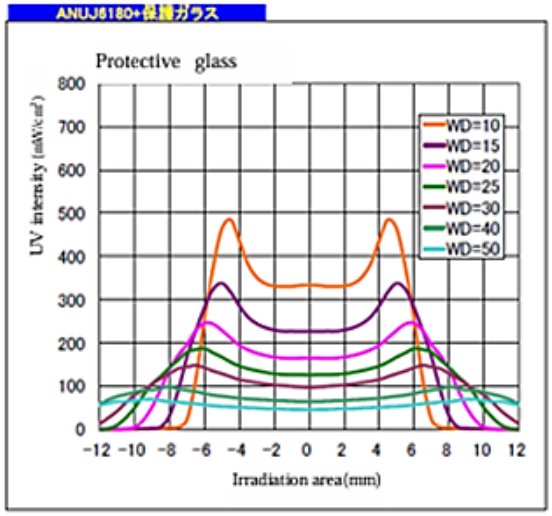




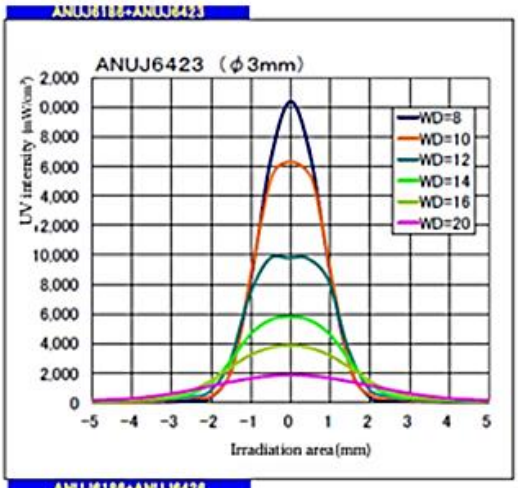


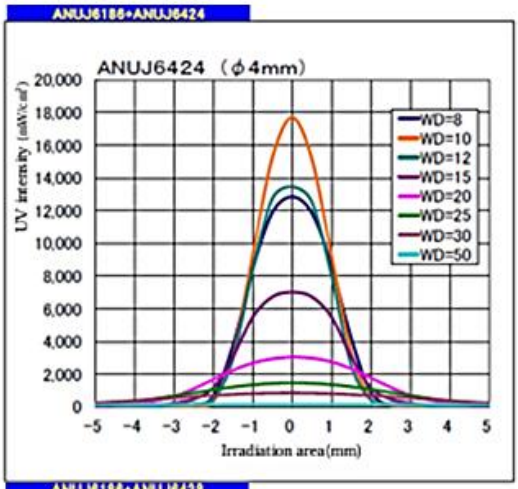


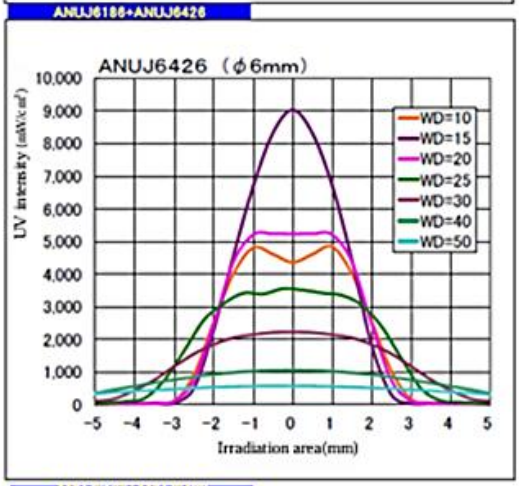


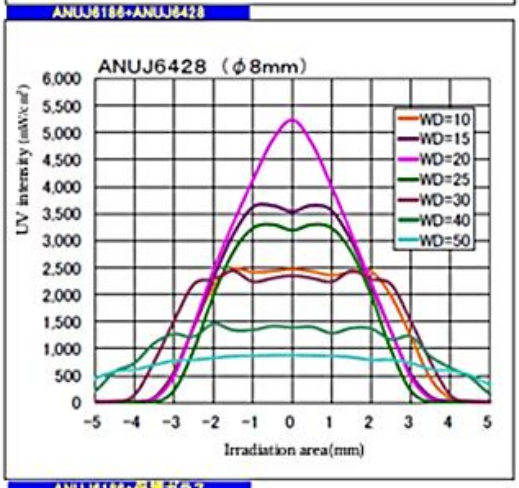


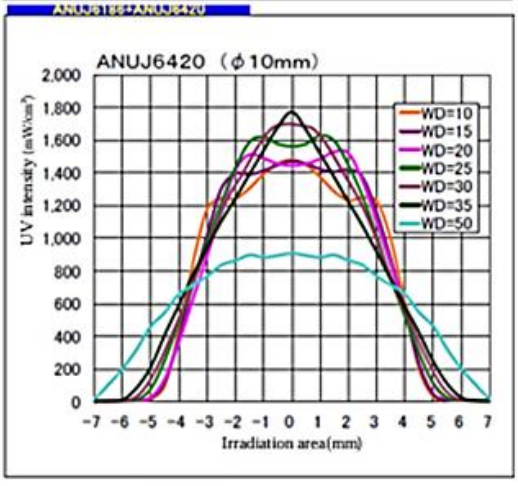
LED head(ANUJ6186)

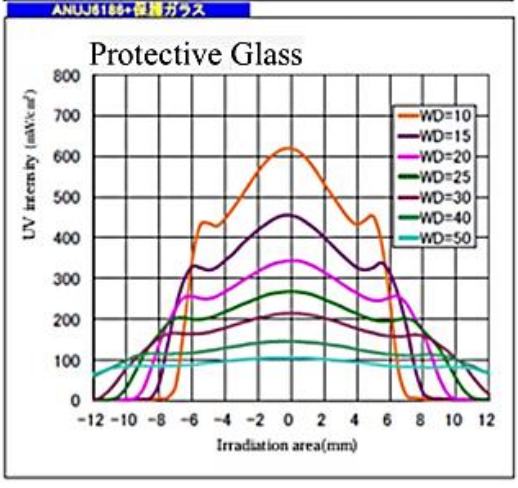












5. Pre-use checks (before every run)

- Verify connections (power supply and LED cables).
- Loose UV head adapters, lens and fixtures.

6. Standard operating procedure

6.1 Startup

Insert the supplied power key into the power key switch and turn it clockwise to ON position. When the power is turned on a beep will sound and the display will indicate startup status. The display will then change to operation mode (under the default setting).

6.3 Operation Modes and Settings

- **Setting Irradiation Conditions for each of CH1 to CH4:**

1. Channel Selection: Select the channel to be set by pressing CH1 to CH4. The selected channel is indicated by a green light (flashing or still). It is not possible to select a CH unless an LED head is connected to it. The display values apply to the flashing channel.
2. Setting Irradiation Intensity: Hold down the SET switch to select the CH to be set. (The selected channel is indicated by a green light.) Initially, only "%" (intensity) appears in the green (7-seg) display. Use △/▽ to set the desired intensity value, then press SET again to confirm. Note that while setting the irradiation intensity you can press the EMISSION switch to start UV irradiation.
3. Setting Irradiation Duration: When you have finished setting the intensity, the green display will automatically display only "sec." Use △/▽ to set the desired time value then press the SET switch again to confirm. Note that if you use ▽ to decrease the setting below "0.0 sec" the display will show "Con". At this setting irradiation will be continuous with no time limit.
4. Finalizing the Settings: After setting irradiation time and pressing SET the controller will return to Operation mode. To continue settings for other channels, repeat the procedure above from step 1 for each channel you wish to set. (It is possible to switch the display even during irradiation. The displayed values are stored in memory even when the controller is powered off. After the controller is powered on again it will restore the display to its last state. Note, however, that unless a channel is selected nothing will appear on the display).

