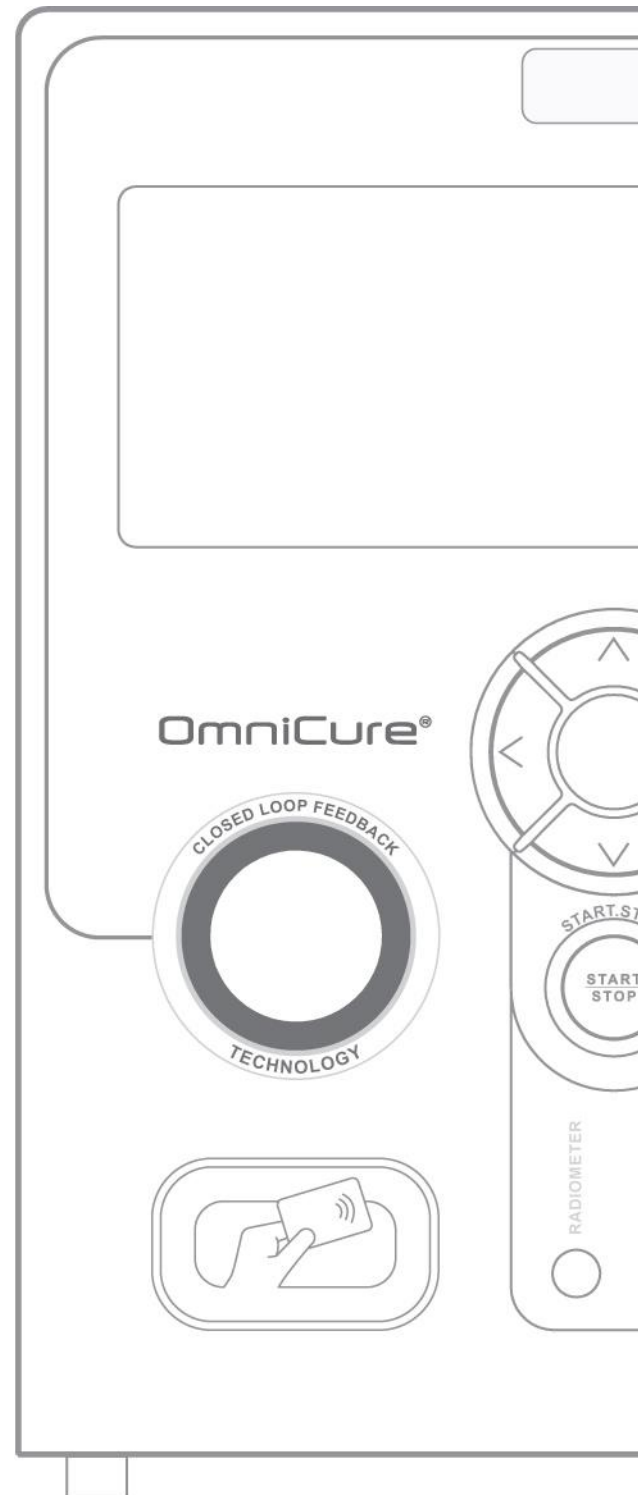


OmniCure®
UV Bonding • In Control

User Guide S2000 Elite/ S1500 Pro



OmniCure®
UV Curing • In Control

2260 Argentia Road, Mississauga, ON L5N 6H7 Canada
omnicure@excelitas.com

P: 905.821.2600
Toll Free (USA and CAN): +1 800 668-8752

www.excelitas.com

S2000 Elite/ S1500 Pro - User Guide

035-00707 Revision 3

1	S2000 Elite/ S1500 Pro - User Guide	8
1.1	Introduction	9
2	Safety Precautions.....	11
2.1	Glossary of Symbols.....	12
2.2	Safety Precautions.....	13
3	Getting Started	15
3.1	Box Contents	16
3.2	System front and rear details.....	17
3.3	Installing and Replacing the Lamp Module.....	19
3.4	Inserting and Removing the Light Guide	25
3.5	Optical Band-Pass Filters	28
3.5.1	Supported Lamp-Filter Combinations	28
3.5.2	Installing the Filter.....	29
3.6	Powering Up and Powering Down.....	30
3.7	Operational, Lamp Off and Sleep Mode	31
4	Running Exposures	31
4.1	Adjusting the Light Output	31
4.2	Adjusting the Light Output in Relative Mode	32
4.3	Adjusting the Light Output in Absolute Mode	34
4.4	Adjusting the Exposure Time.....	36
4.5	Calibration Process.....	37
4.5.1	Optical output calibration ¹	37
4.6	Close-Loop Feedback.....	39
4.6.1	CLF status indicator ¹	39
4.6.2	Relative mode:	39
4.6.3	Absolute mode:	40
4.6.4	Estimated Lifetime	40
5	Navigation.....	41
5.1	Touch-Screen Interface	41
5.1.1	Home Screen	41
5.1.2	Run Screen	42
5.1.3	Information Screen	43
5.1.4	Flight Recorder	43
5.1.5	System Info	48
5.1.6	Lamp Information	48
5.1.7	Settings Screen	49
5.1.8	System Setup	50

S2000 Elite/ S1500 Pro - User Guide

035-00707 Revision 3

5.1.9	Run Screen Settings	50
5.1.10	Network Setup	51
5.1.11	Date/Time Settings	51
5.1.12	Screen Brightness and Volume	52
5.1.13	Screen Lock PIN	52
5.1.14	Load Save	53
5.1.15	Advanced Setup	54
5.1.16	Calibration	55
5.1.17	StepCure	55
5.2	Web-UI	56
5.2.1	Logging-in	56
5.2.2	The <i>Run</i> screen	58
5.2.3	System Settings	58
5.2.4	Network settings	59
5.2.5	Flight Recorder:	60
5.2.6	Flight Recorder Event Types	60
5.2.7	Command Line:	64
5.2.8	StepCure	65
6	Locking and unlocking the S2000 Elite/ S1500 Pro	66
6.1	NFC Enabled access control	66
7	PLC Interfacing with the S2000 Elite/ S1500 Pro	67
7.1	Input/ Output Signals and Descriptions	67
7.1.1	PLC control signal specification:	67
7.1.2	Digital input signal requirement:	67
7.1.3	Analog input signal requirement:	68
7.2	PLC Connector: DB50	70
7.3	3.5mm Foot Pedal Connector: Signal Descriptions	75
7.4	Radiometer RS-232 Phono Connector: Signal Descriptions	75
7.5	Interfacing with the S2000 Elite using original S2000 I/Os	75
7.6	Connecting a Machine Status Indicator	75
8	LED Light Ring	77
9	Clearing Audible Alarm	78
10	Remote Automated Control Requirements	79
10.1	Com Port Configuration (for RS232)	80
10.2	RS232 Message Format and Protocol	81
11	StepCure®	82
11.1	Understanding Inputs, Outputs, and More	82

S2000 Elite/ S1500 Pro - User Guide

035-00707 Revision 3

11.2	How Does StepCure Work.....	83
11.3	Building blocks of a StepCure program:	83
11.3.1	Action Symbols (Inputs/Outputs)	83
11.3.2	Associated Elements	84
11.3.3	Connectors.....	86
11.3.4	Putting it Together	86
11.4	Examples	88
11.5	Interrupting StepCure Exposures	95
12	Routine Care and Maintenance	96
12.1	Replacing the External Fuses.....	97
12.2	Replacing the Air Filter	98
12.3	Light Guide Cleaning	99
13	Software Updates	101
13.1	Software Update via S2000 Elite/ S1500 Pro Touchscreen (w/ SD Card)	102
13.1.1	Materials Required.....	102
13.1.2	Preparing the SD Card	102
13.1.3	Performing the System Software Upgrade	103
13.1.4	Performing the Web Software Upgrade	103
13.2	Software Update via WEB UI	105
13.2.1	Materials Required.....	105
13.2.2	Performing the System Software Upgrade (w/ Web-UI).....	106
13.2.3	Performing the Web Software Upgrade	108
13.3	Software Update via USB	110
13.3.1	Performing the System Software Upgrade	110
14	Troubleshooting	112
15	Technical Specifications	118
15.1	Mechanical Specifications	119
15.2	Orientation	120
15.3	Ducting fans.....	120
15.4	Exposure Specifications	121
15.5	Lamp Module	122
15.6	System Specifications.....	124
15.7	I/O Ports (including RS-232).....	125
15.8	Environmental Conditions.....	126
15.9	Radio specifications.....	127
15.10	Noise and the OmniCure S2000 Elite/ S1500 Pro	128
15.11	Miscellaneous	130

16	Regulatory Compliance	131
16.1	FCC Part 15 Subpart B, Class A - Unintentional Radiators	132
16.2	FCC Part 15 Subpart C, Intentional Radiators	133
16.3	CE Marking	134
16.4	WEEE Directive	135
16.5	China RoHS	136
16.6	Optical Safety Data	137
17	Warranty	138
17.1	Replacement Lamp Warranty	139
17.2	Returning your S2000 Elite/ S1500 Pro to Excelitas Canada	140
18	Contact Information	141

List of Figures and Tables:

Figure 3-1	Front Panel Layout	17
Figure 3-2	Rear Panel	18
Figure 3-3	Lamp Housing Panel	20
Figure 3-4	Lamp Installation Orientation	21
Figure 3-5	Lamp Installation Orientation -2	22
Figure 3-6	Lamp Connections	23
Figure 3-7	Lamp Connections -2	24
Figure 3-8	Light Guide Port and Ring Light	25
Figure 3-9	Light Guide	26
Figure 3-10	Supported Lamp-Filter Combinations	28
Figure 4-1	Run Screen Controls (Relative Mode	32
Figure 4-2	Run screen controls (Absolute mode)	34
Figure 4-3	Start/ Stop Triggers	35
Figure 4-4	Time on Run Screen	36
Figure 4-5	R2000 Connection Diagram	38
Figure 4-6	Calibration Screen	38
Figure 5-1	Home Screen	41
Figure 5-2	Home Screen Icons	42
Figure 5-3	Information Screen	43
Figure 5-4	Flight Recorder	44
Figure 5-5	System Information Screen	48
Figure 5-6	Lamp Information Screen	48
Figure 5-7	Settings Screen	49
Figure 5-8	System Setup Screen	50
Figure 5-9	Run Screen Settings	51
Figure 5-10	Network Setup	51
Figure 5-11	Date/ Time Settings	52
Figure 5-12	Volume/ Screen Settings	52

Figure 5-13 Load/ Save Screen	53
Figure 5-14 Advanced Setup	54
Figure 5-15 Calibration Screen	55
Figure 5-16 WebUI Log-in	57
Figure 5-17 Web-UI Home Screen	57
Figure 5-18 Web-UI Turning on the lamp	58
Figure 5-19 Web-UI Run Screen	58
Figure 5-20 Web-UI System Settings	59
Figure 5-21 Web-UI Network Settings	60
Figure 5-22 Web-UI Flight Recorder	60
Figure 7-1 Active Low Signal Configuration	68
Figure 7-2 Active-High Signal Configuration	69
Figure 7-3 Real panel sample connection	69
Figure 7-4 DB50 Connector	70
Figure 11-1 StepCure connectors	86
Figure 11-2 Anatomy of a StepCure profile	87
Figure 11-3 Structure of a StepCure block	87
Figure 11-4 StepCure profile editor screen	88
Figure 11-5 StepCure block configurator screen	89
Figure 11-6 StepCure I/O configurator screen	89
Figure 13-1 Firmware update via Web-UI	105
Figure 15-1 System Dimensions with PLC Adapter	119
Figure 15-2 System Dimensions	119
Figure 15-3 Duct mounts	120
Table 3-1 Lamp Types	19
Table 3-2 Light Guide Status - Ring Light	26
Table 3-3 Available Filter Options	28
Table 4-1 Radiometer Port	37
Table 5-1 Run Screen Controls	43
Table 5-2 Flight Recorder Event Types	44
Table 5-3 Web-UI Flight Recorder Events	61
Table 5-4 Web-UI Save data to computer	64
Table 5-5 Web-UI Command Line	64
Table 5-6 Web-UI StepCure Interface	65
Table 7-1 PLC Control, Signal Specifications	67
Table 7-2 Digital Input Signal Requirements	68
Table 7-3 Analog input signal requirements	68
Table 7-4 PLC DB50 Pin-out table	74
Table 7-5 Foot pedal connector signal description	75
Table 7-6 Tree/ Stack Light status indicator	76
Table 8-1 LED Light Ring color reference	77
Table 11-1 StepCure Action Symbols	84
Table 11-2 StepCure Elements	86

1 S2000 Elite/ S1500 Pro - User Guide

Excelitas Canada Inc.
2260 Argentia Road
Mississauga (ON)
L5N 6H7 Canada
+1 905.821.2600
www.excelitas.com

Trademarks

OmniCure®, Intelli-Lamp®, StepCure® and Intelli-Tap™ are trademarks of Excelitas Canada Inc. All other product names are trademarks of their respective owners.

© Excelitas Canada Inc. 2023

All rights reserved

No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language in any form by any means without the prior written consent of Excelitas Canada Inc. Every effort has been made to ensure information in this manual is accurate; however, information in this manual is subject to change without notice and does not represent a commitment on the part of the authors.

035-00707R Rev.3

1.1 Introduction

This guide describes how to assemble, use, and maintain the OmniCure S2000 Elite/ S1500 Pro light-curing spot lamp system safely and efficiently. Excelitas Canada prepared this user guide for engineers, technicians, and manufacturing personnel. If you are new to operating ultraviolet light-curing equipment, contact an OmniCure representative to answer your questions before using the equipment. We suggest that you read this manual to discover all the features of the OmniCure S2000 Elite/ S1500 Pro, and how to use them.



This user guide is applicable to both the S2000 Elite and S1500 Pro models. Please note that while some features and functionalities are shared between the two models, certain features may vary or not be available in the S1500 Pro model. Where applicable, differences between models are highlighted in footnotes for easy reference.

The following table provides a comprehensive comparison between the OmniCure® S2000 Elite and the S1500 Pro, highlighting their key functional differences.

		S2000 Elite	S1500 Pro
Control & Repeatability	Closed Loop Feedback intensity monitor	✓	x
	Calibration/ Radiometry (R2000)	✓	x
	Intelli-Lamp 2.0	✓	✓
	High Speed Mechanical Shutter	✓	x
	StepCure	✓	✓
	Web-UI	✓	x
Optical	Replacement Lamp Part No	Standard: 012-68000R Surface Cure: 012-69000R	
	Optical Output	Up to 37W/cm2	
	User Interchangeable Optical Filters	✓	✓
	Filter Selection	No filter, 250-400nm, 320-390nm, 320-500nm, 365nm, 400-500nm	
	Custom Filter Support	✓	✓
	Warmup period	Min 4 min	
	Manual	LCD Touch Screen + Physical Keypad	
Automation / Industry 4.0 Compatibility	Built-in PLC controller	Yes, 7 programmable PLC output channels	Yes, 1 Programmable PLC output channel
	Fully programmable in new StepCure 2.0	✓	✓
	USB Type B	✓	✓
	RJ45 Ethernet	✓	x
	Built-in server enabled Web-GUI based monitoring and remote control	✓	x

S2000 Elite/ S1500 Pro - User Guide

035-00707 Revision 3

	SD Card Store/ Read StepCure profiles, System Log, Firmware Update	✓	✓
	Flight recorder	✓	✓
	NFC	✓	✓
	Field Upgradeable Software	✓	✓
Electrical	Rated Input Voltage	100-240VAC, 50/60Hz	
	Current	3.5A Max at 120VAC	
		2.0A Max at 240VAC	
Physical	Size (H x W x D)	268 x 139 x 289 mm	
		(10.54 x 5.45 x 11.38 in)	
	Weight	3KG (6.6lbs)	
	Rated Operating Temperature	15°C to 40°C	
Warranty	System	1 Year	
	Lamp Strike	2000 Hours	

2 Safety Precautions

The S2000 Elite/ S1500 Pro has been designed with safety in mind. Multiple failsafe mechanisms exist to minimize risks on danger to the user. Some risks cannot be mitigated by the systems' design and requires user precaution and understanding of all potential dangers. Please review the [Glossary of Symbols](#) and [Safety Precautions](#) before proceeding with the use of this product.



To avoid exposure to high-intensity UV radiation, read and ensure you understand the information in this user manual before assembling and operating the S2000 Elite/ S1500 Pro UV spot curing system.

- [Glossary of Symbols](#)
- [Safety Precautions](#)

2.1 Glossary of Symbols



CAUTION - Risk of danger: consult accompanying documents.



CAUTION – Hot surface



WARNING - UV radiation hazard



WARNING – Eye damage may result from directly viewing ultraviolet radiation. Protective eye shielding and clothing must be used at all times.

	Input Signals
	Input/Output Signals
	Output Signals

2.2 Safety Precautions

The S2000 Elite/ S1500 Pro is equipped with two safety sensors to protect the user from accidental UV exposure. In addition, please observe the following precautions during use. This Series of cautions, warnings and dangers relate to the operation and maintenance of the S2000 Elite/ S1500 Pro. They are also presented throughout this User's Guide where necessary.



- Disconnecting the main supply source is only possible by unplugging the POWER cord.
- To reduce the risk of fire or shock, always replace the fuses with the same type and rating. Always detach the POWER supply cord before attempting to replace fuses!
- This unit contains HIGH VOLTAGE components. It is recommended that ONLY QUALIFIED TECHNICAL PERSONNEL perform any testing or repairs.
- Only use detachable MAINS supply cord with adequate RATING supplied by Excelitas Canada Inc. with the S2000 Elite/ S1500 Pro unit. Using inadequate/lower RATING MAINS supply cord in a manner not specified by Excelitas Canada, the protection provided by the equipment may be impaired.
- **Monitoring the unit during manual operation:** The Level of UV energy supplied by the S2000 Elite/ S1500 Pro is sufficient to ignite flammable substances. During manual operation, the unit must always be attended by a qualified operator. The unit must not be left unattended while turned on. If an operator leaves the work area of the unit, the POWER switch must be turned off.
- **Monitoring the unit during automated operation:** The Level of UV energy supplied by the S2000 Elite/ S1500 Pro is sufficient to ignite flammable substances. Therefore, when the unit is operated unattended in an automated environment, the user must provide an alarm function to indicate a malfunction in the associated equipment used.
- **Exposure to Mercury represents a health hazard to humans:** When unpacking or installing the lamp, always wear protective clothing and a face mask. Operate lamp only in the S2000 Elite/ S1500 Pro lamp housing. This prevents direct viewing of the arc and in the case of lamp bursting, contains the lamp particles. In the rare instance in which a lamp bursting occurs, and the mercury content is released, the following safety precautions are recommended: all personnel should be immediately evacuated from the area to prevent inhalation of the mercury vapor. The area should be well ventilated for a minimum of 30 minutes. Before cleaning up, ensure an approved mercury respirator mask and non-porous gloves such as latex or rubber are used. After the lamp housing elements have cooled, the mercury residue should be collected with the use of a special absorbing agent available from laboratory equipment suppliers.
- The method in which lamps are disposed of must comply with local rules & regulations for disposal of hazardous materials. Lamps may be returned to

Excelitas Canada, providing they are returned in its original packaging. Excelitas Canada will dispose of them in the appropriate manner.

- Should this S2000 Elite/ S1500 Pro unit be used in a manner not specified by Excelitas Canada, the protection provided by the equipment may be impaired.
- The lamp module's operational life can be significantly shortened if it is handled incorrectly. Do not touch the bulb's glass envelope or the inside surface of the reflector. Skin oils can cause the lamp module to fail prematurely.
- Any electronic equipment connected to the S2000 Elite/ S1500 Pro must be IEC950 certified.
- Clean exterior of the unit with a water dampened cloth and simple detergent only.



- UV emitted from this product. Avoid eye and skin exposure to unshielded product.
- Ensure the light guide is properly inserted into the S2000 Elite/ S1500 Pro before turning on POWER to the unit. This will minimize the risk of exposure to the UV radiation.



- Before opening the unit and handling the lamp module, allow the lamp module to cool down completely (approximately 20 min).



- Possibly hazardous optical radiation emitted from this product. Do not stare into operating lamp.
- Eye damage may result from directly viewing the light produced by the lamp used in this product. Always use the UV protective eyewear supplied with the unit and always turn the lamp off before removing lamp housing cover.
- Never look into the light emitting end of the light guide. The light could severely damage the cornea and retina of the eye if the light is observed directly. Eye shielding must be used at all times as well as clothing to protect exposed skin.
- UV protective eyewear must meet the following recommended optical specifications: **Spectral range 320-500 nm**

3 Getting Started

To get started, please reference the Quick-Start guide included with your S2000 Elite/ S1500 Pro and review the topics in this section.

- [Box Contents](#)
- [System front and rear details](#)
- [Installing and Replacing the Lamp Module](#)
- [Inserting and Removing the Light Guide](#)
- [Installing the Optical Band-Pass Filter](#)
- [Powering Up and Powering Down](#)
- [Operational, Lamp Off and Sleep Mode](#)

3.1 Box Contents

Every S2000 Elite/ S1500 Pro UV Lamp Spot Curing Unit will come with the following items included in the shipping box:

- UV Safety Glasses
- Foot Pedal Switch
- Lamp Housing Access Tool (fastened beneath the system housing)
- Grounded POWER Cord
- USB Type-B to Type-A Cable
- Quick-Start Guide

If a kitted version was purchased, the following will also be included in the box:

- Optical bandpass filter (Selected wavelength)
- A 200W lamp module

Any additional optional items purchased to customize the unit may also be present in the system packaging or may be shipped in separate packaging.

If your packaged unit is missing any of the above components, call Excelitas Canada Inc. at 905-821-2600 or 1-800-668-8752.

3.2 System front and rear details

Front Panel

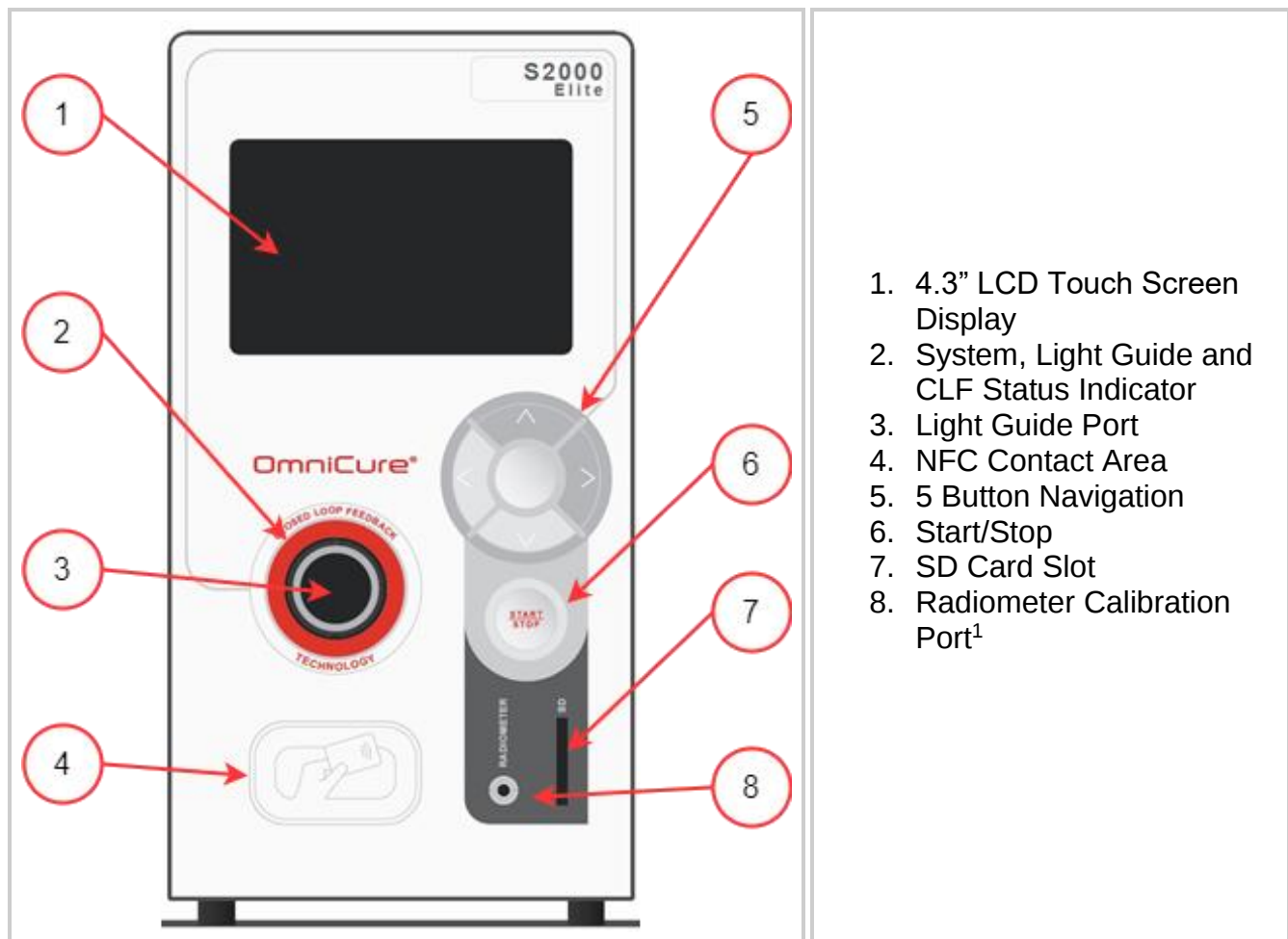


Figure 3-1 Front Panel Layout

¹ Not available on S1500 Pro

Rear Panel

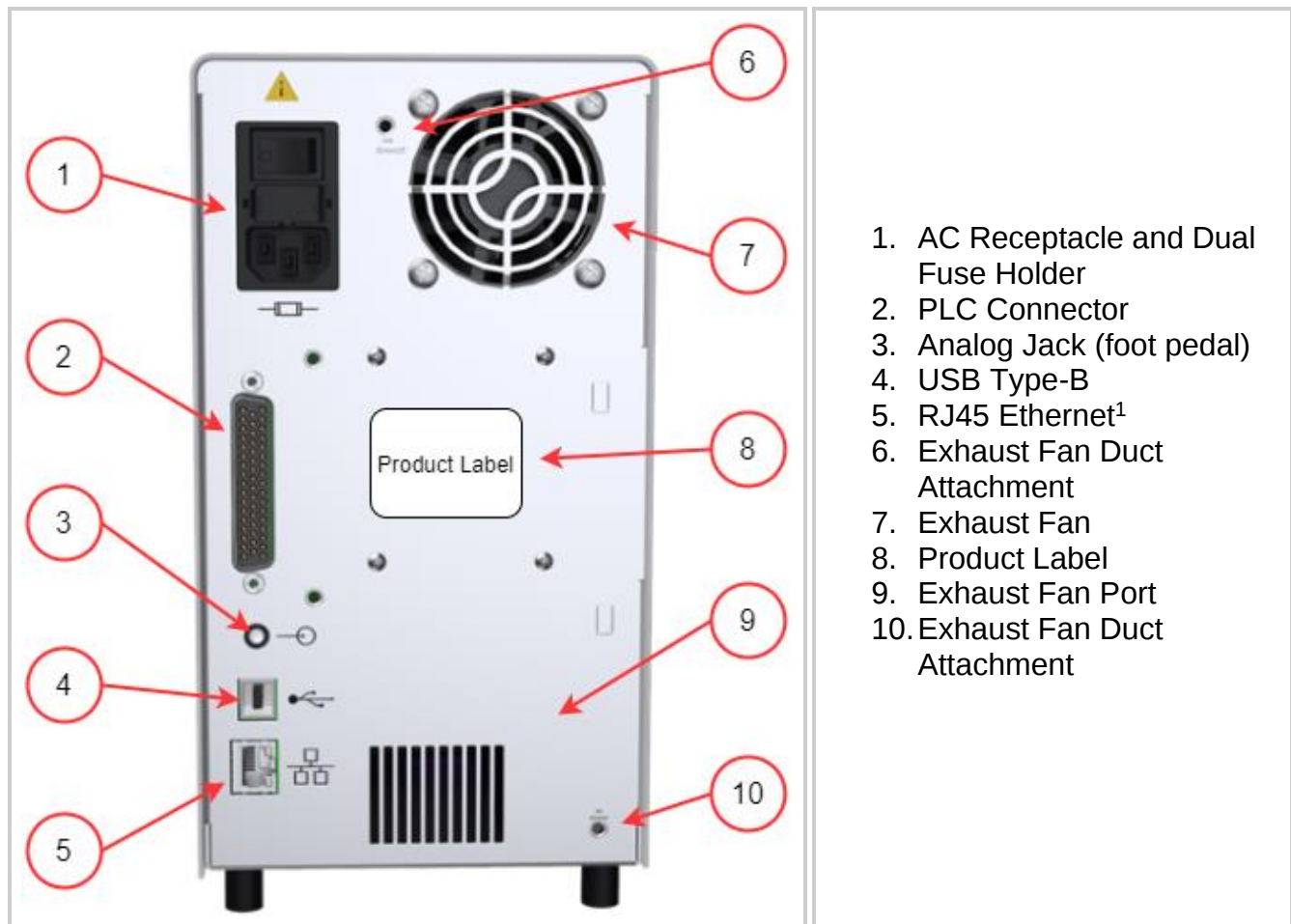


Figure 3-2 Rear Panel

¹ Not functional on S1500 Pro

3.3 Installing and Replacing the Lamp Module

The S2000 Elite/ S1500 Pro comes with a choice of a standard or surface curing lamp. Please ensure that the appropriate lamp type has been selected for your curing application. The part number of the lamp module is available on the lamp box.

Part Number	Description
012-68000R	Standard Curing Lamp
012-69000R	Surface Curing Lamp

Table 3-1 Lamp Types



Please ensure that the AC POWER cord is disconnected from the unit.
Refer to [Safety Precautions](#) before proceeding



If the unit contains an existing lamp, ensure that the lamp module has cooled down completely prior to opening the unit.

The S2000 Elite/ S1500 Pro curing system can automatically detect and adjust its parameters for all lamp options offered with the product.

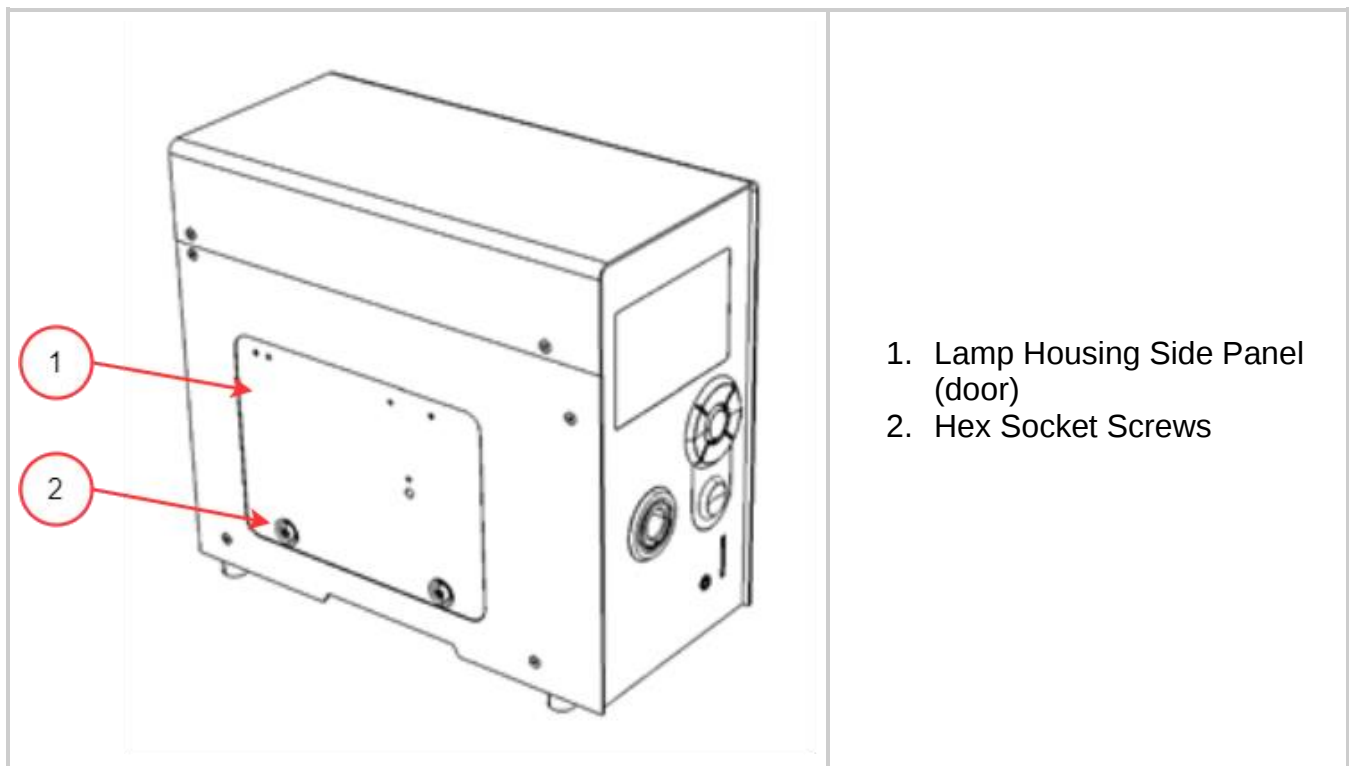


Figure 3-3 Lamp Housing Panel

1. Loosen the two hex socket screws from the lamp housing side panel using the tool provided (3mm Allen key) and remove the panel from the unit cover.
2. Carefully remove the lamp module from its container by holding either the ceramic component or the lamp rim only, as shown in **Figure 3-4**.
3. Position the lamp as illustrated in **Figure 3-4**, facing towards the unit's front panel and the POWER leads facing away from the unit. The lamp should be aligned so that the leading edge of the reflector (lamp rim) fits into the mounting groove on the lamp holder assembly.



The lamp module's operational life can be significantly shortened if handled incorrectly. Be sure only to handle the ceramic surfaces and the lamp rim. Do not touch the bulb's glass envelope or the inside surface of the reflector. Skin oils can cause the lamp module to fail prematurely.

The lamp is sensitive to ESD. Wear ESD protective clothing when handling the lamp to prevent ESD damage.

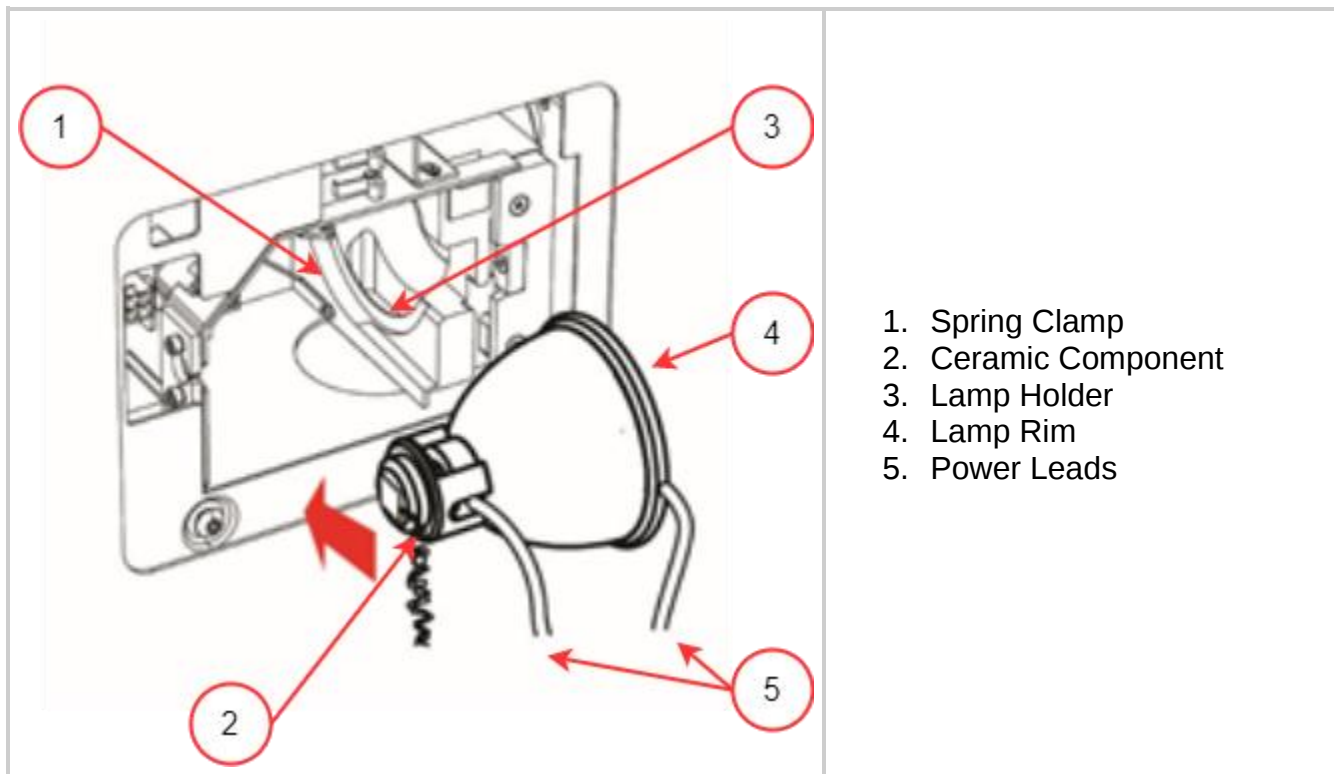


Figure 3-4 Lamp Installation Orientation

1. Ensure that the middle body of the lamp is in position to fit into the spring clamp shown in **Figure 3-4**.
2. Slide the lamp in until it snaps into the spring clamp. The leading edge of the reflector (lamp rim) should fit snugly into the lamp holder recess.
3. Adjust or rotate the lamp to ensure that the right power lead is not in contact with any part of the lamp holder. It should be centered within the lamp holder cut-out shown in **Figure 3-5**.

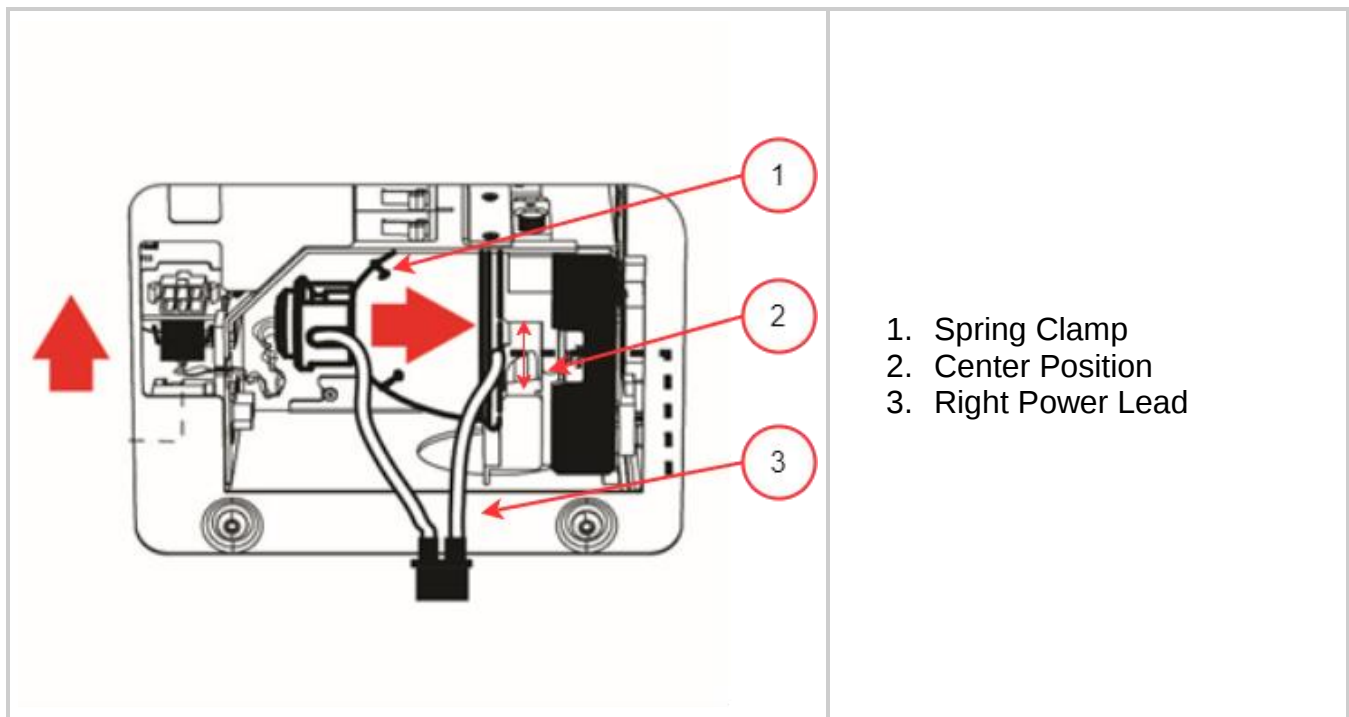


Figure 3-5 Lamp Installation Orientation -2

1. Locate the 6-pin Intelli-Lamp sensor connector at the rear of the lamp module and connect it to its mate located on the top of the lamp-housing wall.
2. Tuck the Intelli-Lamp cables into the grommet shown in **Figure 3-6** or else it may obstruct the panel door from closing.

i The Intelli-lamp connector will only attach in the correct orientation. If there are difficulties attaching the connector, try rotating it by 180°.

If the Intelli-lamp connector is not installed correctly, the lamp will not strike and the screen will display a Lamp Strike Error when POWER is turned on to the unit.

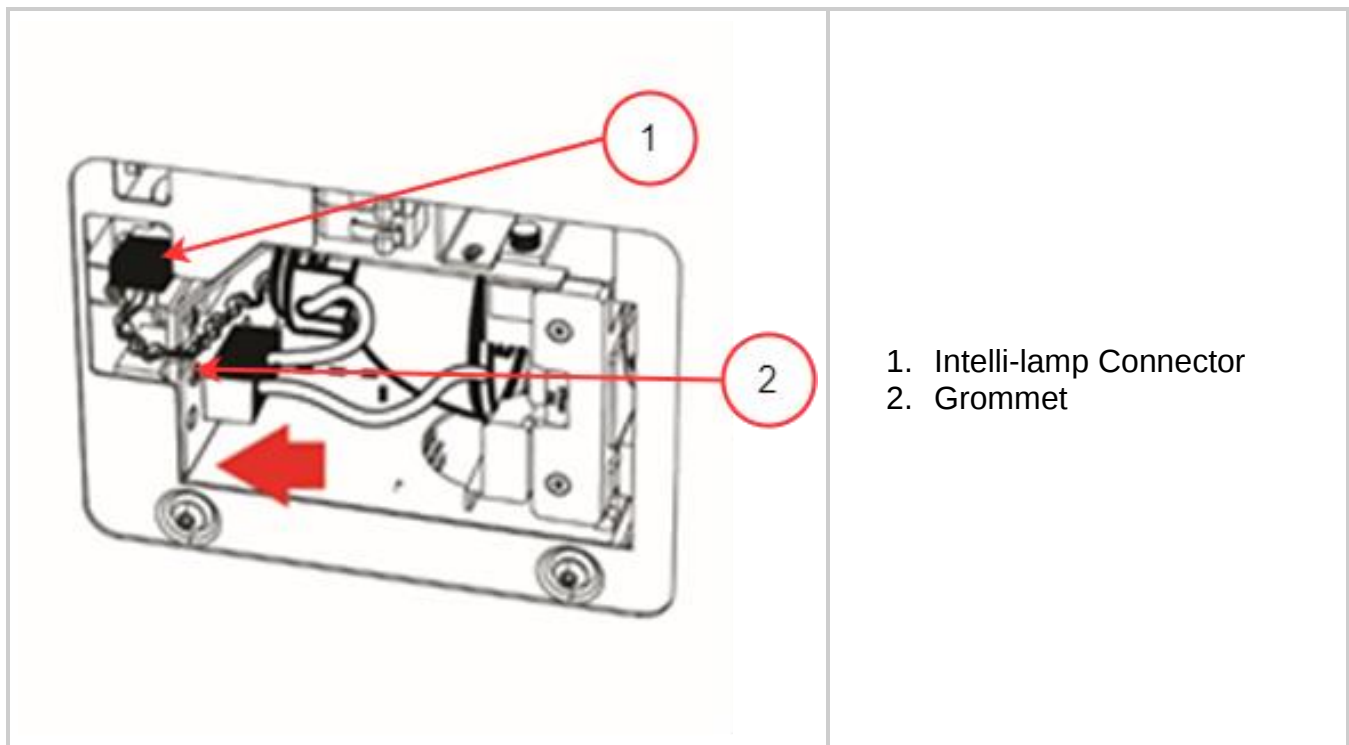
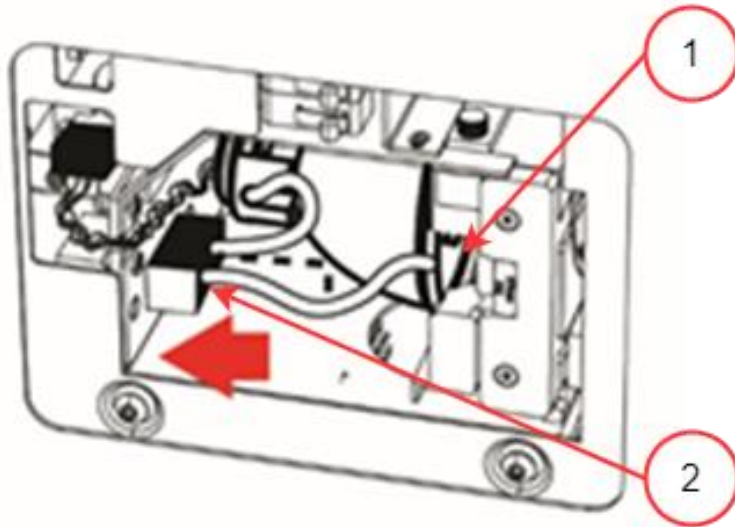


Figure 3-6 Lamp Connections

- i** The power connector will only attach in the correct orientation. If there are difficulties attaching the connector, try rotating it by 180°.

Figure 5: Lamp Connections



1. Center Bar and Lead Within the Cutout.
2. Power Connector

Figure 3-7 Lamp Connections -2

1. Locate power connector with two leads shown in **Figure 3-7** and connect it to the mate located on the side of the lamp-housing wall.
2. Replace the lamp housing side panel (door) and tighten the fastening hex screws shown in **Figure 3-3**.



If the lamp housing panel is not secured completely, the system will not turn on.

If an incompatible lamp has been installed in the unit, the system will not strike the lamp.

3.4 Inserting and Removing the Light Guide

- i** 3mm single leg liquid light guides are not compatible with the S2000 Elite/ S1500 Pro.

1. Ensure that any protective end caps are removed from all ends of the light guide prior to installation.
2. Clean the input and output ends as needed to ensure proper light transmission.
3. Insert the light guide into the light guide port located on the front panel of the unit.
4. Push the light guide in until it sits with a second positive "click".

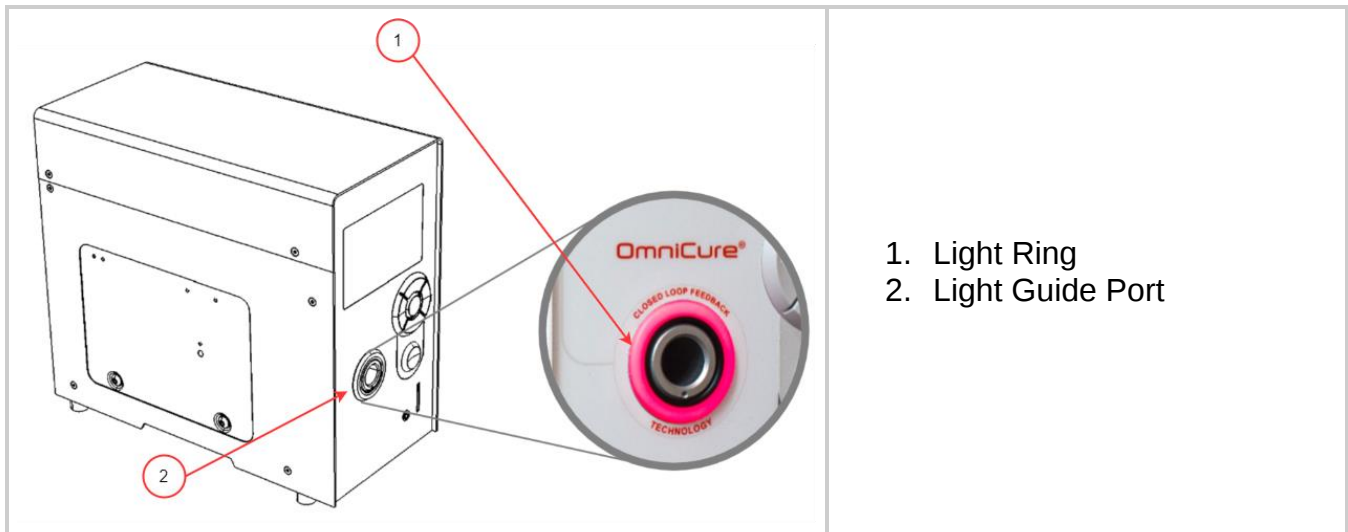


Figure 3-8 Light Guide Port and Ring Light

- i** Never grip the light guide during installation or removal in a place other than the strain relief portion of the light guide.

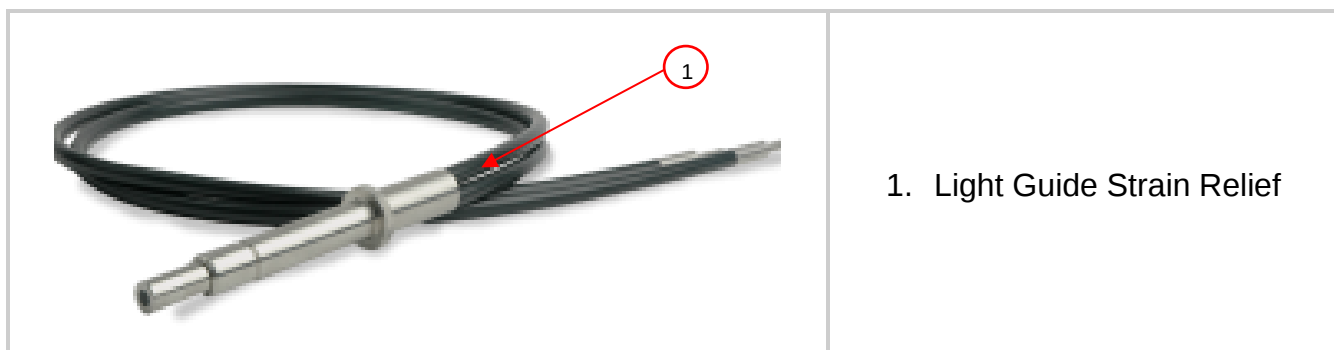


Figure 3-9 Light Guide

1. During installation or removal, grasp the light guide on the strain-relief nearest to the input end of the light guide.
2. To remove the light guide, firmly grip the strain relief near the light guide retainer and pull out firmly.

When the light guide is fully inserted while the unit is powered ON, the light ring will illuminate to: (for more information refer to Table 8-1 LED Light Ring color reference)

Status	Color	Blinking
Calibration in process or Software Update in process	Green	1Hz
Light guide detected (closed loop feedback active, calibrated absolute mode active)	Green	No
Light Guide detected (Calibrated absolute mode, Closed loop feedback active, Iris at 2-5% or 95-99% position and/or calibration time remaining at 18 hours or less.)	Yellow	No
Light guide detected (Closed loop feedback active, Relative Mode)	Purple	No
Lamp warming up	Blue	No
Lamp not lit (Sleep Mode)	White	No
Light guide not detected	Red	No
No lamp detected	Red	1Hz
Alarm or Fault detected	Red	2Hz

Table 3-2 Light Guide Status - Ring Light¹

If the light guide is not inserted or improperly inserted, the light ring will illuminate in red.

¹ Closed loop feedback and Calibration/ Absolute modes are not applicable to S1500 Pro

-  The shutter will not open if the light guide is not fully inserted.

Refer to [Light Guide Cleaning Instructions](#) for instructions on how to clean your light guides.

The S2000 Elite/ S1500 Pro is designed for use with Excelitas Canada Light Guides. Excelitas Canada cannot guarantee the performance of the S2000 Elite/ S1500 Pro if using light guides other than those supplied by Excelitas Canada.