- **Timer Irradiation:**

1. Select the channel/s for irradiation.
2. Press the EMISSION switch. Irradiation will start on all the active channels (green indicator). The EMISSION button glows red during irradiation. Irradiation stops after irradiation is finished on all channels.
3. To stop, press the EMISSION switch again.

- **Continuous Irradiation:**
  It is similar to “Timer Irradiation” but with duration set to “Con”. Refer to step 2 of the instructions above.

6.4 Troubleshooting & Errors

When an error occurs, the three-digit display will indicate the error code.

Display	Error name	Error description
E00	Interlock emergency stop	The interlock contact was opened during irradiation.
CH1-4 E10	Connection error	The LED head was disconnected.
CH1-4 E20	LED break error	A circuit break was detected in the LED head during irradiation.
CH1-4 E30	LED short-circuit error	A short-circuit of the LED head was detected during irradiation.
CH1-4 E40	LED temperature error	The LED head temperature reached an abnormal level.

Symptoms	Checks/Remedies
LED does not irradiate.	Did you select the target channel for the product type? (When selected, the channel switch is lit or flashing.) →Select the target channel when setting the product type. If the target channel is selected but does not irradiate, check if the irradiation time is set to 0.0sec for the channel program for the target product type. →If so, set the irradiation time to 0.0sec or longer.
When a warning message is displayed:	
Temperature warning	The channel connection indicator changes to orange (mixture of green and red) when the LED head temperature has reached the warning level. If you continue the operation in this condition, the product life will be significantly shortened, and the temperature may exceed the upper limit, causing an emergency stop. →Set the UV intensity level (%) lower or improve the heat radiation performance of the LED head to keep the temperature lower than the warning level.
Time warning	When the total irradiation time of the LED reaches the point 30 hours before the preset LED replacement point, the time warning is issued and "x100hrs" will be lit. When the time reaches the LED replacement point, the irradiation process will make an emergency stop. →Prepare a new LED head. After replacement, clear the total irradiation time.
When an error occurs:	
Interlock emergency stop (E00) "The interlock contact was opened during irradiation."	The emergency stop contact was opened during irradiation. →Check the emergency stop contact or the external input terminal block. Close the contact and then restart irradiation. * If the emergency stop contact is open, normal resetting is not available. Hold down SET to forcibly reset the interlock.
Connection error (E10) "The LED was disconnected during irradiation."	It is possible that the connection cable or LED head was broken. →Reset the error status, check the connection of the cable and LED head with the channel in question, and replace them if necessary.
LED wire broken (E20) "LED circuit opening was detected during irradiation."	The current detection was stopped during irradiation. It is possible that the connection cable or LED head was broken. →Reset the error status, check the connection of the connection cable and LED head with the channel in question, and replace them if necessary.
LED short-circuited (E30) "LED short-circuiting was detected during irradiation."	An overcurrent was detected during irradiation. It is possible that the connection cable or LED head was short-circuited. →Reset the error status, check the connection of the cable and LED head with the channel in question, and replace them if necessary.
LED temperature error (E40) "The LED temperature reached an abnormal temperature."	The LED temperature exceeded the upper limit. →Set the UV intensity level (%) lower or improve the heat radiation performance of the LED head to keep the temperature lower than the warning level.
LED time error (E50) "The total irradiation time reached the replacement point."	The total irradiation time of the LED reached the preset LED replacement point. (Or, it is possible that the LED replacement point was set ahead the total irradiation time.) →Reset the error status, replace the LED head, and then clear the total irradiation time. (Or, go to the mode setting screen and correctly set the LED replacement point.)
LED calibration error (E60 to E69) "Calibration uncompleted"	Calibration was stopped before completion. Or, the calibration was not successful. It is possible that the setting is too high, or there is a problem in the dedicated UV sensor (option). →Reset the error status, check the connection of the UV sensor, review the setting, and then retry calibration.

6.5 Shutdown

Turn it clockwise to OFF position (CCW) to turn the system off. No wire disconnection is needed.

7. Process recipes / parameters

- Recipes (settings) be found on ProtoWiki.

8. Change log

- Date / author / summary