3.5 Optical Brand-Pass Filters

The OmniCure S2000 Elite/ S1500 Pro curing system is equipped with user-changeable optical filter cartridges. Listed below are the 7 (seven) different filter options available.

Part #	Description
019-00387R	400-500 nm
019-00388R	365 nm
019-00389R	320-390 nm
019-00390R	250-450 nm
019-00391R	320-500 nm
019-00392R	Blank Filter
SR	Custom Filter

Table 3-3 Available Filter Options

3.5.1 Supported Lamp-Filter Combinations

Only Following configurations of Lamps – Filters are supported by default.

Lamp\Filters	250-450nm	365nm	320-390nm	320-500nm	400-500nm	Empty Filter	Custom*
Standard Lamp UV1 (012-68000R)	✓	✓	✓	✓	✓	✓	✓
Surface Cure Lamp UV3 (012-69000R)	✓	x	x	x	x	✓	✓

Figure 3-10 Supported Lamp-Filter Combinations

3.5.1.1 Custom Filters

- i** Custom Filters ship with an SD-Card which contains information (file: filter_profile.csv) required by the S2000 Elite/ S1500 Pro to recognize the filter and adjust system settings accordingly.
SD-Card with the filter information must be inserted after installing the custom filter and before the system is powered on. The system will not allow the lamp to power on

if it does not detect this information.
If required, contact our support team for further assistance.

3.5.2 Installing the Filter

After selecting the appropriate optical filter, it can be installed inside the unit in a similar fashion to the lamp installation procedure mentioned in [Installing the Lamp Module](#).



Please ensure that the AC POWER cord is disconnected from the unit.



If the unit has a lamp already installed, ensure that the lamp module has cooled down completely prior to opening the unit.

1. Loosen the two hex socket screws from the lamp housing side panel using the tool provided (3mm Allen key) and remove the panel from the unit cover.
2. Carefully remove the filter cartridge from its packaging and insert it into the slot with the filter's model number tag pointing towards the lamp.
3. Secure the filter to the system using the provided M4 screws and 3mm Allen key.
4. Replace the lamp housing side panel and tighten the fastening hex screw.
5. Reconnect the AC power cord and turn on the Power switch at the back of the unit to turn the system ON.



When removing filters from the system, the screws can be secured by inserting them back into the same thread holes.

If the filter is properly installed, the system will automatically recognize the filter type. It will be shown in the "Information" section of the GUI.



If the filter is not properly fastened or a filter was not installed, the filter will not be recognized, and the lamp will not strike.

3.6 Powering Up and Powering Down

Lamp Warm-Up:

The ARC lamp has 3 distinct phases of operation:

Phase 1: Ignition.

Phase 2: Four minute warm up period.

Phase 3: Stable Operation.

Excelitas Canada recommends 20 minutes of warm-up to ensure a stable optical output.



The lamp must be allowed to warm up uninterrupted or else it can result in shortened lamp life.

Interrupting Phase 1 or Phase 2 more than once in the Lamp's lifetime will void the Lamp warranty - "VOID" will be displayed in the Lamp information screen.

1. Ensure that the lamp and light guide have been properly installed and that the lamp housing panel is securely fastened as outlined in chapter 6.
2. Plug the S2000 Elite/ S1500 Pro unit into a properly grounded AC outlet.
3. Turn on the mains POWER switch, located on the [rear panel](#).

As soon as the LCD screen turns on, a splash screen will appear and transition into a warm-up indicator screen. Furthermore, the light ring will light up blue to indicate that the system is warming up.

Phase 2 (warm-up) takes approximately 4 minutes. A timer will be displayed to count down the warm-up period. Once the timer has run out, the user may enter the “Run” screen. Excelitas Canada recommends 20 minutes to ensure a stable optical output.



If the default lamp status has been changed, then phases 2 and 3 will not occur until the lamp is turned on using the front panel controls.



If the lamp is turned off, and an attempt is made to turn it back on before it has fully cooled, the system will wait until the lamp is cool before it can strike. The lamp will automatically re-strike when the lamp has cooled.

To power down the unit, set the mains power switch located on the back panel to “0”.

-  10 (ten) exposures must be run, or 5 minutes required to save any new exposure settings (intensity & timer) into memory for it to remember next time the system is powered-up.

3.7 Operational, Lamp Off and Sleep Mode

The S2000 Elite/ S1500 Pro has three states/modes:

1. Operational
2. Sleep
3. Power Saver

In Operational mode, the system Lamp is turned on and all functions are enabled.

In Sleep mode, the system Lamp is turned off and the RUN screen is not accessible. You can navigate to all other sections of the User Interface, but you cannot run exposures.

If the system has been in Sleep mode for more than 30 minutes with no input, it will go into a power saving mode where the LCD screen will turn off. The system can exit power saving mode and be accessible again by activating the LCD screen or any of the navigational buttons.

4 Running Exposures

4.1 Adjusting the Light Output

Your S2000 Elite/ S1500 Pro system includes an adjustable iris to control the intensity level of the light output from the unit. On the RUN screen, use the navigation buttons to navigate to the intensity window, press OK and use the Up/Down buttons to adjust exposure intensity or press the intensity window icon and enter the desired intensity using the keypad. You can also edit the exposure time in the same way, by navigating to the timer window. Press OK and use the Up/Down buttons to adjust time or press the timer window icon and enter the desired count down time on the number pad (in 0.1s increments). Set value to 0 to operate the system in Count Up mode.

The S2000 Elite/ S1500 Pro system offers two different operating modes for intensity control: *Relative or Absolute*.

Relative Mode (Default): This mode offers an un-calibrated intensity level, in which the light intensity output is proportional to the percentage of the iris opening. The value is shown on the RUN screen as a percentage.

Absolute Mode¹: This mode offers a calibrated intensity level output and is only accessible when the S2000 Elite has been calibrated with an R2000 radiometer. The value is shown on the RUN screen in irradiance (W/cm²) or in units of power (W).

¹ Not available on S1500 Pro



Removing the light guide from the front panel optical port while in Absolute Mode will erase the stored calibration, and the unit will automatically return to Relative Mode.

4.2 Adjusting the Light Output in Relative Mode

Relative mode is the default operational mode for the S2000 Elite/ S1500 Pro when it is not calibrated. In this mode, you can set the UV output as a percentage of the bulb's maximum output. As such, if the maximum output is known, it can be used to estimate the output power at varying percentages.



Closed-Loop Feedback¹ will be OFF if the exposure alarm is activated or if the iris is opened at 100% or 1%.



Ensure that the lamp is ON. By default, the lamp should turn ON when the unit powers up. If not, press the [LAMP](#) icon.

1. Navigate to the RUN Screen to see the light output controls.

1. Remaining calibration (h) ¹
2. Estimated lifetime (h)
 1. Estimated based on current set intensity and prior use history, updates in 1-minute intervals.
 2. See Estimated Lifetime for more details
3. Closed-loop feedback status¹
 - Red - Inactive
 - Yellow – Close to inactive range
 - Green - Active
4. External SD card detected
5. Shortcut to StepCure
6. Start/Stop exposure
7. Set count-down time for exposure duration. Set to 0 for count-up mode.
8. Select to set the exposure intensity. Percentage is displayed for relative mode.
9. Lock/unlock the screen
10. Turn the lamp off (sleep mode)

Figure 4-1 Run Screen Controls (Relative Mode)

¹ Not available on S1500 Pro

The light intensity setting will be displayed with percent to indicate that it is running in relative mode.

- **Count-down mode:** If a time value greater than ZERO is selected, then the timer will be set to COUNT DOWN mode. This will be further indicated by an arrow pointing DOWN above the watch icon. In this mode, the shutter will OPEN and remain OPEN for the duration of the countdown period. The shutter will CLOSE when the timer hits ZERO.
- **Count-up mode:** If the time value is set to ZERO, then the timer will be set to COUNT UP mode. This will be further indicated by an arrow pointing UP above the watch icon. In this mode, the shutter will remain OPEN until manually closed by the user or stopped by an alarm. The timer will behave as a stopwatch.

The shutter can be opened using any of the following triggers below.

	The shutter can be opened using the START/STOP button located on the front panel. The button can be pressed anytime the lamp is ON. The directional buttons can be used to adjust the iris opening even when the shutter is OPEN in COUNT UP mode only.
	The shutter can be opened using this button on the touchscreen or the WEB UI¹.

 UV radiation will be emitted from the light guide. The light could severely damage the cornea and retina of the eye if the light is observed directly. UV protective eye shielding must be used at all times as well as clothing to protect exposed skin.

 The shutter will not open if the light guide is not inserted properly.

For any setting at 99% or less, the S2000 Elite will record the optical output intensity using internal sensors for the Closed-Loop Feedback circuit. Each subsequent exposure will automatically generate the same optical output intensity, even as the lamp ages. As a result of lamp aging, subsequent exposures may display a higher iris open percentage value; however, the output intensity will be consistent with the original setting ($\pm 5\%$ or $200\text{mW}/\text{cm}^2$, whichever is greater).

¹ WebUI is not available on S1500 Pro

4.3 Adjusting the Light Output in Absolute Mode¹

Absolute mode allows the user to control the output using irradiance values. It allows for more control over output independent of the maximum lamp output. This mode is only available after the S2000 Elite has been calibrated using the R2000 Radiometer.



Removing the light guide at any time from the front panel light guide port will require re-calibration of the S2000 Elite.



Ensure that the lamp is ON. By default, the lamp should turn ON when the unit powers up. If not, press the [LAMP](#) icon

1. Navigate to the Run Screen to see the light output controls.



1. Remaining calibration (h)
2. Estimated Remaining lamp life (h)
 - a. Estimated based on current set intensity and prior use history, updates in 1-minute intervals.
 - b. See Estimated Lifetime for more details.
3. Closed-loop feedback status
 - a. Red - Inactive
 - b. Yellow – Close to inactive range
 - c. Green - Active
4. External SD card detected
5. Shortcut to StepCure
6. Start/stop exposure
7. Set a countdown time for exposure duration. set to 0 to count-up.
8. Set the exposure intensity. Irradiance is displayed for absolute mode
9. Lock/unlock the screen
10. Turn lamp off (sleep mode)

Figure 4-2 Run screen controls (Absolute mode)

The light intensity setting will be displayed with irradiance or power units to indicate that it is running in absolute mode.

- Count-down mode: If a time value greater than ZERO is selected, then the timer will be set to COUNT DOWN mode. This will be further indicated by an arrow pointing DOWN above the watch icon. In this mode, the shutter will OPEN and remain OPEN for the duration of the countdown period. The shutter will CLOSE when the timer hits ZERO.

¹ Not available on S1500 Pro

- Count-up mode: If the time value is set to ZERO, then the timer will be set to COUNT UP mode. This will be further indicated by an arrow pointing UP above the watch icon. In this mode, the shutter will remain OPEN until manually closed by the user or stopped by an alarm. The timer will behave as a stopwatch.

The shutter can be opened using any of the following triggers below.

	The shutter can be opened using the START/STOP button located on the front panel. The button can be pressed anytime the lamp is ON. The directional buttons can be used to adjust the iris opening even when the shutter is OPEN in COUNT UP mode only.
	The shutter can be opened using this button on the touchscreen or the WEB UI.

Figure 4-3 Start/ Stop Triggers



UV radiation will emit from the light guide. Do not look into the light. The light could severely damage the cornea and retina of the eyes. UV protective eye shielding must be used at all times and clothing to protect exposed skin.

- i** The shutter will not open if the light guide is not inserted properly.

While in Absolute Mode, and while the shutter is closed, the displayed irradiance value is the user defined Setpoint. Whenever the shutter is open, the S2000 Elite will immediately adjust the optical output to within +/-2% of the Setpoint. The actual output irradiance will be displayed at this point and will vary slightly (to within +/-5% or 200mW/cm², whichever is greater) from exposure to exposure.

OmniCure® S2000 Elite Minimum Adjustable Irradiance Level: 0.5W/cm²

4.4 Adjusting the Exposure Time

Exposure time can be set to either COUNT UP or COUNT DOWN on the RUN SCREEN.

- In COUNT UP mode, the timer will start incrementing when the shutter is OPENED and stop once the shutter CLOSED. This will essentially record the duration of time that the shutter was OPEN. To set the timer to COUNT UP, select the timer button, set the time to ZERO, and press ENTER.
- In COUNT DOWN mode, the timer will start decreasing the selected time when the shutter is OPENED. Once the time reaches ZERO, the shutter will CLOSE. To set the timer to COUNT DOWN, select the timer button and select the time desired (greater than ZERO).

Timer control:

- The timer can be started by pressing the START/STOP button, the PLAY button or with a momentary press on the FOOT PEDAL.
- The timer can be reset once the exposure is running by pressing the START/STOP button, the STOP button, or a momentary press of the FOOT PEDAL.

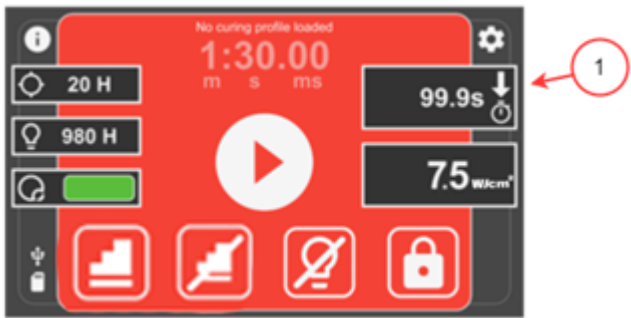
	1. Timer Window
	Run exposure
	Stop & Reset exposure

Figure 4-4 Time on Run Screen

 The shutter will not open if the light guide is not inserted properly.

4.5 Calibration Process

Calibration of the exposure timer is not required.

The S2000 Elite/ S1500 Pro system uses an external oscillator to generate its system clock signal. It provides a stable and precise clock signal to the S2000 Elite/ S1500 Pro control system and sub-systems, including the timing module of the light intensity control shutter. The oscillator maintains a constant frequency throughout the product lifetime and requires no calibration.

The S2000 Elite/ S1500 Pro design allows Excelitas Canada to guarantee the exposure timer tolerance for the lifetime of the product. The exposure timer does not need calibration.

- i** S2000 Elite/ S1500 Pro Exposure Timer Tolerance: +/- 250ms or +/- 1% of the exposure time setting, whichever is greater.

4.5.1 Optical output calibration¹

The S2000 Elite system can operate in two different output intensity modes: Absolute or Relative.

- Absolute mode: refers to the condition when the S2000 Elite has been calibrated. The display will show the absolute value of irradiance in W/cm² or power in W.
- Relative mode: refers to the condition when the S2000 Elite/ S1500 Pro has not been calibrated. The display will show the percentage that the iris is open.

The S2000 Elite can be calibrated¹ and correspondingly set to a specified irradiance (setpoint) by the R2000 Radiometer. The R2000 Radiometer connects to the S2000 Elite via the front panel RS-232 Radiometer port.



1. Radiometer Port (3.5mm)

Table 4-1 Radiometer Port

¹ Not available on S1500 Pro

S2000 Elite/ S1500 Pro - User Guide

035-00707 Revision 3

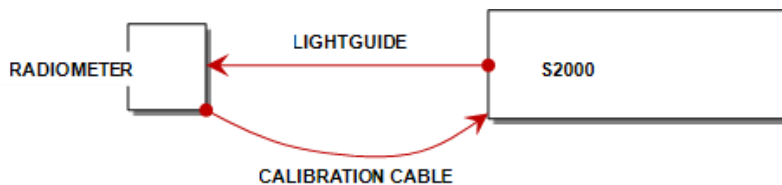


Figure 4-5 R2000 Connection Diagram

While the CAL button on the radiometer is pressed, the display will indicate the current setpoint and the SET icon will be flashing. If the CAL button on the radiometer is pressed for less than 5 seconds, the current radiometer set point will be sent to the S2000 Elite.

Holding this button for 5 seconds will store the current optical input into the radiometer's set point (this feature can be enabled or disabled via PC). The SET Icon will cease flashing and be continuously on until the button is released.

When the CAL button is pressed for less than 5 seconds and released, the radiometer will send the setpoint to the S2000 Elite, thus setting the S2000 Elite in absolute mode. Additionally, the current light guide diameter value selected by the radiometer will be transferred to the S2000 Elite. This light guide diameter will be used by the S2000 Elite to calculate the proper output irradiance in W/cm² or power in W.

Whenever the calibration procedure is activated, the screen on the S2000 Elite will change to the screen below.

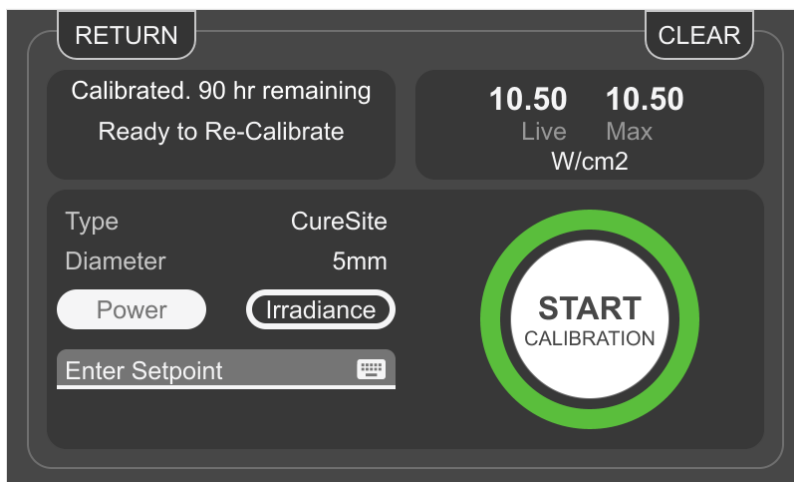


Figure 4-6 Calibration Screen

The S2000 Elite calibration is valid for 112 hours of elapsed lamp-on time as measured from the time the unit is calibrated with an R2000 Radiometer.

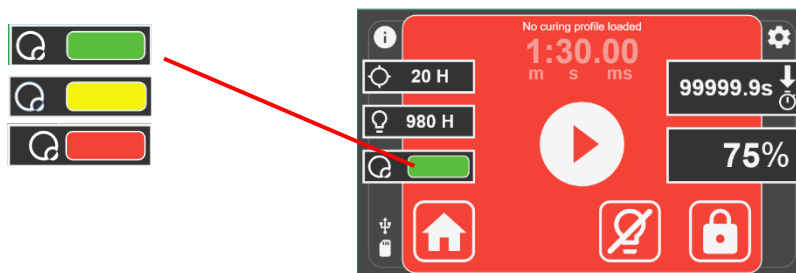
-  For detailed operating instructions regarding calibration of the S2000 Elite, refer to the R2000 user's guide.

4.6 Close-Loop Feedback¹

The OmniCure S2000 Elite patented Closed-Loop Feedback (CLF) technology utilizes an internal optical feedback sensor mechanism to monitor lamp output in real time and adjust the iris to automatically maintain the irradiance level to within +/-5% of the set point, ensuring repeatable and measurable doses of curing energy for increased yields and quality.

4.6.1 CLF status indicator¹

The LCD display has a CLF status indicator window on the run screen.



Condition	Color
Closed-Loop Feedback active	Green
Closed-Loop Feedback within 5% of being inactive (Iris at 2-5% or 95-99% position)	Yellow
Closed-Loop Feedback Inactive (Iris at 1% or 100% position) and/or Light Guide not detected	Red

4.6.2 Relative mode:

4.6.2.1 S2000 Elite

In relative mode, the system will adjust the iris to a user-programmed set-point. For any exposure intensity setting of 99% or less, the S2000 Elite will record the optical output intensity and iris position using internal sensors. Even as the lamp ages over time, Closed Loop Feedback technology ensures that each subsequent exposure automatically generates the same optical output intensity (to within +/-10%), by internally adjusting the iris.

The recorded output intensity is reset under the following circumstances:

- The light guide is removed from the optical port for any reason while the system is operational.
- The lamp is replaced
- Optical filter is replaced

If the system is unable to provide the set output by adjusting the iris position, the system will provide a CLF error. In this case, the user will need to re-insert the lightguide to allow the system to re-record the optical output as the set-point.

¹ Closed Loop Feedback is not available on S1500 Pro

4.6.2.2 S1500 Pro

The system adjusts the iris based on the user-programmed set point. However, it is important to note that without an intensity monitor, as the lamp ages, the optical output at the same set point may decrease.

4.6.3 Absolute mode¹:

This mode is only available once the S2000 Elite system has been calibrated using the connected R-series radiometer.

In absolute mode, the optical feedback monitor will monitor the optical level and maintain it as constant (to within +/-5% or +/-200mW/cm², whichever is the greater) by automatically adjusting the iris position to account for lamp intensity variation. The display will show the calibrated irradiance level in W/cm². Closed Loop Feedback will be active for all exposures greater than 0.1 seconds.

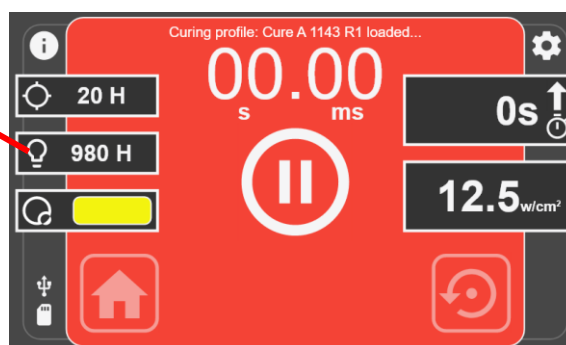
The system will revert to relative mode under any one of the following conditions:

- The light guide is removed from the optical port for any reason while the system is operational
- The calibration expires
- Maintaining the optical output level requires an iris position beyond the available range
- The lamp is replaced
- Optical filter is replaced

A system can be in absolute mode as long as the desired output optical irradiance can be maintained by the system by adjusting the iris position. If the system can no longer compensate for intensity variation by adjusting the iris position, the system generates a CLF error and reverts to relative mode.

4.6.4 Estimated Lifetime

Estimated lifetime display window



For S2000 Elite:

In either absolute or relative mode, the estimated lifetime indicates how long the system can maintain the set output (within +/- 10%) by automatically adjusting the iris position. For example, if you set the exposure intensity to 100%, the system will not be able to open the iris any further to compensate for lamp degradation, so the estimated lifetime will be displayed as

¹ Not available on S1500 Pro

0 Hr. Whereas if the exposure intensity is set to 90%, the system will be able to maintain the set intensity by automatically adjusting the iris position to compensate for lamp degradation, therefore the displayed estimated lifetime will be higher.

Once the lamp accumulates 4500 Hrs. of use, the system will no longer allow you to turn the lamp on and the lamp must be replaced.

If the system is unable to hold the set intensity within the mentioned tolerances, the system will show a CLF error.

For S1500 Pro:

The estimated lifetime window shows the duration in hours during which the lamp will remain functional before reaching its operational limit of 4500 hours of lamp usage.

5 Navigation

The OmniCure S2000 Elite/ S1500 Pro offers multiple convenient options for operation: the touch-screen display panel, the navigation keypad, and accessing controls via the integrated webserver (WEB UI)¹.

5.1 Touch-Screen Interface

The touch-screen interface is the default control method for the S2000 Elite/ S1500 Pro. The user can access the touch-screen interface after the system has booted up into the main screen. The touchscreen or the physical keypad can be used to navigate through the different screens and options.

After the unit has booted up successfully, the user will be presented with the main screen. The main screen will display the effective lamp life remaining, the remaining calibration time¹, and the current system time on the left pane. The middle pane will show the state of the lamp: if the lamp is in warm-up phase, cool-down phase, sleeping, or ready to use. There are three buttons on the screen, functions and icons are described below.

5.1.1 Home Screen

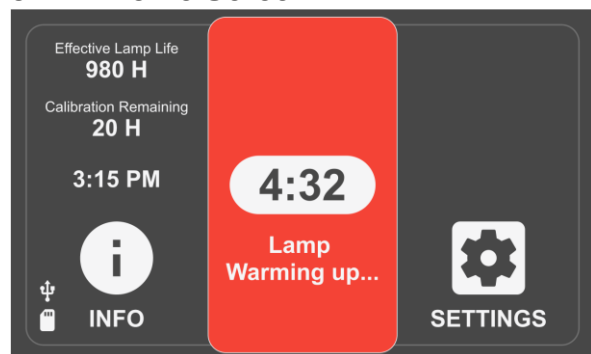


Figure 5-1 Home Screen

¹ Not available on S1500 Pro

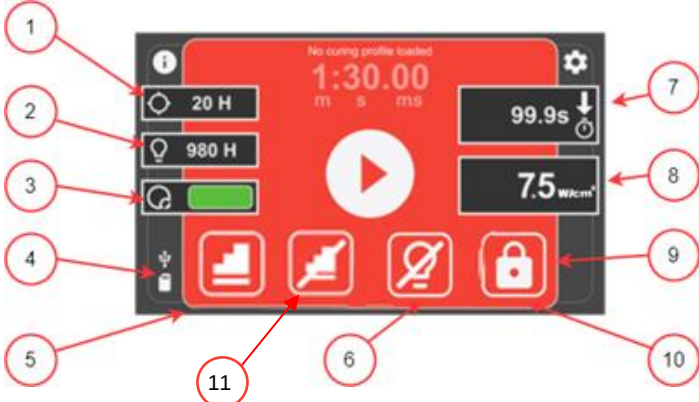
Home Screen Icons

	Selecting this icon will navigate the screen to the <i>setting</i> page where the user will have access to the system setup, configurations, calibrations, and StepCure setup.
	Selecting this icon will navigate the screen to the <i>information</i> page where it will display an overview of all the information regarding the system. The unit flight recorder, lamp information and filter information can be found here.
	Selecting this icon will navigate the screen to the <i>Run</i> page where the user will have access to the exposure controls and duration. Access to this icon and page will be available once the lamp is turned on and warmed up.
	If this icon is shown instead of the icons above, it means that the lamp is currently off. Selecting this icon will start the process to strike the lamp. The lamp will enter the cool-down phase if required and then follow with the 4 minute lamp warm-up phase.

Figure 5-2 Home Screen Icons

5.1.2 Run Screen

UV exposure parameters used to control the UV dose is displayed on this screen. The unit can be operated in calibrated¹ and uncalibrated mode. When the unit is not calibrated, the intensity will be displayed as a percentage of the lamp's maximum output. When calibrated (with the R2000), the irradiance (W/cm²) or power levels (W) will be displayed.



1. Remaining calibration¹ (h)
2. Estimated lifetime (h)
See Section 4.6.4 - Estimated Lifetime for more details.
3. Closed-loop feedback¹ status
Red - Inactive
Yellow – Close to inactive range
Green - Active
4. External SD card detected
5. Shortcut to StepCure
6. Turn the lamp off (sleep mode)
7. Set count-down time for exposure duration. Set to 0 for count-up mode.
8. Select to set the exposure intensity. Absolute w or w/cm2 is displayed if system is calibrated².

¹ Not available on S1500 Pro

² Only relative intensity input is available on S1500 Pro

	9. Lock/unlock the screen 10. Lock/unlock the screen 11. Removes the current profile from active operation.
--	--

Table 5-1 Run Screen Controls

Navigating the run screen can be done through the Touch Screen or Physical keypad. To navigate all other screen functions using the physical keypad, press the CENTER select button to access the Run screen navigation mode and use the directional arrows to move around the desired options. CENTER select needs to be pressed again to confirm selection.

5.1.3 Information Screen

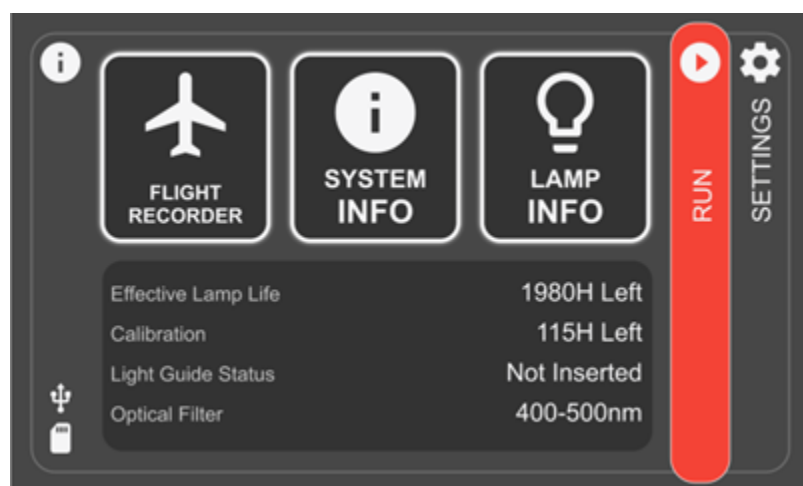
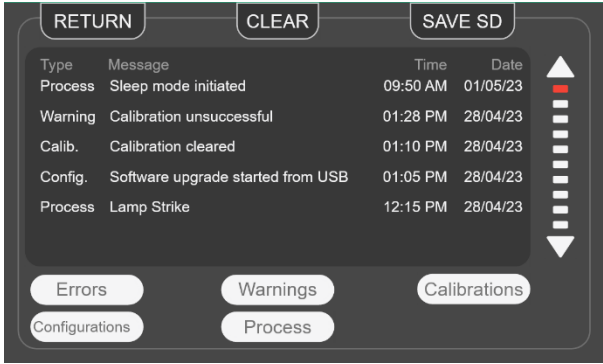


Figure 5-3 Information Screen

5.1.4 Flight Recorder

The Flight Recorder is an event viewer which stores historical data of any processes, activities, alarms or configuration changes on the unit. Events will be time-stamped and can be further filtered to display any type of *Errors, Warnings, Configurations, Process, and Calibration*. Multiple types can be selected to display the result simultaneously. The type can be de-selected by pressing it again.



RETURN - Returns to the previous screen.

CLEAR - Clears all records of the flight recording from the system's internal memory. A cleared Flight Recorder log cannot be restored.

SAVE SD - The entire flight recorder can be saved to an external SD card if there is one inserted in the front panel. The file will be exported as a comma-separated value (CSV) file and the file name will be prefixed with unit serial number. Attempting to save the flight recorder multiple times will overwrite the previous file. The information can be saved to the external SD card slot, located in the front panel.

Scroll arrows - Touch the UP or DOWN arrow to vertically scroll the flight recorder. Using the physical UP/DOWN buttons on the navigation panel will also allow to scroll vertically.

Figure 5-4 Flight Recorder

Flight Recorder Event Types

Button	Description
Errors	Displays a list of errors that occurred during operation chronologically. Events that will have a direct negative impact on operation are designated as errors. This can range from improper dose delivery to hardware issues.
Warnings	Displays list of warnings that occurred during operation chronologically. Events that require user's attention but are not currently impacting operation are designated as warnings.
Process	Displays list of process actions that executed chronologically. Events which do not require attention are designated as process events.
Configurations	Displays list of configuration changes chronologically.
Calibrations	Displays list of calibration events chronologically.

Table 5-2 Flight Recorder Event Types

Flight Recorder Log Message	Flight Recorder Message Type
Lamp strike error	Error
Lamp end of life	Error

S2000 Elite/ S1500 Pro - User Guide

035-00707 Revision 3

Unexpected lamp extinguish event	Error
Lamp over temperature	Error
Lamp under temperature	Error
Lamp Severely Abused	Error
No Filter detected	Error
Shutter failure	Error
System temperature too high	Error
Intensity monitor railed high	Error
Intensity monitor railed low	Error
Delivered dose did not meet target	Error
Light guide removed during exposure	Error
Lamp extinguish event	Error
System failed self-test routine	Error
Iris not in correct position	Error
Software update error	Error
Serial communications lost	Error
SD card error	Error
Iris Homing Failed	Error
Custom Filter Missing	Error
Lamp Fan Error	Error
System Fan Error	Error
NVM Corruption	Error
NVM Save Failed	Error
Lamp required within 100 hours	Warning
No lamp detected	Warning
Invalid Lamp	Warning
Lamp Idle	Warning
Lamp Sleep	Warning
N/A	Warning
Lamp reached 2000 hrs	Warning
Lamp reached 4000 hrs	Warning
Calibration expires soon	Warning
Calibration unsuccessful	Warning
Failed to load new system configuration	Warning
Failed to save system configuration	Warning
SD Card not formatted	Warning
Insert SD card	Warning
SD card full	Warning
NFC/RFID Module Initialization Failed	Warning
Load prompt	Warning
Clear Prompt	Warning
Software upgraded prompt	Warning
Network setting change	Warning

S2000 Elite/ S1500 Pro - User Guide

035-00707 Revision 3

Restored Default	Warning
Set StepCure Active	Warning
New StepCure	Warning
StepCure Cleared	Warning
StepCure Cleared due to Error	Warning
Stepcure Interlock Error	Warning
Stepcure Lockstep Error	Warning
PLC Reset Hold On	Warning
Network mode	Configuration
IP Address set to...	Configuration
Subnet mask set to...	Configuration
Gateway set to...	Configuration
DNS server set to...	Configuration
Host name set to...	Configuration
Calibration time remaining run display	Configuration
Effective lamp life run display	Configuration
CLF status run display	Configuration
Idle mode	Configuration
Idle mode intensity set to...	Configuration
Sleep mode	Configuration
Alarm volume set to...	Configuration
Screen brightness set to...	Configuration
Date format	Configuration
Time format	Configuration
Time zone set to...	Configuration
Time sync	Configuration
Time set to...	Configuration
Date set to...	Configuration
Default lamp state	Configuration
Lamp care	Configuration
Lamp care set to...	Configuration
NFC/RFID	Configuration
Language	Configuration
Software ... loaded	Configuration
Filter changed to...	Configuration
Lamp changed to...	Configuration
Irradiance completed	Calibration
Power completed	Calibration
Irradiance completed with setpoint...	Calibration
Power completed with setpoint...	Calibration
Hours logged...	Process
Profile loaded...	Process
Profile saved...	Process

Intensity set to...	Process
Counter set to...	Process
Mode set to...	Process
Locked	Process
Unlocked	Process
Idle mode initiated	Process
Resumed from idle	Process
Sleep mode initiated	Process
Resumed from sleep	Process
Inserted	Process
Removed	Process
Hours logged	Process
Supervisor tag detected	Process
Engineering tag detected	Process
Light guide coupled	Process
Light guide uncoupled	Process
Saved to SD card	Process
Saved to NVM	Process
Logged-in from WEB GUI	Process

- i** The Flight Recorder has *system* memory and can store a maximum of 819 events. Once the system memory reaches full capacity, the oldest events will be deleted chronologically to make room for new events.

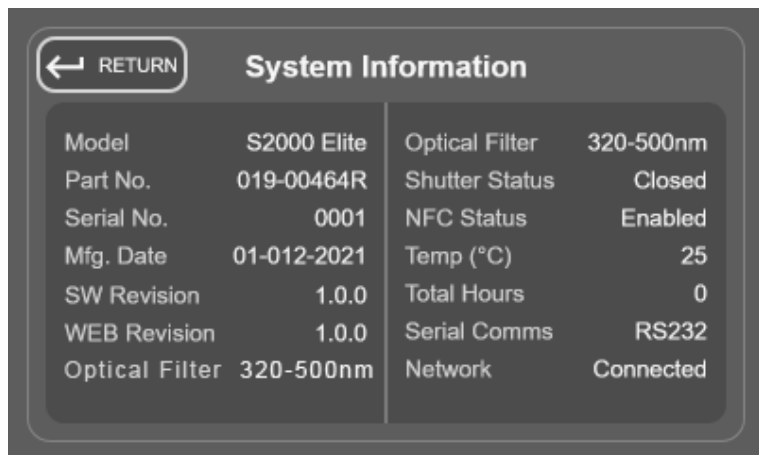
To ensure that a complete system event log is maintained, the user may regularly export the system log to an SD card/ PC.

The system screen allows you to view up to 120 events, to view all 819 events, you must either export the log to SD card and view it on a PC or access the flight recorder log via the WebUI interface.

Additional details about Errors and Warnings can be found in the [Section 14](#) Trouble Shooting.

5.1.5 System Info

This screen highlights important system information regarding the S2000 Elite/ S1500 Pro unit. The report includes but is not limited to shutter status, operating hours, filter type, etc.



System Information			
Model	S2000 Elite	Optical Filter	320-500nm
Part No.	019-00464R	Shutter Status	Closed
Serial No.	0001	NFC Status	Enabled
Mfg. Date	01-012-2021	Temp (°C)	25
SW Revision	1.0.0	Total Hours	0
WEB Revision	1.0.0	Serial Comms	RS232
Optical Filter	320-500nm	Network	Connected

Figure 5-5 System Information Screen

5.1.6 Lamp Information

Selecting this will present the user with information regarding the lamp inside the S2000 Elite/ S1500 Pro unit. The report includes but is not limited to lamp type, total hours, temperatures, etc.



Lamp Information			
Type	Standard	Warranty Rem.	980 H
Part No.	012-68000R	Total Hours	1020 H
Serial No.	0001	Temp (°C)	70
Mfg. Date	01-12-2021	Status	On

Figure 5-6 Lamp Information Screen

 If no lamp is installed when the system turns on, the information on this screen will be blank.

5.1.7 Settings Screen

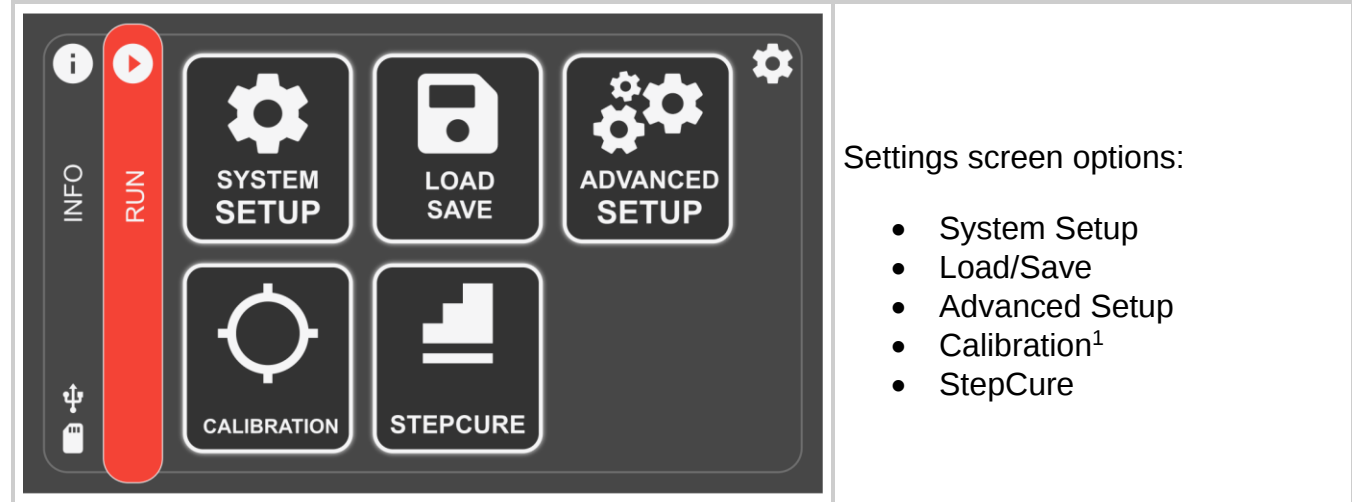
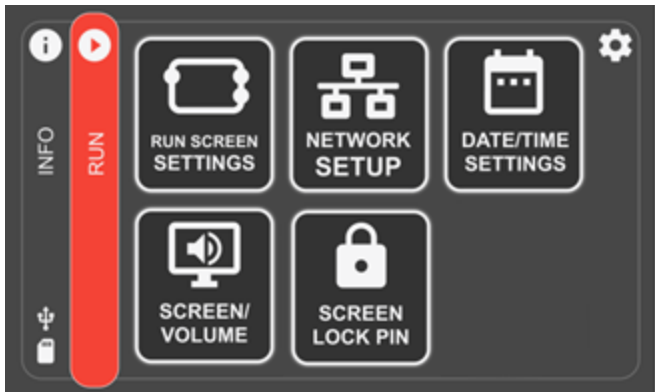


Figure 5-7 Settings Screen

¹ Not available on S1500 Pro

5.1.8 System Setup

Selecting this will present the user with the *system setup* screen, where the user will be able to configure settings on how the system will be used.



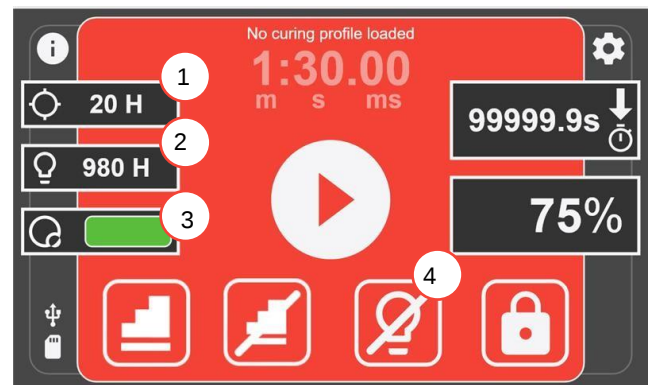
System Setup screen options:

- Run Screen Settings
- Network Setup¹
- Date/Time Settings
- Screen Volume
- Screen Lock Pin

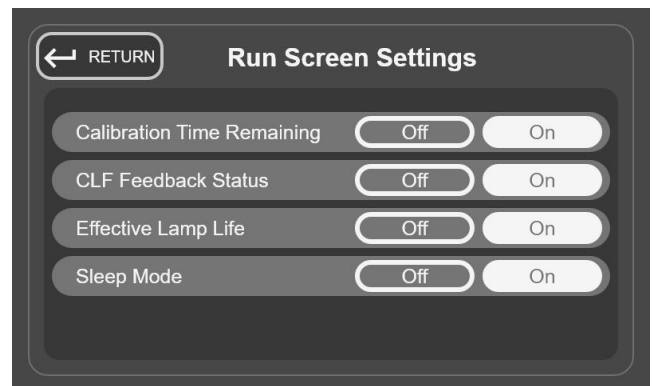
Figure 5-8 System Setup Screen

5.1.9 Run Screen Settings

Selecting this will display options on the run screen during operation. The user can choose disable the visibility of these options.



1. Calibration Time Remaining window¹
2. Effective Lamp Life window
3. CLF Feedback Status window¹
4. Sleep Mode icon



1. **Calibration Time Remaining¹** – Show/ Hide calibration time display in Run screen
2. **CLF Feedback Status¹** – Show/ Hide Close-loop Feedback status display in Run Screen.
3. **Effective lifetime¹** – Show/ Hide effective lamp life display in Run Screen

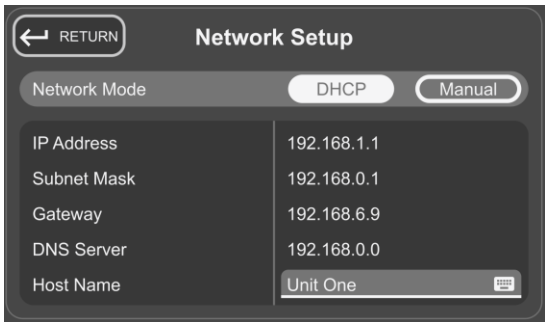
¹ Not available on S1500 Pro

4. **Sleep Mode** – Show/ Hide Sleep mode Icon in Run Screen

Figure 5-9 Run Screen Settings

5.1.10 Network Setup¹

Selecting this will display the network parameters and settings needed for communication over Ethernet. Addresses can be set using DHCP or manually. When set to DHCP, only the Host Name can be configured.



IP Address - IP address is the host identification number used for proper communication between devices.

Subnet Mask - The subnet mask is used to distinguish the subnet part of the IP address, as well as the part that is the host address of that subnet.

Gateway - The gateway is a network device that acts as an entry point from one network to others. The host sends all packets directed to other hosts outside the local network to the default gateway.

DNS Server - DNS (Domain Name System) service is used to change public (external) IP addresses from numeric to a domain format.

Host Name - The unique identifier that serves as the name of your unit. It can be as long as 255 characters and consists of numbers and letters.

Figure 5-10 Network Setup

When configuring a system for manual IP usage, the gateway must be within the same subnet mask as the IP address being assigned. For example, if your netmask is 255.255.255.0, your IP address and Gateway must be the same where the netmask is '255', so an IP of 192.16.8.0.X must have a gateway of 192.168.0.Y.

5.1.11 Date/Time Settings

Selecting this will display the system date and time related settings. The user can select the time format and the source of the time.



Date Format - Select the desired date format from the three choices.

Time Format - Select if the time should be displayed in 12 or 24 hour format.

Time Sync - Select the time source over NTP or manual.

Daylight Saving - time Select if Daylight Savings should be applied.

Figure 5-11 Date/ Time Settings

- i** The NTP (Network-time protocol) timestamp is currently from the "pool.ntp.org" which can only be accessed from the system if the system network is connected to the internet. (only available on S2000 Elite)

5.1.12 Screen Brightness and Volume

Selecting this will display the alarm volume and screen brightness controls.

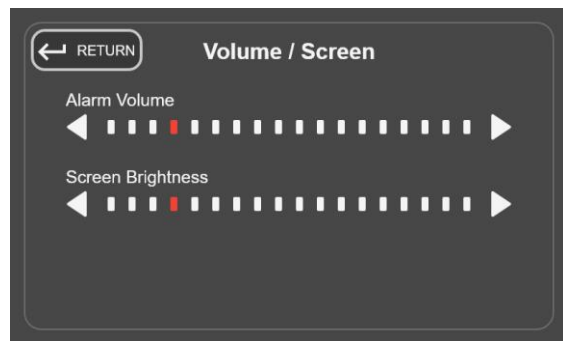


Figure 5-12 Volume/ Screen Settings

5.1.13 Screen Lock PIN

Selecting this will immediately ask the user to input a PIN that will be used to lock/unlock the unit from the RUN screen. The default PIN is 1234.

5.1.14 Load Save

Selecting this will present the user with the screen to load and save configurations, firmware, and system configuration.

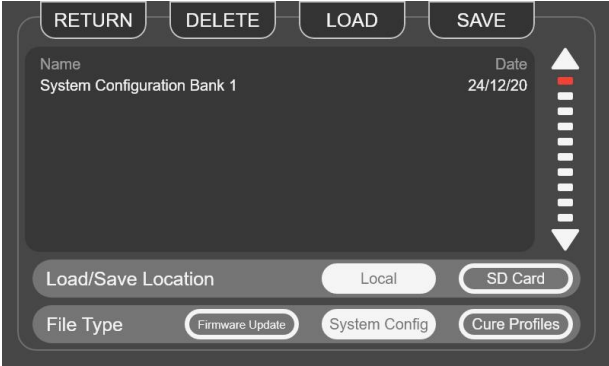
	Local Select - Load from/ Save to system memory. SD Card Select - Load from/ Save to external SD Card. Firmware Update - Select if loading/upgrading the firmware (available only if SD Card is selected). System Config - Select if loading/saving a system configuration. Cure Profiles - Select if loading/saving a cure profile. Load - Select load to see list of compatible files. Save - Select save to save/rename a new or existing file. Delete - Select to remove a file.
---	--

Figure 5-13 Load/ Save Screen

Only the following settings are saved when the system configuration is saved:

- Lamp Intensity (%)
- Lamp Calibrated Intensity
- Lamp Care Duration (h)
- Alarm Volume (%)
- Screen Brightness (%)
- Language Code
- Time Zone
- Date Format Code
- Exposure Counter (s)
- NFC Enabled
- Default Lamp State
- Lamp Care Enabled
- Calibration Time Remaining on Display
- Effective Lamp Life on Display

- CLF Status on Display
- Sleep Mode on Display
- 24 Hr Mode
- Log Exposures to SD

5.1.15 Advanced Setup

Selecting this will present the user with additional options and functionality that are not required for basic operation.

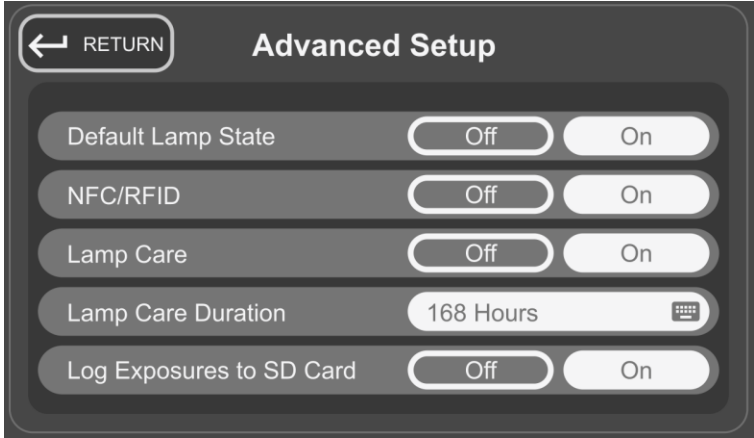
	Default Lamp - State Select if the lamp will ignite upon system boot. Default setting: ON NFC/RFID - Select to Enable/Disable NFC/RFID. Default setting: ON Lamp Care¹ - Enable to notify the user to undertake a lamp restrike operation to prevent ion migration shortening the life of the lamp. Default setting: OFF Lamp Care Duration¹ - Select to set the lamp care duration. Default Setting: 168 hours Log Exposures to SD card - Select to enable saving exposure data to SD card. Default setting: OFF
--	---

Figure 5-14 Advanced Setup

¹ Not available on S1500 Pro

5.1.16 Calibration¹

Selecting this will present the user with the ability to calibrate the unit with a Radiometer. The user will be presented with this screen whenever any calibration effort is made using the R2000 from any point of the unit operation. More information in the [Calibration section](#).

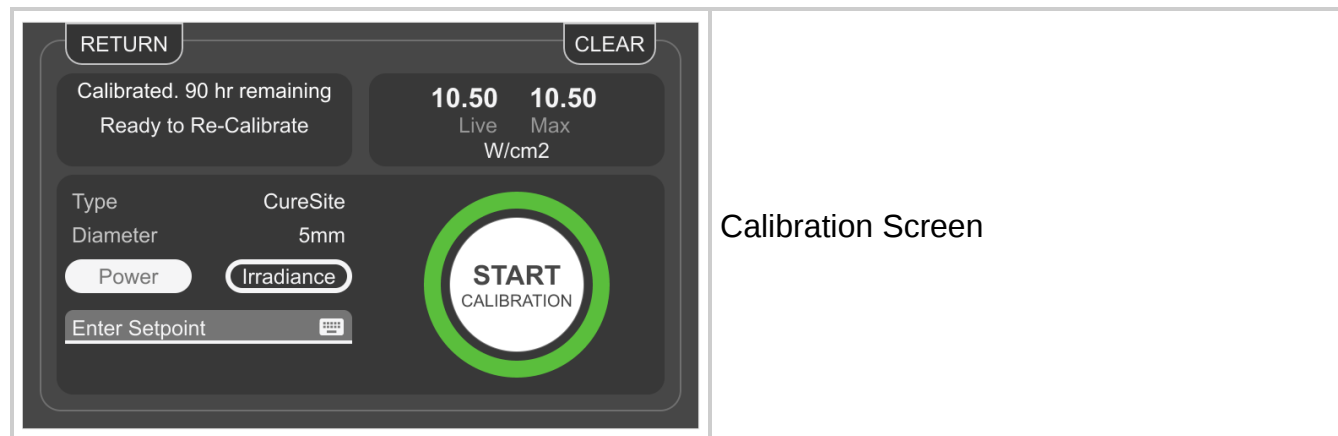


Figure 5-15 Calibration Screen

5.1.17 StepCure

StepCure screen allows users to program custom exposure profiles to accommodate different applications. These profiles can be saved and loaded across other units for simultaneous operations.

Return: Takes you back to the previous screen.

New: Opens a new blank profile

Set: Sets the current profile as "Active," Once the profile is set as "Active," you can navigate to the Run screen and begin using the programmed actions.

Clear: Removes the current profile from active operation, without deleting it from the system.

Load/ Save: Takes you to the load/save screen, where you can load a profile from/ save your

¹ Not available on S1500 Pro

profile to internal storage or an external SD card.

 Additional details on StepCure available in the [StepCure section](#).

5.2 Web-UI¹

The web user interface provides an alternate method to control your S2000 Elite through an external PC. Even though the amount of information and level of control is identical to the touch-screen interface, there are some graphical differences. The web interface can be accessed by using the network address set up on the unit. Using the address in a web browser will present the login screen and some basic information about the system.

5.2.1 Logging-in

The default username is *admin* and the default password is *password*.

¹ Web-UI is not available on S1500 Pro

S2000 Elite/ S1500 Pro - User Guide

035-00707 Revision 3

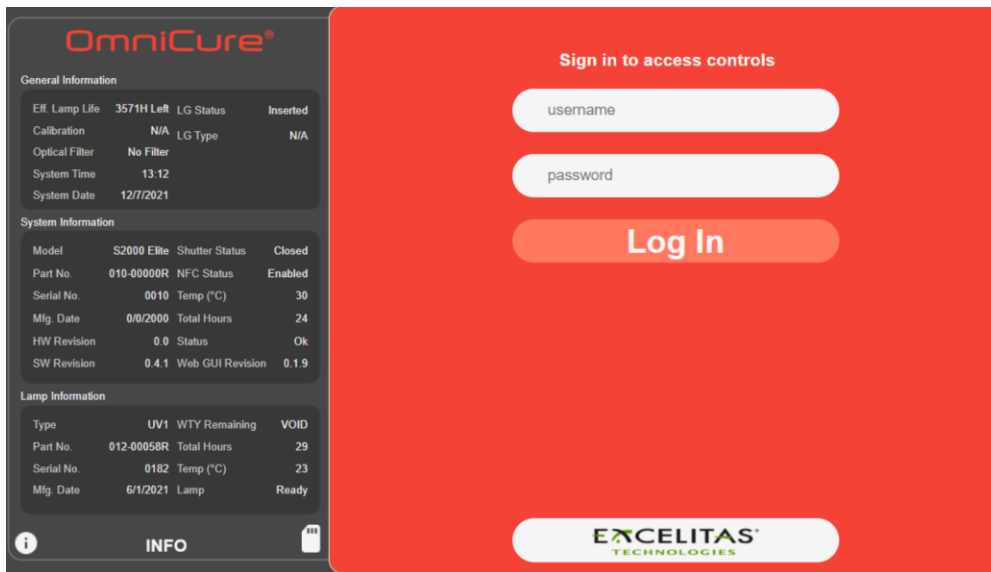


Figure 5-16 WebUI Log-in

After a successful login and lamp-warm up phase, the main screen will be shown as below.

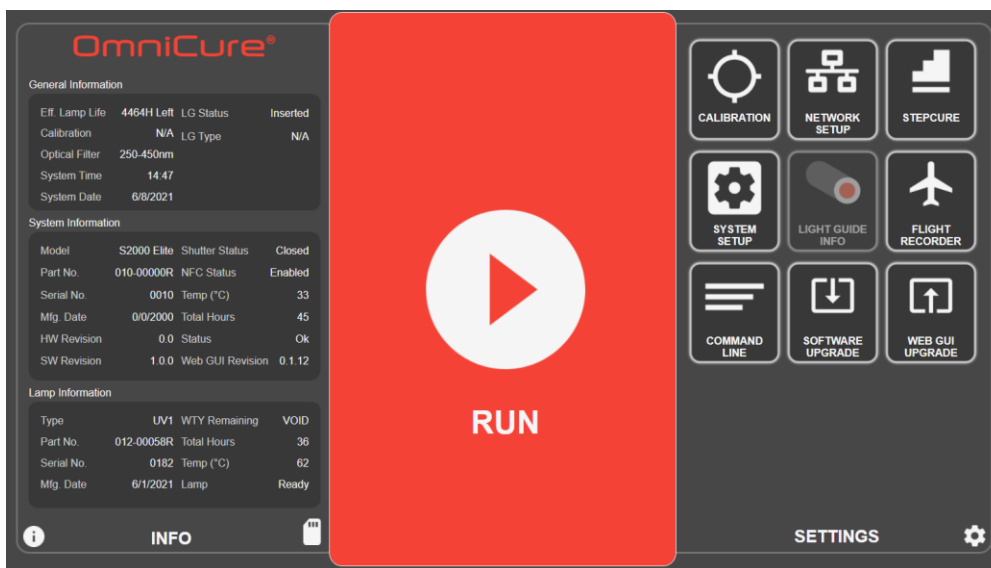


Figure 5-17 Web-UI Home Screen

If the lamp is turned OFF, a screen will appear and allow the user to turn the lamp ON. If the lamp Wake Up icon is selected, the lamp will ignite, and a four-minute timer will appear on the screen. The warm-up process needs to be complete before the user can run a produce UV exposure.

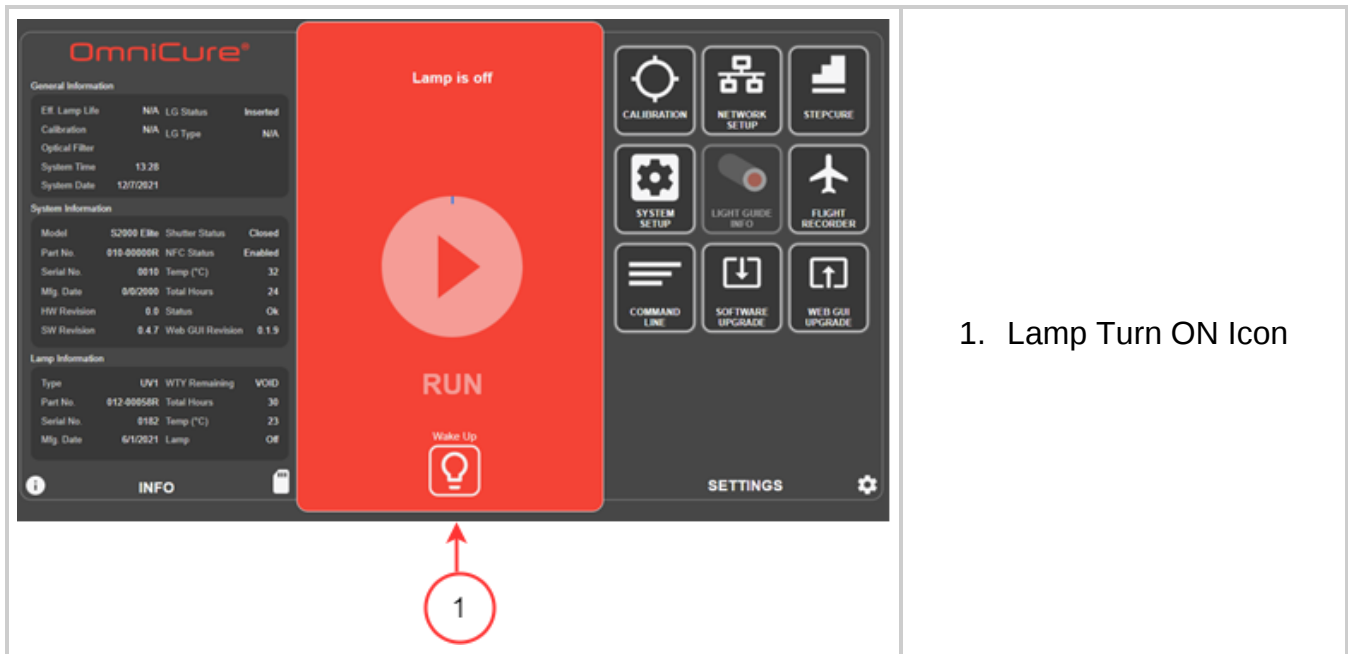


Figure 5-18 Web-UI Turning on the lamp

5.2.2 The Run screen

Used to control and deliver UV exposures. Unlike the touch-screen interface, the user can load/save profiles and run exposures in the same window. The icons displayed on the run screen can be configured under the *Settings* page.

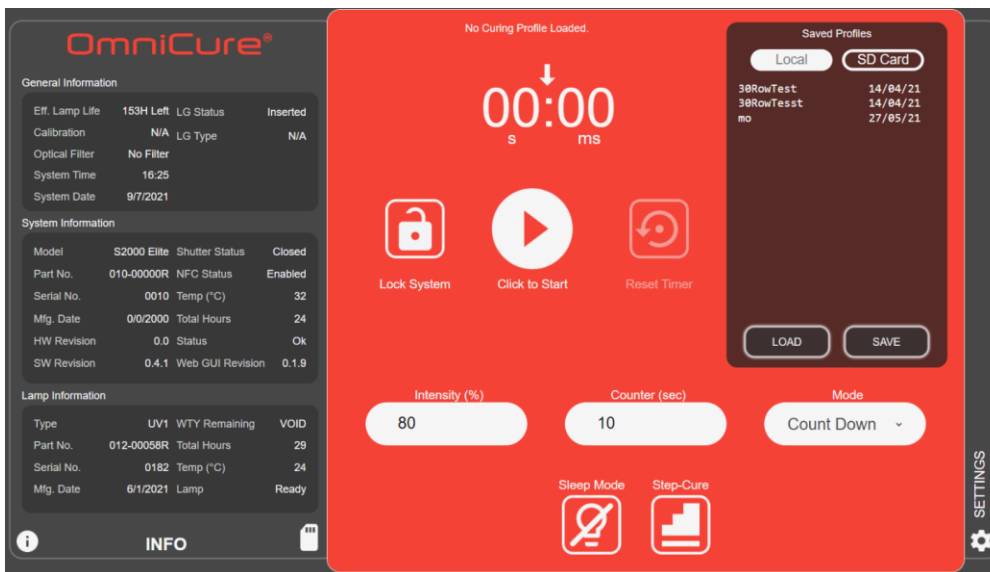


Figure 5-19 Web-UI Run Screen

5.2.3 System Settings

Selecting this will present user with the *system settings* screen, where the user will be able to configure settings on how the system will be used. The layout of the window is different than that of the touch-screen interface. Despite the differences, the available options are still the same between the two interfaces.



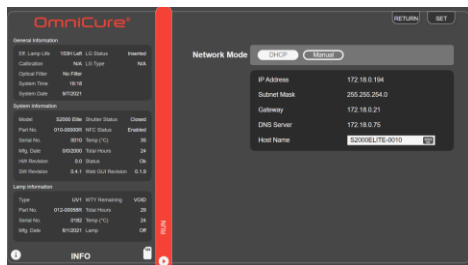
Figure 5-20 Web-UI System Settings

5.2.4 Network settings

Allows the S2000 Elite to communicate over an Ethernet network. Addresses can be configured by *DHCP* or *Manual*. When set to *DHCP*, only the *Host Name* can be configured. Once changes have been made, select *Set* on the top to save and apply the settings.



Changing the network settings using the web-interface may cause loss of connectivity.



IP Address - IP address is the host identification number used for proper communication between devices over Ethernet.

Subnet Mask - The subnet is used to distinguish the subnet part of the IP address, as well as the part that is the host address of that subnet.

Gateway - The gateway is a network device that acts as an entry point from one network to others. The host sends all packets directed to other hosts outside the local network to the default gateway.

	DNS Server - DNS (Domain Name System) service is used to change public (external) IP addresses from numeric to a domain format. Host Name - The unique identifier that serves as the name of your unit. It can be as long as 15 characters and consists of numbers and letters.
--	---

Figure 5-21 Web-UI Network Settings

When configuring a system for manual IP usage, the gateway must be within the same subnet mask as the IP address being assigned. For example, If your netmask is 255.255.255.0, your IP address and Gateway must be the same where the netmask is 255, so an IP of 192.16.8.0.X must have a gateway of 192.168.0.Y.

5.2.5 Flight Recorder:

This screen will present the user with an event log regarding the unit's performance and activities. Events will be time-stamped and can be further filtered to display any type of *Errors*, *Warnings*, *Configurations*, *Process*, and *Calibration*. Multiple types can be selected to display the result simultaneously.

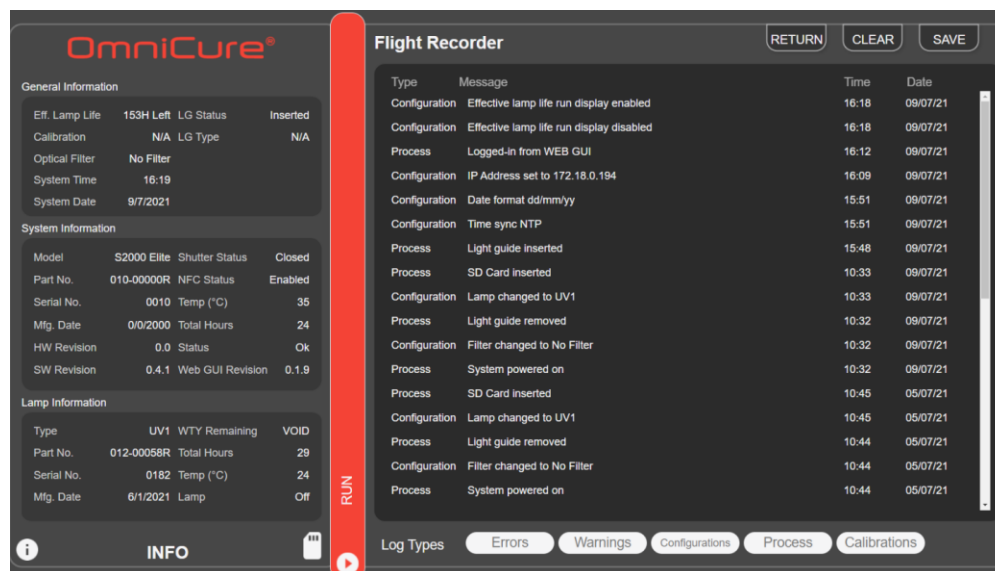


Figure 5-22 Web-UI Flight Recorder

5.2.6 Flight Recorder Event Types

Button	Description
Errors	Displays a list of errors that occurred during operation chronologically. Events that will have a direct negative impact on operation are designated as errors. This can range from improper dose delivery to hardware issues.

Warnings	Displays list of warnings that occurred during operation chronologically. Events that require user's attention but are not currently impacting operation are designated as warnings.
Process	Displays list of process actions that executed chronologically. Events which do not require attention are designated as process events.
Configurations	Displays list of configuration changes chronologically.
Calibrations	Displays list of calibration events chronologically.

Table 5-3 Web-UI Flight Recorder Events

The following table provides a complete list of events that are tracked in the Flight Recorder.

Lamp end of life	Error
Unexpected lamp extinguish event	Error
Lamp over temperature	Error
Lamp under temperature	Error
Lamp Severely Abused	Error
No Filter detected	Error
Shutter failure	Error
System temperature too high	Error
Intensity monitor railed high	Error
Intensity monitor railed low	Error
Delivered dose did not meet target	Error
Light guide removed during exposure	Error
Lamp extinguish event	Error
System failed self-test routine	Error
Iris not in correct position	Error
Software update error	Error
Serial communications lost	Error
SD card error	Error
Iris Homing Failed	Error
Custom Filter Missing	Error
Lamp Fan Error	Error
System Fan Error	Error
NVM Corruption	Error
NVM Save Failed	Error
Lamp required within 100 hours	Warning
No lamp detected	Warning
Invalid Lamp	Warning
Lamp Idle	Warning
Lamp Sleep	Warning
N/A	Warning
Lamp reached 2000 hrs	Warning

S2000 Elite/ S1500 Pro - User Guide

035-00707 Revision 3

Lamp reached 4000 hrs	Warning
Calibration expires soon	Warning
Calibration unsuccessful	Warning
Failed to load new system configuration	Warning
Failed to save system configuration	Warning
SD Card not formatted	Warning
Insert SD card	Warning
SD card full	Warning
NFC/RFID Module Initialization Failed	Warning
Load prompt	Warning
Clear Prompt	Warning
Software upgraded prompt	Warning
Network setting change	Warning
Restored Default	Warning
Set StepCure Active	Warning
New StepCure	Warning
StepCure Cleared	Warning
StepCure Cleared due to Error	Warning
Stepcure Interlock Error	Warning
Stepcure Lockstep Error	Warning
PLC Reset Hold On	Warning
Network mode	Configuration
IP Address set to...	Configuration
Subnet mask set to...	Configuration
Gateway set to...	Configuration
DNS server set to...	Configuration
Host name set to...	Configuration
Calibration time remaining run display	Configuration
Effective lamp life run display	Configuration
CLF status run display	Configuration
Idle mode	Configuration
Idle mode intensity set to...	Configuration
Sleep mode	Configuration
Alarm volume set to...	Configuration
Screen brightness set to...	Configuration
Date format	Configuration
Time format	Configuration
Time zone set to...	Configuration
Time sync	Configuration
Time set to...	Configuration
Date set to...	Configuration
Default lamp state	Configuration
Lamp care	Configuration

S2000 Elite/ S1500 Pro - User Guide

035-00707 Revision 3

Lamp care set to...	Configuration
NFC/RFID	Configuration
Language	Configuration
Software ... loaded	Configuration
Filter changed to...	Configuration
Lamp changed to...	Configuration
Irradiance completed	Calibration
Power completed	Calibration
Irradiance completed with setpoint...	Calibration
Power completed with setpoint...	Calibration
Hours logged...	Process
Profile loaded...	Process
Profile saved...	Process
Intensity set to...	Process
Counter set to...	Process
Mode set to...	Process
Locked	Process
Unlocked	Process
Idle mode initiated	Process
Resumed from idle	Process
Sleep mode initiated	Process
Resumed from sleep	Process
Inserted	Process
Removed	Process
Hours logged	Process
Supervisor tag detected	Process
Engineering tag detected	Process
Light guide coupled	Process
Light guide uncoupled	Process
Saved to SD card	Process
Saved to NVM	Process
Logged-in from WEB GUI	Process

The web-interface has an option to save the flight recorder events to a PC. Clicking the **Save** button will present the user with a choice to save the file. After selecting either the *Computer* or *SD Card*, clicking **Save** will begin the download to the default directory.

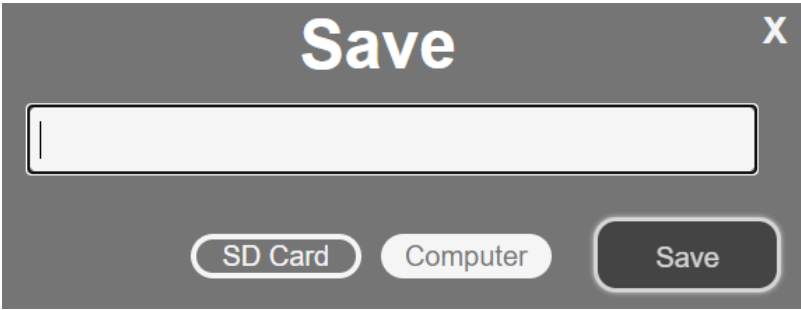


Table 5-4 Web-UI Save data to computer

5.2.7 Command Line:

The S2000 Elite/ S1500 Pro system is designed to provide remote automated control of the UV spot curing system from a PC. Control commands can be submitted in the *Command Line* using commands found in document 035-00724R Software SDK.

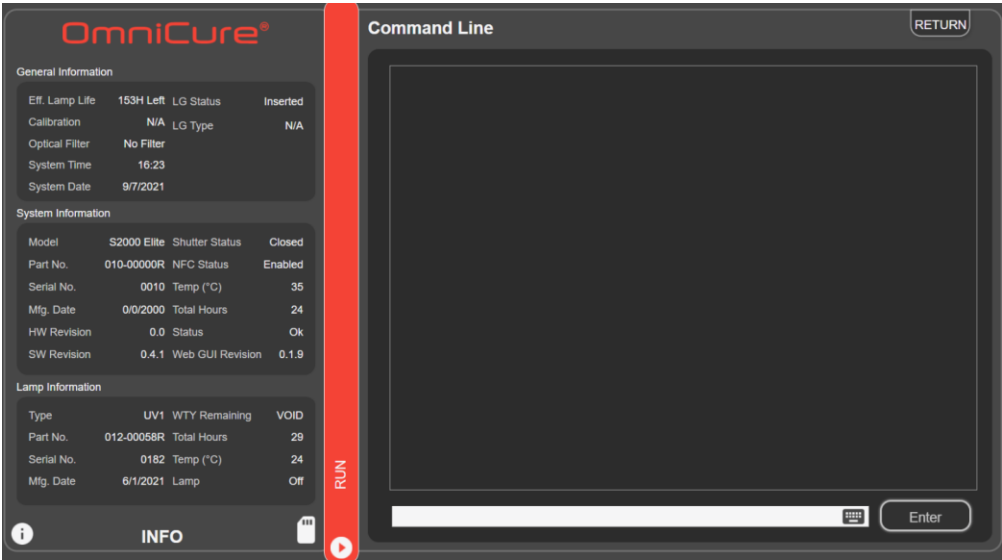


Table 5-5 Web-UI Command Line

 The Command Line option only exists for the web-interface.

5.2.8 StepCure

Allows users to program custom exposure profiles to accommodate different applications. These profiles can be saved and loaded across other units for simultaneous operations. See [StepCure section](#) for more information.

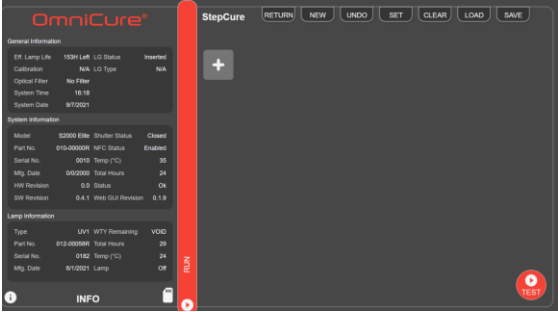
	Return – Navigates back to previous screen. New – Clears existing StepCure design and starts a new one. Undo – Removes the last change made in the profile (not available on system touch-screen). Set – Apply the current profile to use for operation. Clear – Clears the profile from operation. Profile design will remain. Load – Loads an external profile from local, SD or computer source. Save – Saves current profile to local, SD or computer destination.
---	--

Table 5-6 Web-UI StepCure Interface

6 Locking and unlocking the S2000 Elite/ S1500 Pro

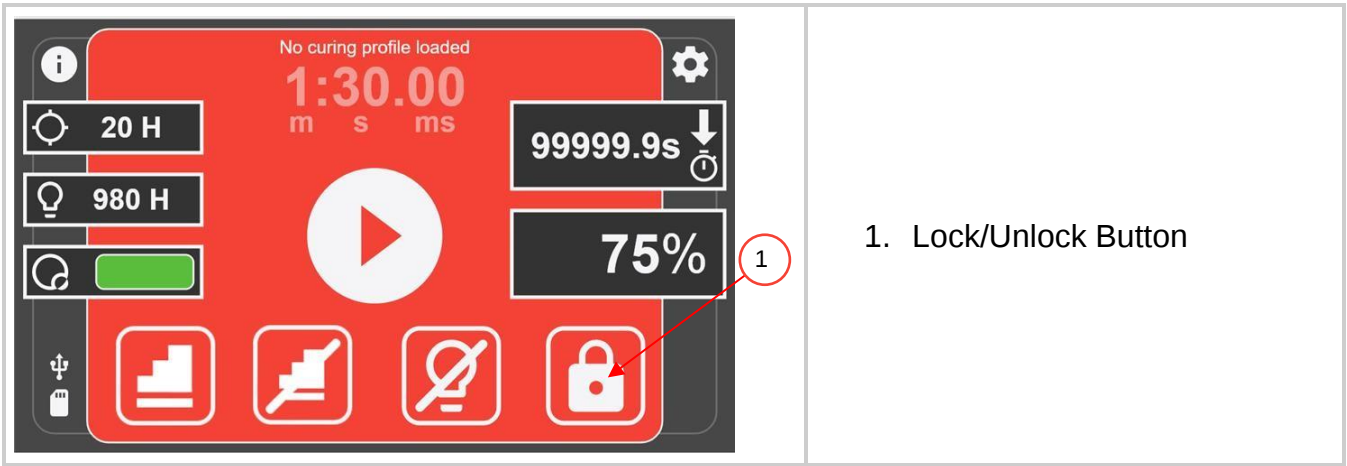
Your S2000 Elite/ S1500 Pro system allows you to disable all but basic run functions. When the system is locked, no modifications to the set time, the optical output power or the system’s settings can be made. This can help to ensure process control when multiple operators are using the same equipment.

To Lock the run screen, press the lock button, shown below.

To Unlock the run screen:

- 1. Press the unlock button (same icon shown below).
- 2. Prompt will appear to enter password. Use the system’s PIN to unlock the run screen.

The default PIN is: 1234



The default PIN can be changed by navigation to the [System Setup](#) screen and selecting Screen Lock Pin option.

 The front panel can also be locked via the PLC 50-pin I/O’s, via the WEB UI and via the command prompt.

6.1 NFC Enabled access control

The S2000 Elite/ S1500 Pro can enable multi-level access control with NFC functionality. There are two available access levels “Admin” and “Supervisor”. Please note that these NFC fobs must be purchased separately.

019-00406R	Intelli-Tap Supervisor NFC card
019-00407R	Intelli-Tap Admin NFC card

Admin fob to lock/unlock system only when in run screen. Can clear errors and alarms. Cannot be used as an input trigger.

Supervisor fob can clear errors and alarms. Can be used as an input trigger for StepCure.

7 PLC Interfacing with the S2000 Elite/ S1500 Pro

The S2000 Elite/ S1500 Pro is automated via PLC or computer control using the 50pin I/O, USB and Ethernet port¹. The advanced features ensure the process control and curing repeatability is accessed through built-in standard optically isolated 50pin I/O signals.

Additionally, a stereo phono connector is available on S2000 Elite only for a simple RS-232 Radiometer connection on the front panel.

The PLC I/O's, foot pedal and RS-232 port are optically isolated from the control system control electronics. This has been done to maximize the immunity to noise and minimize its noise output. Even the analog inputs and outputs (intensity monitor output and intensity control input) are optically isolated from the control circuitry.

7.1 Input/ Output Signals and Descriptions

All inputs and outputs from the PLC interface are opto-isolated. The digital outputs are implemented using NPN logic and can be configured as active low or active high. The digital inputs are active low and activate on contact closure to ground. The equivalent circuits are shown in the figures below.

7.1.1 PLC control signal specification:

	Digital	Analog
Input	Floating Voltage: Max 5.5VDC	Voltage: 1-5V
	Current: Max 5mA	Current: Max 500uA
Output	Voltage: Max 30VDC	Voltage: 1-5V
	Current: Sink or Source 10mA	Current: Max 1mA

Table 7-1 PLC Control, Signal Specifications

7.1.2 Digital input signal requirement:

	Enable	Disable
Input	Connect to Ground	Floating

¹ Ethernet port is not available on S1500 Pro

Table 7-2 Digital Input Signal Requirements

7.1.3 Analog input signal requirement:

Analog Input	Intensity Setting
0-1V	Signal ignored*
1V	1%
1-5V	Input Voltage = 1 + (Required Output POWER * 0.36) W (1W=1.360V, 0W = 1VDC)
5V	100%

Table 7-3 Analog input signal requirements

- i If the input voltage falls below 1V, the analog input will not be taken into consideration. Instead, the system will maintain the previous intensity setting. The analog intensity settings are stored within the system and will be reinstated following a power cycle. If the desired output exceeds the system's capability, the system will automatically default to a 100% output level.

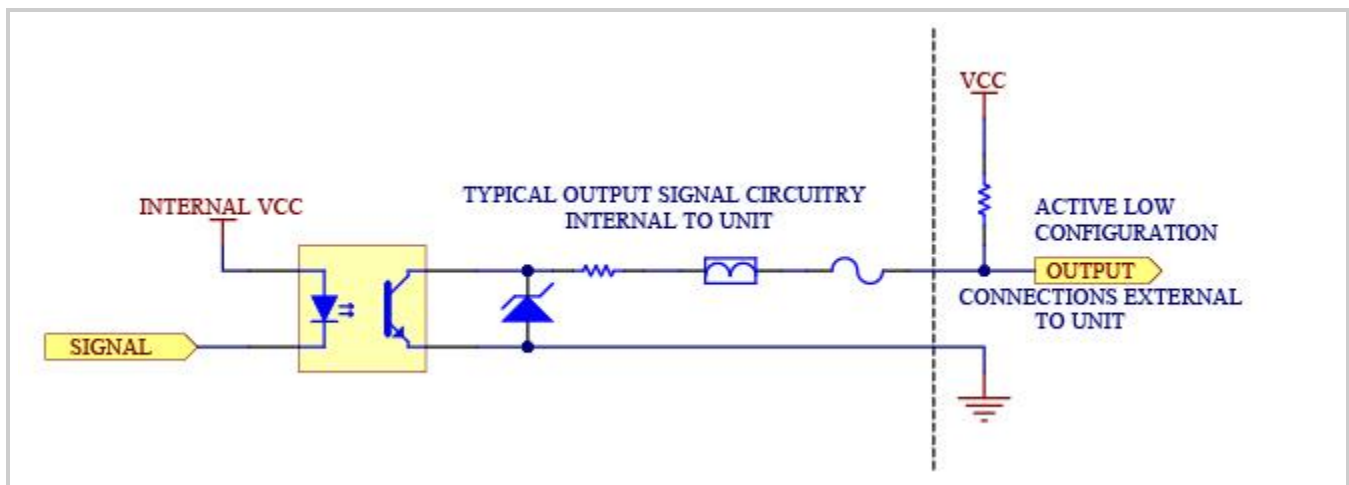


Figure 7-1 Active Low Signal Configuration

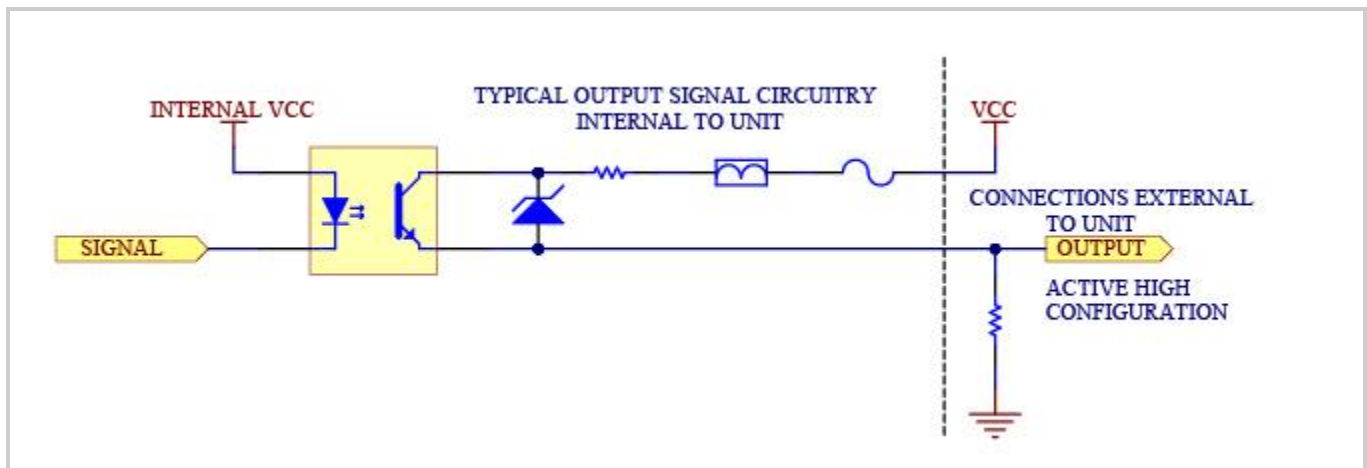


Figure 7-2 Active-High Signal Configuration

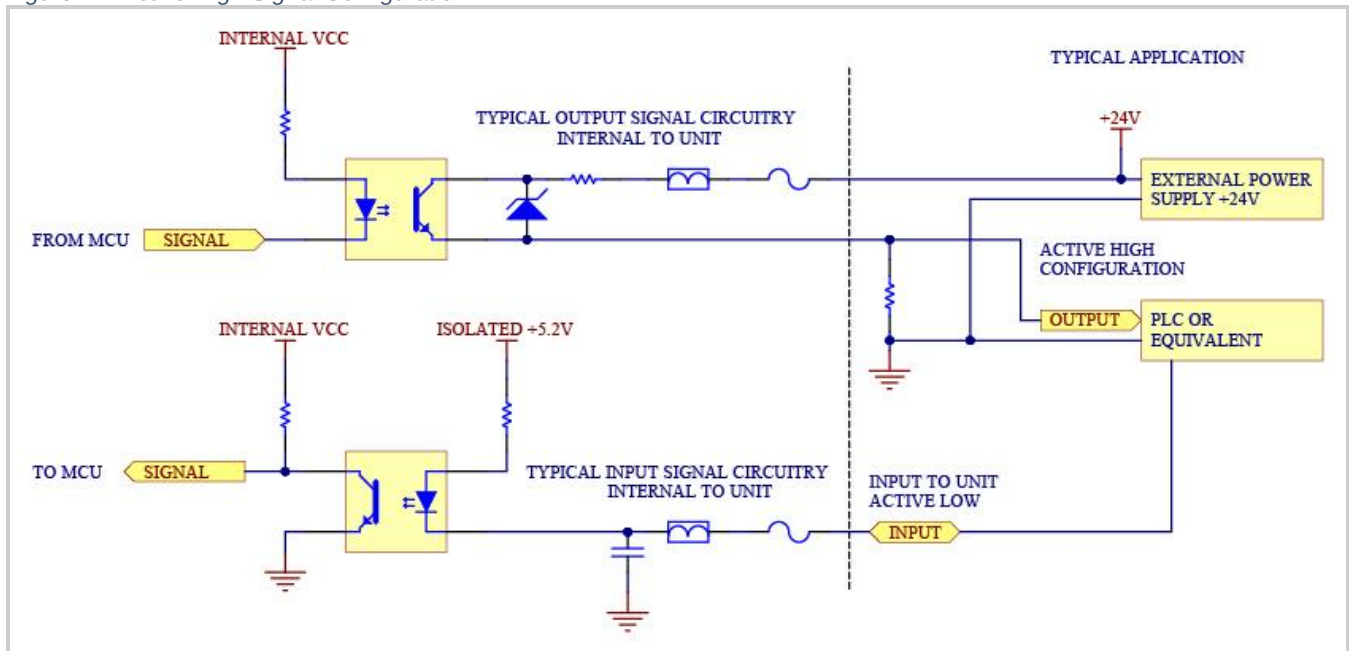


Figure 7-3 Real panel sample connection

One 50pin I/O signal connector is on the rear panel of the S2000 Elite/ S1500 Pro, and the other connector is on the right side of the front panel. Refer to the following pages for signal descriptions and locations.

7.2 PLC Connector: DB50

- i** In the following pinout table, positive output pins connect to the collector of the optocoupler output, and negative output pins connect to the emitter.

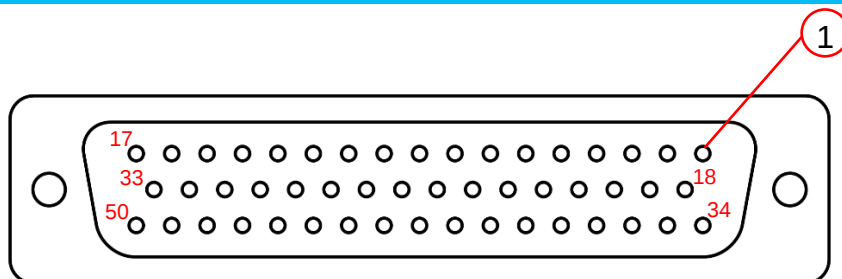


Figure 7-4 DB50 Connector

Pin #	Input/Output	Analog/Digital	Signal Name	Description	S2000 Original PLC Connector	Notes
1	Input	Bipolar	Rx	RS232 receive line.	P3 - 3	NA
2	Output	Bipolar	Tx	RS232 transmit line.	P3 - 2	NA
3	-	-	GND	Ground: Common/return for all signals.	P1 - 4; P3 - 5	P3-5 is for RS-232 GND
45	-	-	GND	Ground: Common/return for all signals.	P2 - 14; P2 - 15	
4	Output	Analog	Intensity Monitor Output:	DC output is between 1-5V depending on the intensity sampled by the internal intensity monitor sensor. Output Voltage = $1 + (\text{POWER} \times 0.36) \text{ W}$	P2 - 7	If the system is not calibrated, you may see a larger error in the representative optical output voltage.
7	Input	Analog	Intensity Control Input:	Controls the intensity setting Input Voltage = $1 + (\text{Required Output POWER} \times 0.36) \text{ W}$	P2 - 6	
14	Input	Digital	Pause:	Used by the StepCure sequencer. Will pause the StepCure profile when activated. Will resume the StepCure profile when the input is deactivated.	NA	NA
15	Input	Digital	Intensity Adjust Decrease:	Remotely decreases output intensity by 1% for each input toggle.	P1 - 8	NA

S2000 Elite/ S1500 Pro - User Guide

035-00707 Revision 3

16	Input	Digital	Remote Trigger 1 Activation:	Activates Remote Trigger Input #1 (RT1) of StepCure. If no StepCure is active, RT1 Activation will start the run profile.	P1 - 5	Same is FP
29	Input	Digital	Intensity Lock:	Prevents intensity adjustments through pins 15 and 32.	P1 - 15	NA
30	Input	Digital	Lamp Power ON/OFF:	Toggles the lamp on or off.	P1 - 12	NA
31	Input	Digital	Mode Select:	Not used	P2 - 12	NA
32	Input	Digital	Intensity Adjust Increase:	Remotely increases output intensity by 1% for each input toggle.	P1 - 7	NA
33	Input	Digital	Reset:	Holding the reset input low will prevent the StepCure sequence or the Exposure from starting/restarting If a StepCure profile is activated: Releasing the reset input after the signal is held low for a minimum of 20ms will raise the reset event. If the reset event is raised during a lamp exposure, the exposure will complete, and the sequence will halt. If the reset event is raised at other times, the StepCure will return to the start of the sequence and halt.	NA	NA
36	Input	Digital	Shutter Mode Select:	When active, shutter verification output becomes the shutter position signal.	P1 - 13	NA
46	Input	Digital	Front Panel Lock:	Prevents the front panel buttons from being usable when this signal is active.	P1 - 14	NA
47	Input	Digital	Foot Pedal:	Simulates the activation of the foot pedal.	FP and P1 - 5	Foot Pedal Jack
48	Input	Digital	Alarm Clear:	Clears and mutes any activated alarms.	P2 - 1	NA
49	Input	Digital	Shutter Interlock:	Prevents the shutter from being activated.	P1 - 6	NA
50	Input	Digital	Remote Trigger 2 Activation:	Activates Remote Trigger Input #2 (RT2) of StepCure. If no StepCure is active, RT1	NA	NA

				Activation will start the run profile.		
6(-)	Output	Digital	Sync/Channel 0:	Reports the shutter status	P2 - 2	NA
39(+)				Active: Shutter is open Inactive: Shutter is closed	P2 - 10	
43(-)	Output	Digital	Channel 1:	Used by the StepCure sequencer	NA	NA
26(+)				Active: StepCure C1 Output is energized Inactive: StepCure C1 Output is de-energized	NA	NA
27(-)	Output	Digital	Channel 2 ¹ :	Used by the StepCure sequencer	NA	NA
10(+)				Active: StepCure C2 Output is energized Inactive: StepCure C2 Output is de-energized	NA	NA
11(-)	Output	Digital	Channel 3 ¹ :	Used by the StepCure sequencer	NA	NA
44(+)				Active: StepCure C3 Output is energized Inactive: StepCure C3 Output is de-energized	NA	NA
25(-)	Output	Digital	Green, LED Tower:	Green status indicator for stack lights, and Tree #1 (T1) when used in StepCure.	NA	NA
8(+)				Active: Status indicator is active. Inactive: Status indicator is inactive.	NA	NA
41(-)	Output	Digital	Amber, LED Tower:	Amber status indicator for stack lights, and Tree #2 (T2) when used in StepCure.	NA	NA
24(+)				Active: Status indicator is active. Inactive: Status indicator is inactive.	NA	NA
40(-)	Output	Digital	Red, LED Tower:	Red status indicator for stack lights, and Tree #3 (T3) when used in StepCure. Active: Status indicator is active.	NA	NA

¹ Not available on S1500 Pro

S2000 Elite/ S1500 Pro - User Guide

035-00707 Revision 3

23(+)				Inactive: Status indicator is inactive.	NA	NA
9(-)	Output	Digital	Blue, LED Tower:	White Status Indicator for stack lights, and Tree #4 (T4) when used in StepCure. Active: Status indicator is active.	NA	NA
42(+)				Inactive: Status indicator is inactive.	NA	NA
13(-)	Output	Digital	Exposure Fault:	Reports that an error has occurred during an exposure. Active: An exposure fault has occurred.	P1 - 3	NA
12(+)				Inactive: No exposure fault has occurred.	P1 - 11	NA
18(-)	Output	Digital	Lamp On:	Reports lamp status. Active: Lamp is on.	P1 - 1	NA
34(+)				Inactive: Lamp is off.	P1 - 9	NA
19(-)	Output	Digital	Shutter Verification:	Reports shutter position when shutter mode select is enabled: Active: Shutter is in the open position	P1 - 2	P1 - 13 must be low; tied to pin 4.
35(+)				Inactive: Shutter is in the closed position If shutter mode select is inactive: Active: Shutter has failed	P1 - 10	
22(-)	Output	Digital	Cooling:	Indicates that the system is cooling to restrike. Active: Cooling state is active.	P2 - 8	NA
5(+)				Inactive: The system is not in the cooling state.	P2 - 9	NA
37(-)	Output	Digital	Shutter Alarm:	Indication of shutter failure. Active: Shutter has failed.	P2 - 2 (-) P1 - 2 (-)	P1 - 13 must be high (open) for P1 signals to work as an alarm.
20(+)				Inactive: No shutter failure detected.	P2 - 3 (+) P1 - 10 (+)	
38(-)	Output	Digital	Bulb Alarm:	Indication of lamp failure. Active: Lamp has extinguished unexpectedly.	P2 - 4	NA
21(+)				Inactive: No lamp failure detected.	P2 - 5	NA

S2000 Elite/ S1500 Pro - User Guide

035-00707 Revision 3

17	NC	NC	NA	NC: Do NOT connect anything to this pin.	NA	NA
28	NC	NC	NA	NC: Do NOT connect anything to this pin.	NA	NA

Table 7-4 PLC DB50 Pin-out table

7.3 3.5mm Foot Pedal Connector: Signal Descriptions

The rear panel foot pedal connector, a 3 mm audio style jack, has the following pin-out:

Connection Point	Signal Name
Outer Rim	Positive input, active low
Center Pin	Common ground (GND)

Table 7-5 Foot pedal connector signal description

This is a simple 2-wire, audio style jack that can be connected to a foot pedal (supplied with each unit) or any other electro-mechanical triggering device. This is an exposure trigger input used to start an exposure. PLC pin 47 (Foot Pedal simulation) and front panel START/STOP button will also trigger the shutter.

7.4 Radiometer RS-232 Phono Connector: Signal Descriptions¹

The front panel RS-232 stereo phono connector is labelled “Radiometer”. This connector is used to connect S2000 Elite to the R2000 Radiometer for calibration and setup purposes. It is a RS-232 connector dedicated to communication with the R2000 Radiometer.

PIN NO	SIGNAL NAME
1 (Shield)	GND
2 (Ring)	Tx
3 (Tip)	Rx

7.5 Interfacing with the S2000 Elite using original S2000 I/Os

Replacing the original S2000 (XLA) is made easy using the optional PLC External Adapter (019-00395R). This accessory converts the S2000 Elite 50pin I/O port into 3 I/O ports meant to replicate the ones found on the original S2000.

7.6 Connecting a Machine Status Indicator

The S2000 Elite/ S1500 Pro is pre-programmed to be able to connect to a Stack light via the DB50 port.

See Table 7-4 PLC DB50 Pin-out table to learn more about pin-out corresponding to status indicator colors mentioned below.

¹ Not available on S1500 Pro

Status	Color	Clearable	Action Required
Ready for use	Green (static)	No	None
Running Exposure Non-exposure sequencing	Green (Flashing 1Hz)	No	None
Lamp ON Calibration not set	Red and Blue (Static)	Yes	Calibrate the system
Lamp Off, System on Stand-by	Amber (Static)	No	None
Sequence paused Calibration expired	Amber (Flashing 1Hz)	Yes	None
Cooling	Blue (Static)	No	None
Lamp warm-up time	Blue (Flashing 1Hz)	No	None
Lamp failure Internal system error Shutter activation failure	Red (Static)	No	Yes
Light guide removal Exposure fault Lock-Step fault	Red (Flashing 1Hz)	Yes	Yes
Clearing Fault	Red and Green (Static for 3s)	No	None
Boot	Red, Amber, Green and Blue (Static for 3s)	No	None

Table 7-6 Tree/ Stack Light status indicator

Red – T1

Amber – T2

Green – T3

Blue – T4

By default, the S2000 Elite/ S1500 Pro energizes the corresponding output channels as outlined in the table above. This behavior is over-ridden if any of these channels (T1/T2/T3/T4) are used within an active StepCure profile. See Action Symbols (Inputs/Outputs) for more details

8 LED Light Ring

The LED light ring indicator displays the status of the following:

- Light Guide
- Lamp
- Shutter
- Calibration
- Software Update

The following table describes LED status and descriptions of each status in details.

Status	Color	Blinking
Calibration in process or Software Update in process	Green	1Hz
Light guide detected (closed loop feedback active, calibrated absolute mode active)	Green	No
Light Guide detected (Calibrated absolute mode, Closed loop feedback active, Iris at 2-5% or 95-99% position and/or calibration time remaining at 18 hours or less.)	Yellow	No
Light guide detected (Closed loop feedback active, Relative Mode)	Purple	No
Lamp warming up	Blue	No
Lamp not lit (Sleep Mode)	White	No
Light guide not detected	Red	No
No lamp detected	Red	1Hz

Table 8-1 LED Light Ring color reference

9 Clearing Audible Alarm

The S2000 Elite/ S1500 Pro provides an audible alarm to alert the user of various error conditions.

To clear the audible alarm:

1. Press the front panel Start/Stop button, prompt on LCD screen or navigation enter button.

 Alternately, depressing the foot pedal, or providing a momentary contact closure on the rear panel mono jack, will clear an audible alarm.

2. The audible alarm can be also cleared remotely:
 - When the “CLR” command is sent to the S2000 Elite/ S1500 Pro through command line using the WEB UI or a PC.
 - Through the PLC 50-Pin I/O port (Pin 48 see Table 7-4 PLC DB50 Pin-out table for more details)

10 Remote Automated Control Requirements

The S2000 Elite/ S1500 Pro system is designed to provide remote automated control of the UV spot curing system from a PC through the USB port, RS232 port, and it is also accessible via TELNET and Direct IP.

The specification in the following topics are used to describe the communication protocol between the S2000 Elite/ S1500 Pro unit and a PC.

Operating System: Windows 10+ recommended.

*If using an older operating system, contact Excelitas Canada.



If the user does not observe and adhere to the protocol and command timing specifications, abnormal unit operation will result!

10.1 Com Port Configuration (for RS232)

Baud rate: 19200

Data bits: 8

Parity: None

Stop bits: 1

Flow Control: None

10.2 RS232 Message Format and Protocol

All commands sent to the S2000 Elite/ S1500 Pro and responses from the S2000 Elite/ S1500 Pro include 3 pieces of data:

1. the command section
2. CRC8
3. carriage return (“\r” in C code or chr\$(13) in basic code).

The CRC8 (one byte value) is entered as a hex string.

When the carriage return character (CR) is received, the S2000 Elite/ S1500 Pro will respond with an error message if there is a problem. For example:

Error Message Response: “Err67\r”

 The command “CONN18\r” must be sent out first to establish communication with the connected PC. If a “READY0A\r” is received from the S2000 Elite/ S1500 Pro, communications can commence with the unit, otherwise, the command “CONN18\r” should be resent until the response “READY0A\r” is received.

If there are no errors, the S2000 Elite/ S1500 Pro will respond as indicated below. In the example, the XX presents one byte CRC8 value.

By default, RS232 employs CRC for error detection. However, it is possible to disable CRC8 using the Command Line Interface. CRC8 is disabled by default for USB, telnet, and direct IP connections, but it can be enabled through the command line interface if desired. For more information, please refer to the 035-00724R Software SDK.

11 StepCure®

Welcome to StepCure, a powerful and intuitive programming engine that lets you automate your curing process with ease!

The OmniCure S2000 Elite/ S1500 Pro has a “StepCure” run-time and programming engine built into it. This engine can be utilized to perform intricate multi-step exposures, automate your curing process, and substitute Programmable Logic Controllers (PLC) in your applications. By connecting with various input/output options accessible on the S2000 Elite/ S1500 Pro, it allows for easy integration. The following sections will introduce StepCure programming logic, available input/output options, the elements of a curing profile, and walk you through some common use cases with step-by-step examples to familiarize you with the StepCure UI.

11.1 Understanding Inputs, Outputs, and More

StepCure is a powerful programming engine that follows a ladder logic methodology similar to that used in PLC programming. In this user guide, we'll take you through the components that make up StepCure and how they work together to help you create complex multi-step exposures and automate your curing process.

Let's start with **INPUTS** - these allow StepCure to communicate with the outside world. They can receive signals from a variety of sources, such as foot pedal triggers, Start/Stop buttons, NFC, or commands from a PLC input channel.

On the other hand, **OUTPUTS** send signals to the outside world. They can switch on/off elements such as PLC output channels, lights, and other devices.

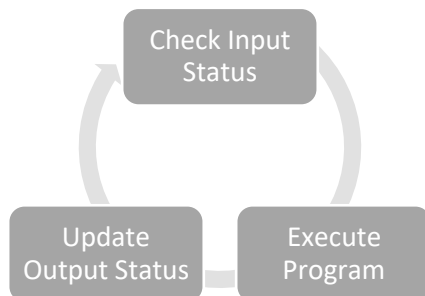
Now, let's talk about **VIRTUAL I/O UTILITY RELAYS** - these are simulated relays that don't receive signals from the outside world and don't physically exist. Instead, they help enable some advanced programming capabilities that we'll cover later. Some are always on, while others are always off, but they can also be programmed to switch when certain conditions are met.

DATA STORAGE is another essential component of StepCure. These are *registers* assigned to store data temporarily and are usually used for program logic manipulation in conjunction with Virtual I/O Relays.

Another important component is **TIMERS**, which can be used to control the activation of an action within a specific period of time. With StepCure's on/off-delay timers, you have precise control over the timing of your curing process.

Finally, we have **ACTIONS**, which are the set of operations that can be performed with any of the components described above. By using StepCure's comprehensive instruction set, you can create complex and precise curing profiles to meet your specific needs.

11.2 How Does StepCure Work



Just like a PLC, StepCure works by scanning your program continuously. But unlike traditional programming methods, StepCure makes it easy to create complex and precise curing profiles without any programming experience.

Let's break down the three steps of the StepCure cycle to see how it works:

- **Step 1 - Check Input Status**
StepCure starts by checking the status of each input - is it on or off? By analyzing the input status, StepCure records this data into its memory to be used in the next step.
- **Step 2 - Execute Program**
Next, StepCure executes your program instruction by instruction, based on the input status it recorded in the previous step.
- **Step 3 - Update Output Status**
Finally, StepCure updates the status of your outputs based on the results of executing your program during the second step. With StepCure, you have complete control over the output status, allowing you to create precise and accurate curing profiles.

And that's it! StepCure goes back to Step 1 and repeats the cycle continuously.

11.3 Building blocks of a StepCure program:

Each action in your program is represented by a symbol with connections, just like an electrical circuit. And don't worry if you're new to ladder diagrams - our user-friendly tables provide all the information you need to get started with Action symbols, Connections, and Associated Elements.

11.3.1 Action Symbols (Inputs/Outputs)

Action Symbol	Description	Associated Elements
	Normally open input. • <i>Contact</i> is closed when a signal is received from an associated element.	• Foot Pedal (FP) • Remote Trigger 1/2 (RT1/RT2) • Start/Stop Trigger (SS)

	When executed, tells the program to evaluate the next connected element.	- NFC Card Detected Event (NFC) - Virtual Input (VI) - CTD (Counter Done)
	Normally closed input. <i>Contact</i> is opened when a signal is received from an associated element. - When executed, tells the program to evaluate the next connected element.	- Foot Pedal (FP) - Remote Trigger 1/2 (RT1/RT2) - Virtual Input (VI) - CTD (Counter Done)
	Latch output - The latch action will keep the specified output energized until the corresponding output is de-energized with a corresponding unlatch action. - If there is no corresponding unlatch action, the output is only energized momentarily.	- Channel 1/2/3 Output (C1/C2/C3)¹ - Tree 1/2/3/4 Output (T1/T2/T3/T4)¹ - Load Counter (LCT) - Count Accumulate (CT) - Lock-Step (LCK) - Interlock (ALM) - Virtual Output (VO)
	Unlatch output The unlatch action will de-energize a previously energized latch action.	- Channel 1/2/3 Output (C1/C2/C3)¹ - Tree 1/2/3/4 Output (T1/T2/T3/T4)¹ - Virtual Output (VO)
	Duration element (DU) - When this action is executed, a timer will start. - Functions as a delay-on/ off.	- Only valid if it is placed before certain actions. - See table below for more details.
	Exposure action This will run an exposure at a specified intensity.	Duration element before the exposure action functions as a delay off (Turns the lamp off after a set time).

Table 11-1 StepCure Action Symbols

11.3.2 Associated Elements

¹ Only C1 configurable I/O is available on S1500 Pro

Element	Description
Start/Stop (SS)	Generates a signal if the Start/Stop button is pressed.
Duration (DU)	Loads a timer with the specified value in seconds. - Must be followed by a virtual output or an exposure action. - If the duration block is before an exposure action, the duration value will set the exposure duration. - If the duration block is before a virtual output, the duration value will set the time delay until the virtual output is activated.
Exposure Action (% , W, W/cm2)	Runs an exposure when the action executes. - StepCure instruction with a running exposure will be momentarily blocked until that exposure completes. - The other sequenced steps will still execute. - Only one exposure action can execute at a time. - A minimum DU of 0.2s is suggested between two consecutive exposures to allow the iris to adjust position.
Foot Pedal (FP)	Generates a signal if a foot pedal is activated.
NFC Event (NFC)	Generates a signal if a valid NFC card is detected by the system. See 6.1 NFC Enabled access control for more details.
Remote Trigger (RT1/RT2)	Generates a signal if remote trigger #1 (or #2) is activated. See DB50 pin-out table for more details (pin 16, 50).
Command Line (CMD)	Generates a signal if a command line input is set. Refer to the 035-00724R Software SDK for more details.
Virtual Input (VI)	Used to act as a simulated relay. - Requires a data storage address to grab on/off value from. 32 addresses available from 1-32.
Virtual Output (VO)	Used to act as a simulated relay. <i>Latches/ unlatches</i> an on/ off value to an address. There are 32 addresses available (1-32).
Load Counter (LCT)	Loads a counter with the provided value. - Maximum allowed value is 250. - Zero value indicates the counter will never stop. - Only one counter is allowed in a StepCure profile.
Accumulate Counter (CT)	Will accumulate by plus one. Switches the Counter Done Input once the counter reaches the provided value.
Counter Done (CTD)	Functions as switch Activates once the counter reaches the value provided to LCT.
Channel 1/2/3 (C1/C2/C3)	A physical output that can be used by the process line to control external equipment. They can be latched (energized)/ unlatched (de-energized). See the DB50 pin-out table for more details. ¹

¹ C2/C3 not available on S1500 Pro

Tree 1/2/3/4 (T1/T2/T3/T4)	A physical output that can be used by the process line to control external equipment. They can be latched (energized)/unlatched (de-energized). See the DB50 pin-out table for more details.
Lock StepCure (LCK)	StepCure will be locked from running, until there is supervisory intervention.
Interlock (ALM)	Any running exposures will be suspended and the StepCure will reset. To allow the StepCure to resume, supervisor intervention is required.

Table 11-2 StepCure Elements

11.3.3 Connectors

In StepCure, connectors are the links between the various actions and elements, representing the logic flow of your program. It's like an electrical connection between different blocks of your program, just like in a ladder diagram. To illustrate, consider the ladder diagram on the left. In StepCure, it would be represented with connector blocks and action symbols as shown on the right, with the arrow indicating the direction of the connection or the direction of current flow if

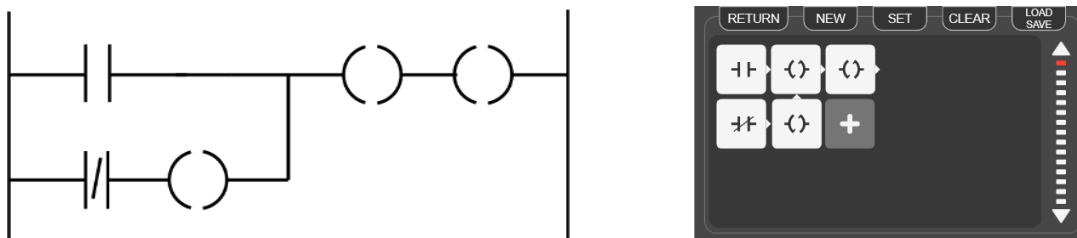


Figure 11-1 StepCure connectors

you think of it in electrical terms. This allows you to easily visualize and understand the logic structure of your program in StepCure.

See Figure 11-3 Structure of a StepCure block (4) for more details.

11.3.4 Putting it Together

In StepCure, profiles are a collection of instructions that allow you to automate tasks on your production line with precision and ease.

To illustrate, look at the following image which demonstrates a simple StepCure profile. The start/stop button on the unit is used as the trigger for this exposure. The profile will run a cure for 2.0 seconds at 10% intensity.

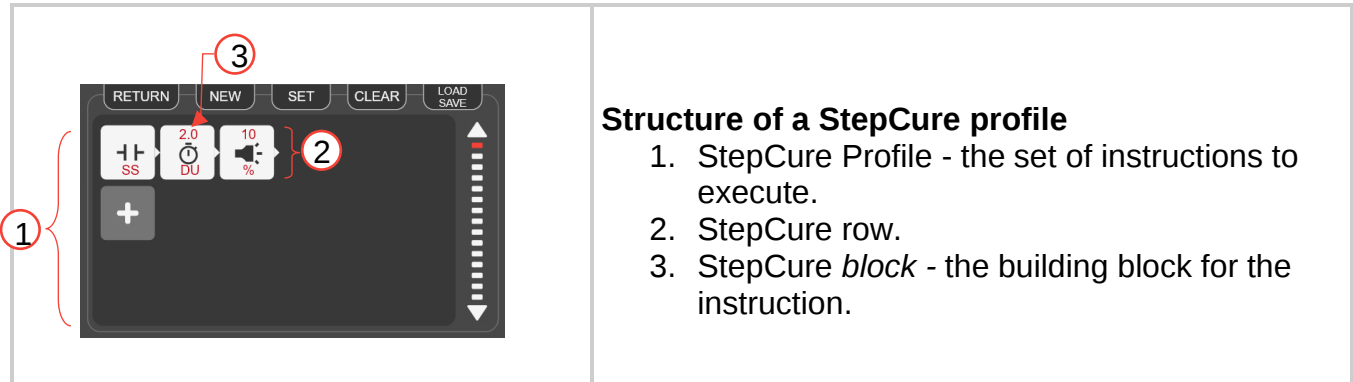


Figure 11-2 Anatomy of a StepCure profile

- i** A StepCure profile can contain a maximum of 30 rows, and each row can have a maximum of 6 Blocks.

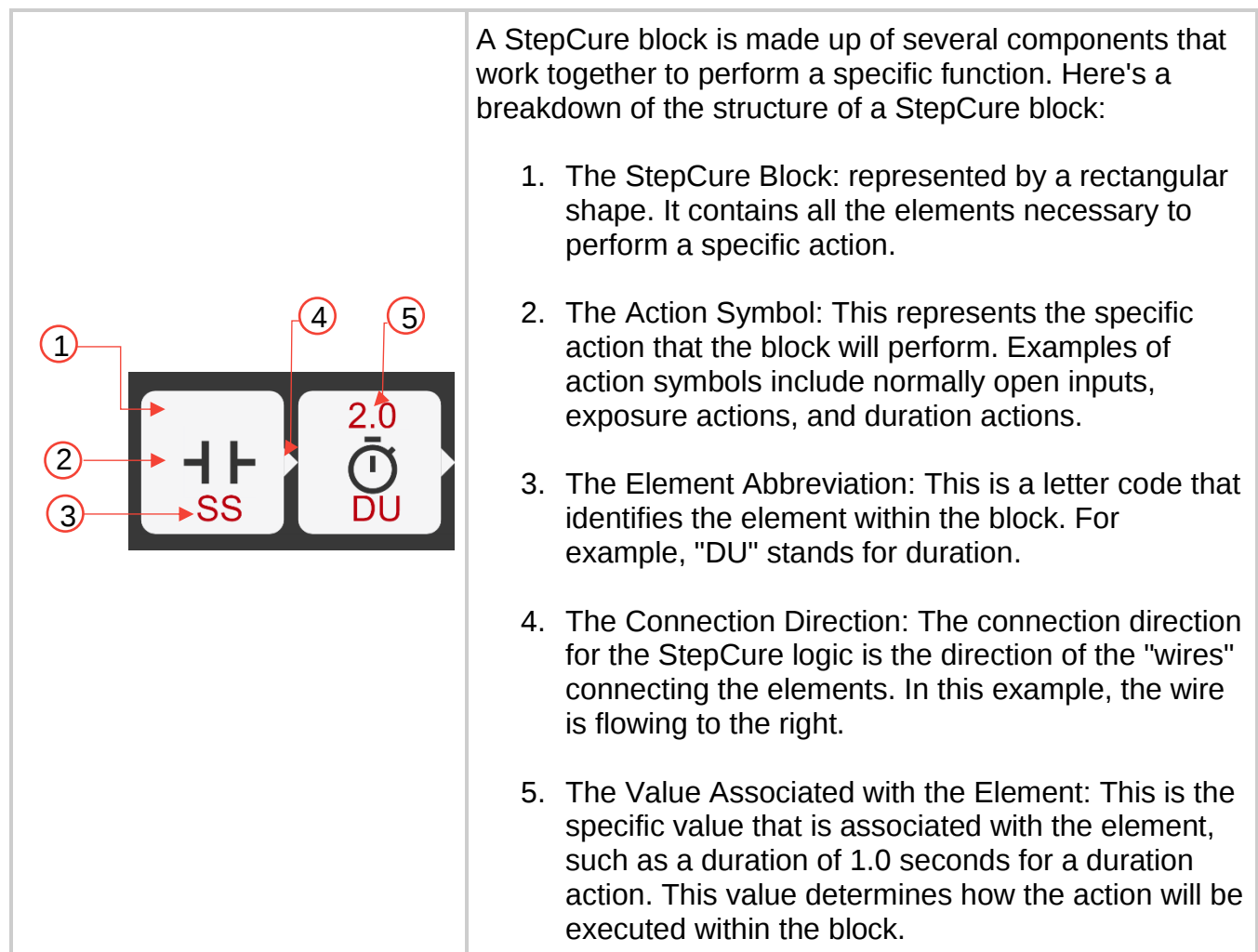


Figure 11-3 Structure of a StepCure block

11.4 Examples

Now that you have a good understanding of the elements that make up a StepCure profile, it's time to start creating your own. To help you get started, we've provided step-by-step examples of some of the most commonly used tasks in StepCure. By following these examples, you'll not only learn how to use the StepCure interface, but also gain the confidence to create your own custom profiles.

11.4.1.1 Example 1

Let's start with a simple objective: when the Start/Stop button is pressed, you want the system to execute a 2-second exposure at 10% intensity.

Here's how to break down this objective:

Step 1: Teach the program to "listen" for the Start/Stop (S/S) button signal. We'll do this by creating a normally open input associated with the S/S button.

Step 2: Once the program detects the S/S signal, it will execute the exposure action. Remember, a DU action before an exposure action functions as a delay off. So we'll use DU with 2 seconds followed by an exposure action at 10% intensity to execute this action.

Programming it:

Open StepCure by clicking on the Run screen icon or selecting it from the Settings menu.

	Return: Takes you back to the previous screen. New: Deletes or clears your current StepCure profile. Set: Sets the current profile as "Active". Once the profile is set as "Active" you can navigate to the Run screen and begin using the programmed actions. Clear: Removes the current profile from active operation without deleting it from the system. Load/ Save: Takes you to the load/save screen, where you can load a profile from, or save your profile to, internal storage or an external SD card.
---	--

Figure 11-4 StepCure profile editor screen

1. Click on the '+' icon to access the block configurator screen.

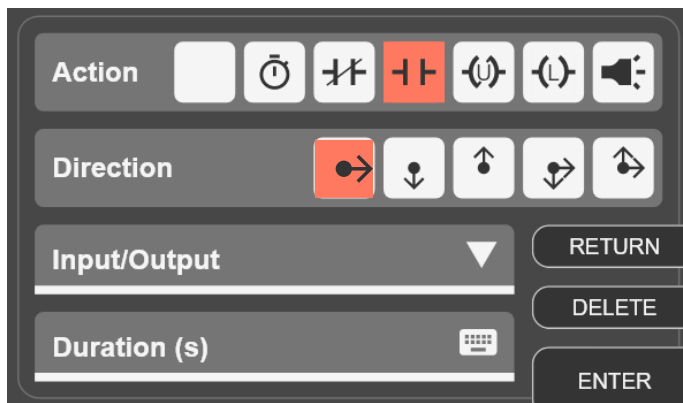
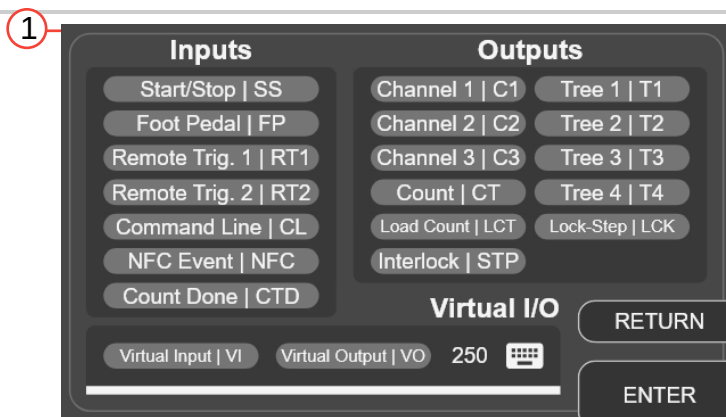


Figure 11-5 StepCure block configurator screen

- To start, make sure you have a normally open input.
- Next, select the “Right” connector direction, which will allow the signal to flow into the next block on the right.
- Navigate to the Input/Output configurator screen by pressing the "Input/Output" tab.



The Input/ Output configurator screen shows the various available input/ output elements that may be paired with the selected action symbol.

2. The Input/ Output configurator screen shows the various available input/ output elements that may be paired with the selected action symbol.
3. To create a delay before the exposure action, add a new block with the DU action element and set the duration to 2 seconds.
4. Next, add an exposure action element and set the relative intensity to 10%. Your configuration should now resemble the image below:



5. Save your profile by navigating to Load/Save.
6. Make the current profile active by pressing the Set button. This will take you to the Run screen and enable you to use the profile during operation.
7. Test your new profile by pressing the Start/Stop button.

11.4.1.2 Example 2

Objective: When the Start/Stop button is pressed, the system executes a 2 second exposure at 10% intensity and repeats the same at a 2 second interval indefinitely.

Here's how to break down this objective:

1. Listen for the Start/Stop button signal.
2. When the Start/Stop button is pressed, execute a 2-second exposure at 10% intensity.
3. Wait for 2 seconds.
4. Repeat steps 2-3 indefinitely until the program is stopped.

To achieve Steps 1-3, we'll use a combination of a normally open input, a delay off (DU) block with 2-second duration, and an exposure action block with 10% intensity.

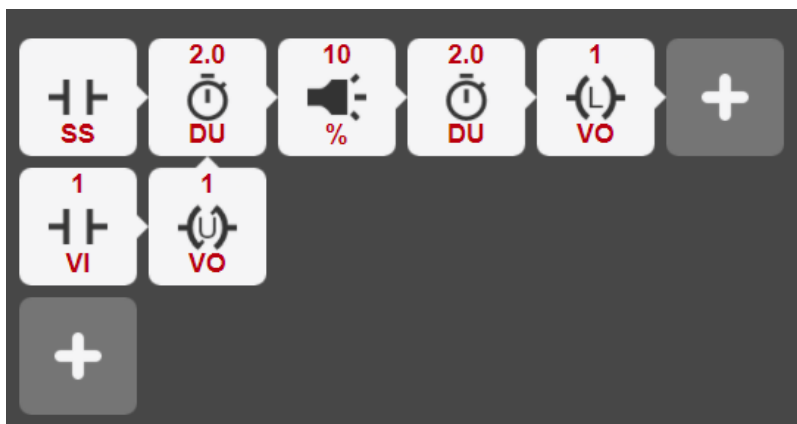
To achieve Step 4, we need a loop, which can be created by a latch block with a virtual output, and virtual input linked to the same address as the latch.

The latch block is set to turn on the virtual output with a 2-second delay after the exposure action has been executed. A virtual input takes the value from the same address as the virtual output and acts as a trigger to re-execute the exposure. The unlatch block is used to reset the latch to create a self-resetting loop.

Now let's program it in StepCure:

1. Open StepCure by clicking on the Run screen icon or selecting it from the Settings menu.
2. Click on the '+' icon to access the block configurator screen.
3. Create a Normally Open Input associated with the Start/Stop button by selecting the Input element, the desired connector direction and S/S from the associate elements.
4. Add a DU action block by selecting the DU element and set the duration to 2 seconds.
5. Add an Exposure Action element and set the relative intensity to 10%.
6. Add a DU action block by selecting the DU element and set the duration to 5 seconds.
7. Add a Latch block and set the virtual output address to "1".
Note: We are using "1" as an example, but there are up to 32 addresses available for Virtual I/O (numbered 1 to 32) so you can use any value from 1-32.
8. In the second row, add a normally open input with associated virtual input at the same address ("1").
Note: The virtual input takes the value from the same address as the virtual output in Step 7. and acts as a trigger to re-execute the exposure.
9. Add an Unlatch Virtual Output block at the same address ("1") and connect it to the DU (2s) block above.
Note: The unlatch block is used to reset/ de-energize the latch stored at address "1" to create a self-resetting loop.
10. Save your profile by navigating to Load/Save.
11. Make the current profile active by pressing the Set button. This will take you to the Run screen and enable you to use the profile during operation.
12. Test your new profile by pressing the Start/Stop button.

Your Profile should look like this:



11.4.1.3 Example 3

Now that you've become familiar with the StepCure UI and programming a profile, let's take on a more challenging objective. This time, we're going to focus on the logic flow required to achieve our goals.

Our objective is to create a profile that listens for the Start/Stop button signal and executes a specific sequence of exposures for a particular number of times when the button is pressed. Here's the breakdown:

1. Listen for the Start/Stop button signal.
2. When the Start/Stop button is pressed, execute a 3-step exposure:
 - 2 seconds at 10% intensity
 - Wait for 2 seconds
 - 1 second at 15% intensity
 - Wait for 1 second
 - 5 seconds at 10% intensity
 - Wait for 2 seconds
 - Repeat 3 times

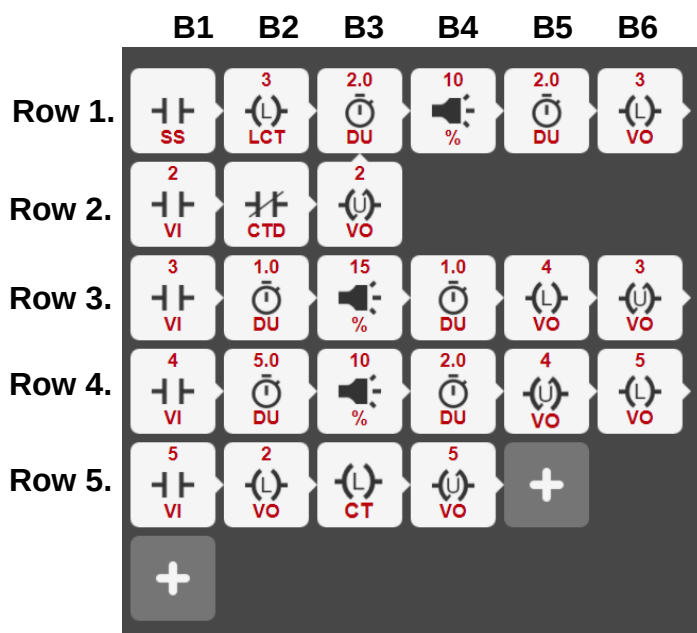
Note: Since we have a complex exposure that needs multiple rows, we need to use Latch with VO and Virtual Inputs associated with common addresses to tell the program the sequence in which different rows must be executed.

3. Repeat step 2, 3 times.

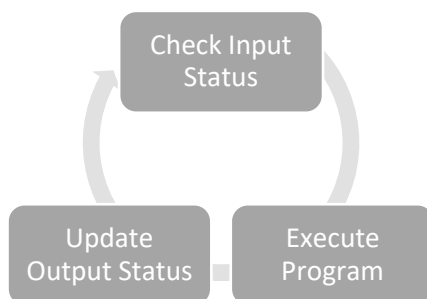
Note: We need to keep track of the number of times the loop has been executed and reset it automatically after the specified number of exposures have occurred. To achieve this, we can use Latch actions with LCT, CT and CTD elements. The CT block acts as a counter and increments by one each time the loop is executed. Once the CT block reaches 3, it will send a

signal to the CTD block to open the Normally Closed switch in Row 2, which completes the exposure.

Your profile should look like the following:



To fully understand how this program works, it's important to have a clear understanding of how StepCure executes a program. To facilitate this, we will use a table to track all the Virtual Inputs at the beginning of each cycle.



Cycle 1:

The program is triggered as soon as the Start/Stop button is pressed. StepCure starts executing at Row 1 and loads a value of 3 to the Counter block. Then, it executes a 2-second exposure at 10% intensity and waits for 2 seconds before energizing (latching) the Virtual output (VO) at address 3.

Address	2	3	4	5	LCT	CT (Counter)	CTD (Counter Done)
Value	0	0	0	0	0	0	0

Cycle 2:

Address	2	3	4	5	LCT	CT (Counter)	CTD (Counter Done)
Value	0	1	0	0	3	0	0

The energized VI at address 3 causes StepCure to execute Row 3. Note that Row 3 begins with a Normally Open switch that closes when VI at address 3 is energized. StepCure then executes a 2-second exposure at 15% intensity, waits for 1 second, energizes (latches) the VO at address 4, and de-energizes (unlatches) the VO at address 3.

Cycle 3:

Address	2	3	4	5	LCT	CT (Counter)	CTD (Counter Done)
Value	0	0	1	0	3	0	0

The energized VI at address 4 causes StepCure to execute Row 4. Note that Row 4 begins with a Normally Open switch that closes when VI at address 4 is energized. The program then executes a 5-second exposure at 10% intensity, waits for 2 seconds, energizes (latches) the VO at address 5, and de-energizes (unlatches) the VO at address 4.

Cycle 4:

Address	2	3	4	5	LCT	CT (Counter)	CTD (Counter Done)
Value	0	0	0	1	3	0	0

StepCure executes Row 5 and updates the outputs.

Cycle 5:

Address	2	3	4	5	LCT	CT (Counter)	CTD (Counter Done)
Value	1	0	0	0	3	1	0

Energized VI at address 2 causes StepCure to execute Row 2 and continue to Row 1-B3, starting the second 3-step exposure.

Cycle n:

The program continues to run the 3-step exposure for two more cycles. Once the Counter block's value reaches 3, it triggers the Counter Done (CTD) block to switch to 1. This update is reflected in the table, indicating that the Always Closed switch in Row 2 is now open, signaling the end of the 3-step exposure. At this point, the program is back to Row1 – B1 and waiting for input from the Start/Stop button.

Address	2	3	4	5	LCT	CT (Counter)	CTD (Counter Done)
Value	1	0	0	0	3	3	1

11.4.1.4 Example 4

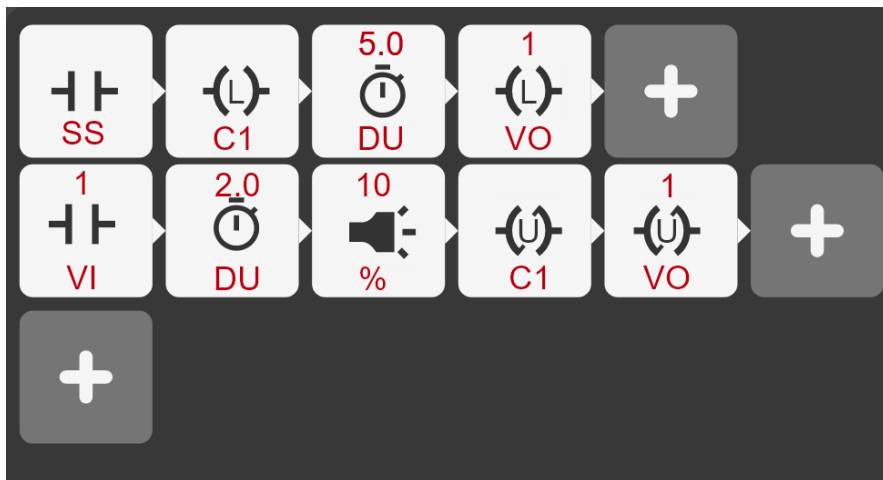
The S2000 Elite/ S1500 Pro also feature programmable physical outputs that can enable integration and control of external equipment. In this example we will use a programmable output channel via StepCure to trigger a nitrogen purge setup.

Our objective is to create a StepCure profile that listens for the Start/Stop button signal to enable the nitrogen purge for 5 seconds, execute an exposure, and then switch off the nitrogen dispenser.

Here's a breakdown of the objective:

1. Listen for the Start/Stop button signal.
2. When the Start/Stop button is pressed, activate the programmable output channel to enable the nitrogen purge setup.
3. Wait for 5 seconds.
4. Execute **a 2 second exposure @10% intensity**.
5. Switch off the nitrogen dispenser via the programmable output channel.

Your StepCure profile should look like this:



In this example, Channel C1 is utilized to act as a switch for an external device (the nitrogen purge station). From [Table 7-4 PLC DB50 Pin-out table](#), C1 corresponds to pins 43(-) and 26(+) of the DB50 connector. When we latch C1 (in Row 1), the switch turns on and continues to stay on until we unlatch it after the exposure in Row 2 of the step cure profile.

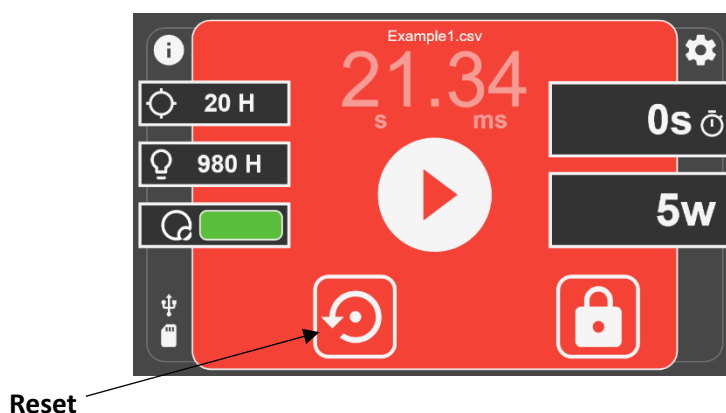
Similarly, you can use up to 7 programmable output channels to control external equipment using StepCure.

11.5 Interrupting StepCure Exposures

The run screen in StepCure mode includes a reset button specifically designed for resetting the cure profile. In situations where a reset action is not applicable, the reset button changes to a Clear StepCure button.

StepCure provides a very high degree of flexibility to enable customization and optimization of the curing process. In order to ensure that inputs and triggers are compatible and properly aligned to achieve the desired behaviour, it is highly recommended that users confirm the expected outcome for each new profile.

Note: Providing multiple or unexpected triggers in a StepCure profile may lead to unexpected behavior. If this should occur, it is recommended to utilize the "Reset" button to restore the system to its initial state and ensure smooth operation.



In the event you need to interrupt an ongoing StepCure exposure, you can use the "Reset" button to stop and reset the exposure. This ensures that the program initiates from the beginning when you subsequently run the profile, ensuring accurate execution. It is important to note that the "Reset" button transitions into the "Clear StepCure" button once the profile has been successfully reset or if it is already in its initial state.

12 Routine Care and Maintenance



Operate the unit in a well-ventilated area with at least six inches clearance at the rear of the unit for proper air flow. Do not place any objects between the feet below the unit, as this will restrict airflow through the bottom of the front face plate.

It is recommended that the unit to be situated on a benchtop, shelf or rack when in use.

For safe operation, use only a grounded outlet.

Avoid physical shocks or jarring to the unit especially while the unit is operating. Such sudden movements reduce the lamp module life.

The lamp module must be operated for a minimum of 20 minutes each time it is turned on to prevent damaging the lamp. Increasing the time between turning the lamp module on and off will maximize lamp life.

Replace the air filter (found under the front faceplate) frequently to ensure unrestricted airflow. It is recommended that the air filter be removed and washed with a mild detergent and water every time the lamp module is replaced.



Restricted airflow can cause the lamp temperature to increase above optimum temperature, significantly reducing lamp life.

1. When necessary, clean the light-emitting end of the light guide using an optical cleaning solution.
2. Cleaning of the unit is not required; however, if cleaning is desired, disconnect the AC power cord from the unit and use de-ionised water, isopropyl alcohol or an ammonia-based glass cleaning fluid. Ensure that the cleaning solution does not come in contact with any optical, moving mechanical or electrical parts.
3. Recommended operation of S2000 Elite/ S1500 Pro is in a horizontal position. Using S2000 Elite/ S1500 Pro beyond 15% of tilt from a flat position will wear lamp life.
 - [Replacing the External Fuses](#)
 - [Replacing the Air Filter](#)
 - [Light Guide Cleaning](#)

12.1 Replacing the External Fuses

 The external (mains) fuses are located in the fuse drawer which is located in the AC inlet module on the rear panel.

1. Turn off the main POWER switch and remove the AC POWER cord from the unit.
2. Gently pull out the drawer with the aid of a flat-head screwdriver.
3. Carefully lever one end of the blown fuse up from its retaining clip with a small flat-head screwdriver and lift it out.

 Replace the damaged fuse(s) only with the same type and rating (F4A, 250V). The rear compartment must contain two active fuses.

1. Close the fuse drawer.
2. Reconnect the AC POWER cord.

12.2 Replacing the Air Filter

 The external air filter is located under the front faceplate of the S2000 Elite/ S1500 Pro.

1. Turn off the main POWER switch and remove the AC POWER cord from the unit.
2. Remove screws holding the filter cover in place and remove the filter.
3. Push in the replacement filter so that it sits flat in place and re-install filter cover.

12.3 Light Guide Cleaning

Instructions for cleaning the light emitting end (output) of the light guide

Materials:

- Lens Tissue sheets
- Optical Swabs
- IPA (Isopropyl Alcohol) solution
- Wooden stick (e.g.; tongue depressor/popsicle stick)



Before using Isopropyl Alcohol consult the manufacturers MSDS Sheets for proper handling and storage.

Never look directly into the light emitting end (output) of the light guide. The light could severely damage the cornea and retina of the eye. Protective eye wear must be used at all times and always turn the system off before removing the lightguide.

Notes:

1. The staining that appears on the light guide's light-emitting end is the result of gaseous burn-off from the UV adhesive.
2. Inspect light guide optical input port of R2000 Radiometer for signs of residual gaseous burn-off powder/dirt, transferred from the light-emitting end of the light guide, clean as stated below.
3. Never apply a dirty tissue/swab to the end of the light guide or R2000 optical input port.
4. Never use a razor blade or any other metallic apparatus to scrape off adhesive build-up from the quartz lens on the light-emitting end of the light guide. This may cause permanent damage (scratches) to the quartz lens.

Procedure:

1. Turn off power to the UV spot curing system and let the light guide cool down for at least 10 minutes.
2. If required, remove the light guide output end from the production fixture.
3. Remove the light guide from the light guide port of the UV spot curing system.

4. Place the protective cap onto the light guide input end while cleaning the output end.
5. Wipe output end of light guide with non-abrasive lint-free lens tissue or optical swab saturated with an IPA cleaning solution with sufficient pressure until the staining has disappeared.
6. For excessive adhesive build-up on the light-emitting end, lightly scrape the adhesive build-up with a wooden stick such as tongue depressor/popsicle stick. Take care not to damage the quartz lens.
7. Re-install the light guide as per the instructions located in the relevant UV spot curing manual/user guide.
8. For cleaning R2000 optical input port; wipe surfaces with non-abrasive lint-free lens tissue or optical swab saturated with an IPA cleaning solution until the staining has disappeared. Care is to be taken to avoid puddling/over-saturation of input port.

13 Software Updates

The S2000 Elite/ S1500 Pro runs two separate software, one for the System software (EES or EEC) and another one for the WEB UI interface (BIN). Both software can be easily updated to the latest versions. It is recommended to run the latest software versions as they contain improvements, bug fixes as well as additional features and options.

- [Software Update via S2000 Elite/ S1500 Pro Touchscreen](#)
- [Software Update via WEB UI](#)
- [Software Update via USB](#)

13.1 Software Update via S2000 Elite/ S1500 Pro Touchscreen (w/ SD Card)

The S2000 Elite/ S1500 Pro's System Software and Web Software can be upgraded directly using the touchscreen and an SD card.

13.1.1 Materials Required

1. S2000 Elite/ S1500 Pro System with reliable power source.
2. Computer to download latest software file(s) with SD card read/write capability.
3. Compatible SD Card formatted to FAT32.



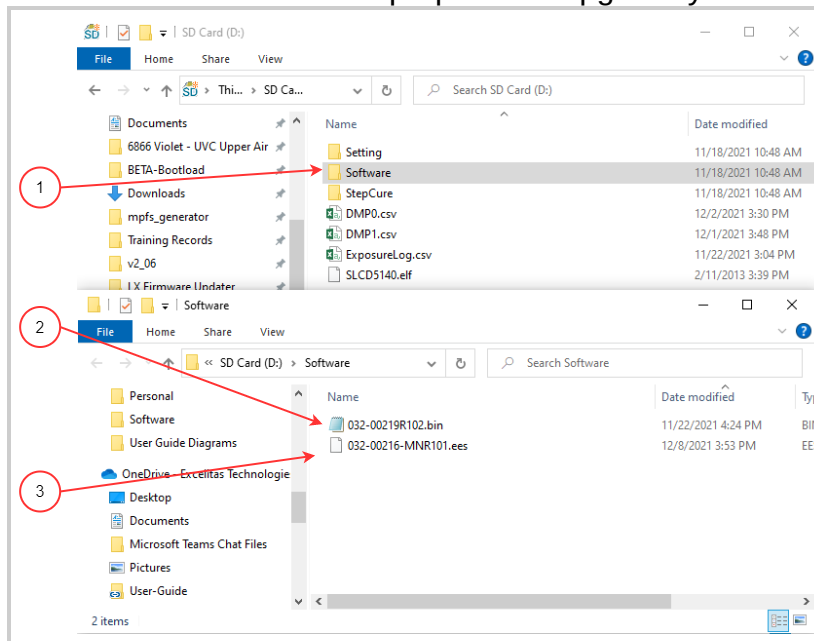
If your computer does not have an SD card slot to read/write, an external SD card to USB adapter can be used.

The S2000 Elite/ S1500 Pro is compatible with SD, SDHC or SDXC cards. MiniSD or MicroSD cards are accepted once inserted into an SD adapter.

Upgrading the System Software is estimated to take 3 minutes.

13.1.2 Preparing the SD Card

1. Insert your FAT32 formatted SD card into a computer.
2. Create a folder called "Software" in the root directory of the SD card.
3. Download the latest System Software upgrade file (.EES) and/or the Web UI Software upgrade file (.BIN) to your computer.
4. Copy the downloaded files into the previously created Software folder on the SD Card
5. Safely eject the SD card from your computer.
6. The SD card is now prepared to upgrade your S2000 Elite/ S1500 Pro unit(s).



SD Card Folder Layout

1. Software folder created on your SD Card
2. Web UI Software upgrade file (.bin extension)
3. System Software upgrade file (.ees extension)

13.1.3 Performing the System Software Upgrade



Do not disconnect the system power supply once the System Software update has started. Otherwise, you will be required to [Software Update via USB method](#).



If updating both the System and the Web Software, the System Software needs to be updated first.

The system lamp must be OFF or READY before starting the upgrade. If the lamp is COOLING or WARMING UP, you must wait for that process to complete.

1. Power on your S2000 Elite/ S1500 Pro unit and insert the SD card into the system.
2. Using the touchscreen, navigate to Settings → Load Save and select the “SD Card” and “Firmware Update” toggles on the bottom of the screen. The files loaded on the SD card should now appear.
3. Using the UP or DOWN navigation buttons or the touchscreen, select the .EES file you wish to load and press the “LOAD” button on the touchscreen, or the keypad ENTER button.
4. The system will prompt a warning to confirm if you wish to continue with the update, select the Check Mark to continue. If your lamp is on, the system will request to turn the lamp off before proceeding.
5. The system screen will update with a warning prompt that the upgrade is in progress.
6. The system screen will turn black and the light guide ring will flash GREEN confirming the system upgrade is in progress. The system will reboot after the update completes.



If the light guide ring flashes BLUE instead of GREEN during the software upgrade, the system has detected a corrupt file and is requesting for the files to be loaded through USB. Refer to [Software Update via USB method](#).

13.1.4 Performing the Web Software Upgrade ¹



If updating both the System and the Web Software, the System Software needs to be updated first.

1. Power on your S2000 Elite/ S1500 Pro unit and insert the SD card into the system.
2. Using the touchscreen, navigate to Settings → Load Save and select the “SD Card” and “Firmware Update” toggles on the bottom of the screen. The files loaded on the SD card should now appear.
3. Using the UP or DOWN navigation buttons or the touchscreen, select the .BIN file you wish to load and press the “LOAD” button on the touchscreen, or the keypad ENTER button.

¹ Not available on S1500 Pro

4. The system will prompt a warning to confirm if you wish to continue with the update, select the Check Mark to continue.
5. The system screen will perform the upgrade and return back to the MAIN screen after the upgrade completes.
6. There is no need to reboot the unit after the upgrade completes.



Your Web Browser Cache must be cleared to view the new Web Software.

13.2 Software Update via WEB UI¹

The S2000 Elite System Software and Web Software can be remotely upgraded using the Web UI.

13.2.1 Materials Required

1. S2000 Elite System with reliable power source and network connectivity.
2. Computer or mobile device with one of the supported browsers: Google Chrome or Microsoft Edge.
3. S2000 Elite System host name or IP address.
4. Software file(s) saved on your device OR a correctly prepared SD Card (refer to [Software Update via S2000 Elite/ S1500 Pro Touchscreen](#) on how to prepare an SD card for upgrade(s)).



Your device must be connected on the same network as the S2000 Elite.

You can determine the network properties of your S2000 Elite system by navigating to the Network Setup screen using the touchscreen. Record your IP address or host name (DNS).

Upgrading the System Software is estimated to take 3 minutes.

Type	File	Date
Website	602-002198102.htm	22/10/21
Filesystem	S2000-Elite-Software-Upgrade-20210121.ees	28/10/21

Software Upgrade Page

1. Software Upgrade HTML page
2. LOAD button for selecting a local .EES file from your device and upgrade via Network
3. List of all Software Upgrade and Web Upgrade files located on the SD card
4. Selected SD card file for upgrade
5. Start Upgrade button

Figure 13-1 Firmware update via Web-UI

¹ Not available on S1500 Pro

13.2.2 Performing the System Software Upgrade (w/ Web-UI)¹



Do not disconnect the system power supply once the System Software update has started. Otherwise, you will be required to [Software Update via USB method](#).

Do not close your browser tab once the System Software update has started and ensure you have a stable network connection. Interruptions may require you to restart the upgrade.

- i** If updating both the System and the Web Software, the System Software needs to be updated first.

The system lamp must be OFF or READY before starting the upgrade. If the lamp is COOLING or WARMING UP, you must wait for that process to complete.

The Web Software Upgrade page is found by navigating to **http://[your-host-name-or-ip]/index.htm** and clicking the "Web Software Upgrade" button, or directly with the following link: **http://[your-host-name-or-ip]/softwareupgrade.htm**

The System Software can be uploaded using the Web UI in two ways:

1. Directly transferring a local .EES file that is stored on your device over your network.
2. Using the Web UI to access a connected SD card.

Using a local file on your device

1. Power on your S2000 Elite unit and ensure the network cable is connected.
2. Using your computer/mobile device browser, navigate to the S2000 Elite Web Software Upgrade page.
3. Select the LOAD button on the top right of the screen and locate the .EES file on your device.
4. The Web UI will prompt a warning to confirm if you wish to continue with the update, select the Check Mark to continue. If your lamp is on, the Web UI will request to turn the lamp off before proceeding.
5. The Web UI screen will update with an estimated countdown for the time remaining.
6. If your system is visible, you will notice:
 - a. The touchscreen will update with a warning prompt that the upgrade is in progress.
 - b. The system screen will turn black after the file is transferred, and the light guide ring will flash GREEN confirming the system upgrade is in progress.
7. The system will reboot after the update completes and the Web UI will refresh back to the home page.

¹ Not available on S1500 Pro



If you are not able to remotely access your system after the upgrade:

- Your S2000 Elite network settings may have changed after a power cycle. Confirm the network settings on your unit.
- If your light guide ring is flashing BLUE instead of GREEN, refer to [Software Update via USB method](#).

If the network transfer of the .EES file is interrupted, a warning prompt will display on the Web UI.

Using a prepared SD card

1. Power on your S2000 Elite/ S1500 Pro unit and ensure the network cable and SD card are connected to the unit.
2. Using your computer/mobile device browser, navigate to the S2000 Elite/ S1500 Pro Web Software Upgrade page.
3. The page will show the files on your SD card. Click on the .EES file you wish to upload
4. Click on the Start Upgrade button.
5. The Web UI will prompt a warning to confirm if you wish to continue with the update, select the Check Mark to continue. If your lamp is on, the Web UI will request to turn the lamp off before proceeding.
6. The Web UI screen will update with an estimated countdown for the time remaining
7. If you have access to your system, you will notice:
 - a. The touchscreen will update with a warning prompt that the upgrade is in progress.
 - b. The system screen will turn black after the file is transferred, and the light guide ring will flash GREEN confirming the system upgrade is in progress.
8. The system will reboot after the update completes and the Web UI will refresh back to the home page.



If you are not able to remotely access your system after the upgrade:

- Your S2000 Elite/ S1500 Pro network settings may have changed after a power cycle. Confirm the network settings on your unit.
- If your light guide ring is flashing BLUE instead of GREEN, refer to [Software Update via USB method](#).

13.2.3 Performing the Web Software Upgrade ¹

- i If updating both the System and the Web Software, the System Software needs to be updated first.

The Web Software can be uploaded using the Web UI in two ways:

1. Directly transferring a local .BIN file that is stored on your device.
2. Using the Web UI to access a connected SD card.

Using a local file on your device



Web Software Direct Upload Page

1. Upload file dialog box to select file from your device's local storage
2. Upload button to upgrade the Web Software

- i The Web Software direct upload page is found by navigating to **http://[your-host-name-or-ip]/index.htm** and clicking the "Web GUI Upgrade" button, or directly with the following link: **http://[your-host-name-or-ip]/upload.htm**

1. Power on your S2000 Elite/ S1500 Pro unit and ensure the network cable is connected.
2. Using your computer/mobile device browser, navigate to the S2000 Elite/ S1500 Pro Web Software Upgrade page.
3. The page will show an upload file dialog box, click on the box to select an appropriate .BIN file.
4. Click on the upload button and the upload should take a few seconds.
5. If the upload is successful, a success message will be displayed, otherwise, retry the upgrade.
6. There is no need to reboot the unit after the upgrade completes.

-  Your Web Browser Cache must be cleared to view the new Web Software.

¹ Not applicable on S1500 Pro

Using a prepared SD card

 The Web Software Upgrade page is found by navigating to **[http://\[your-host-name-or-ip\]/index.htm](http://[your-host-name-or-ip]/index.htm)** and clicking the "Web Software Upgrade" button, or directly with the following link: **[http://\[your-host-name-or-ip\]/softwareupgrade.htm](http://[your-host-name-or-ip]/softwareupgrade.htm)**

1. Power on your S2000 Elite/ S1500 Pro unit and ensure the network cable and SD card are connected to the unit.
2. Using your computer/mobile device browser, navigate to the S2000 Elite/ S1500 Pro Web Software Upgrade page.
3. The page will show the files on your SD card. Click on the .BIN file you wish to upload.
4. Click on the Start Upgrade button and the upload should take only a few seconds.
5. There is no need to reboot the unit after the upgrade completes.

 Your Web Browser Cache must be cleared to view the new Web Software.

13.3 Software Update via USB

The S2000 Elite/ S1500 Pro System Software (.EEC) can be upgraded using a Windows PC and a USB cable.

Materials Required

1. S2000 Elite/ S1500 Pro System with reliable power source.
2. Windows PC with the provided update package downloaded. The package contains:
 - a. Excelitas Updater Application (ExcelitasUpdate.exe)
 - b. The USB Software Update file: *ldgi.eec*
3. Supplied USB Type-B to Type-A Cable.



The USB update method is only for the System Software. To upgrade the Web Software, refer to [update via Touch Screen](#) or [update via WEB UI](#)

Upgrading the System Software using USB is estimated to take 5 minutes.

Operating System required: Windows 8 minimum. Windows 10 recommended.

13.3.1 Performing the System Software Upgrade



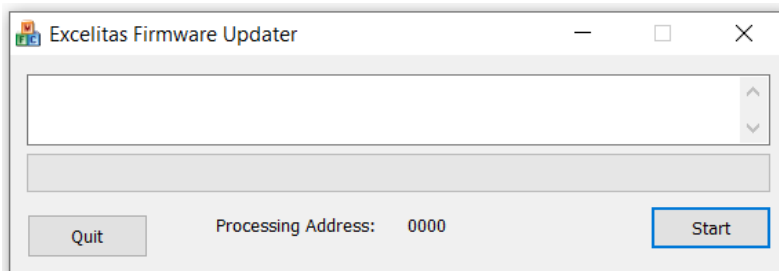
Do not disconnect the system power supply once the System Software update has started. Otherwise, you will be required to restart your upgrade.



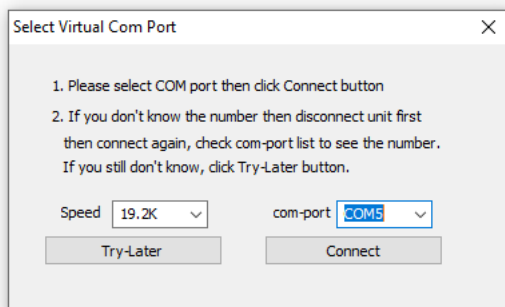
If updating both the System and the Web Software, the System Software needs to be updated first.

The system lamp must be OFF or READY before starting the upgrade. If the lamp is COOLING or WARMING UP, you must wait for that process to complete.

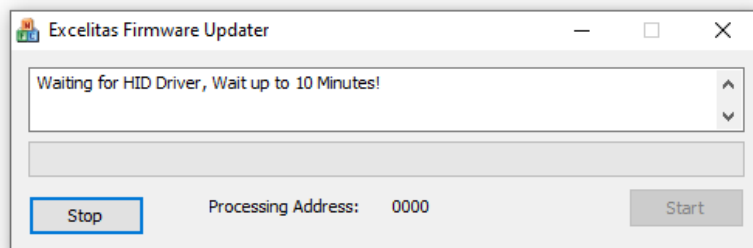
1. Power on your S2000 Elite/ S1500 Pro unit.
2. Connect the USB cable from the S2000 Elite/ S1500 Pro with your Windows PC.
3. Launch the Excelitas Updater Application and hit the Start button.
4. Follow the on screen instructions for completing the upgrade.
5. Perform a power cycle on the unit (flip the ON/OFF switch on the rear panel).



The Excelitas Firmware Updater application. Hit the "START" button to connect to your device.



Select the COM port that was assigned to your S2000 Elite/ S1500 Pro System when it was plugged into your computer.



The Software Upgrade has started. Wait for the progress bar to complete.

i If you see multiple COM ports in the drop-down, you can determine your specific COM port by opening the Window's Device Manager.

14 Troubleshooting

The table below provides a summary of software messages along with probable causes and possible corrective actions that can be referenced for system trouble shooting.

Flight recorder log	On-screen message	Probable Causes	Possible Corrective Actions
Lamp required within 100 hours	The lamp will reach end-of-life in 100hrs. Please replace lamp.	N/A	N/A
No lamp detected	There was no Lamp Detected. Install lamp.	N/A	Install the lamp securely.
			Confirm that all connectors are properly seated.
			Ensure that you are using a genuine OmniCure Lamp that is supported by the system
Invalid Lamp	Invalid lamp detected. Please insert a genuine Omnicure lamp.	N/A	Install the lamp securely.
			Confirm that all connectors are properly seated.
			Ensure that you are using a genuine OmniCure Lamp that is supported by the system
Lamp Severely Abused	The lamp has been severely abused. Please replace lamp.	Due to repeated interruptions during the lamp warm-up procedure, the lamp has been disabled as a precautionary measure to prevent any potential non-passive failures.	Replace the lamp.
Lamp strike error	The system has experienced a lamp strike fault. Reboot the system.	Non-passive lamp failure: this is usually accompanied by a loud noise.	If loud noise was heard, there is a potential risk of Mercury spillage from the damaged lamp. Follow safety precautions for Mercury spill cleanup and replace the lamp.
			If no loud noise was heard, reboot the unit, and try again. If the lamp fails to turn on, replace it.
Lamp end of life	Lamp has reached its end of life. Replace lamp to resume exposures.	To ensure safety, the lamp has a maximum operational limit of 4500 hours. Once this limit is reached, the lamp is automatically disabled to prevent the occurrence of non-passive lamp failures.	Replace the lamp.
N/A	Effective Lamp life less than 100H. OmniCure recommends lowering intensity or lamp replacement.	Effective lamp life at the programmed intensity is less than 100 hrs.	Reduce the set intensity or replace the lamp.
N/A	Lamp Care recommends a lamp re-strike. Cool-down	Message is displayed if lamp care is enabled.	Re-striking the lamp at a regular interval can help enhance lamp life.

S2000 Elite/ S1500 Pro - User Guide
035-00707 Revision 3

	and warm-up period of up to 20 minutes required.		Note: Lamp care is an optional feature that can be tuned off from the setting menu.
Unexpected lamp extinguish event	The lamp has experienced an unexpected shutdown. Reboot the system.	The lamp has turned off to prevent damage to the unit.	Make sure the rear ventilation fans are unobstructed and clear of any blockages.
			Additionally, replace the intake air filter located on the bottom front of the unit to maintain proper airflow.
Lamp extinguish event	The lamp was intentionally shutdown. Reboot system.	N/A	N/A
Lamp over temperature	The lamp has exceeded the maximum allowed temperature. Reboot the system.	The system is not able to regulate the lamp temperature within required limit.	Make sure the intake and exhaust ports at the unit's rear and bottom are clear from any obstructions, dust, or dirt. Additionally, replace the filter located on the front bottom of the unit to ensure optimal performance.
			Ensure that the system is being operated within the specified operating temperature range.
Lamp under temperature	The lamp is under temperature. Reboot the system.	The system is not able to regulate the lamp temperature within required limit.	Ensure that the system is being operated within the specified operating temperature range.
System temperature too high	The system has exceeded the maximum allowed temperature. Reboot the system.	The system is not able to maintain a safe operating temperature. This is usually caused by air flow restrictions or too high ambient temperature.	Ensure the intake and exhaust ports on the back of the unit, and under the bottom are not obstructed and free from dust/dirt. Replace the filter on the bottom front of the unit.
			Make sure system is being operated within the operating temperature range.
Lamp Fan Error	The lamp cooling fan malfunctioned. Reboot the system.	The system is not able to maintain a safe operating temperature due to a fan malfunction.	Ensure the intake and exhaust ports on the back of the unit, and under the bottom are not obstructed and free from dust/dirt. Replace the filter on the bottom front of the unit.
System Fan Error	The system cooling fan malfunctioned. Reboot the system.		Power off the unit and then power it on again. If the problem persists, contact our support team for further assistance.
No Filter detected	No Filter Detected!	The system is unable to detect the optical filter.	Make sure the filter is correctly seated and securely screwed in place.
Custom Filter Missing	Filter profile not found on SD card. Load profile and retry.	A custom optical filter has been installed, and the required filter information file was not detected	Custom Filters ship with an SD-Card which contains information (file: filter_profile.csv) required by

		in the root directory of the SD card.	the S2000 Elite/ S1500 Pro to recognize the filter and adjust system settings accordingly. SD-Card with the filter information must be inserted after installing the custom filter and before the system is powered on. The system will not allow the lamp to power on if it does not detect this information.
N/A	No LightGuide Detected, insert a LightGuide to run an exposure	No Lightguide inserted or Lightguide not inserted correctly	The system will not allow an exposure to run without a lightguide. Ensure that the Lightguide is properly plugged in while running an exposure. Push the light guide in until it sits with a positive "click".
Shutter failure	The system has experienced a shutter fault. Reboot the system.	This may be caused by inserting the LG too harshly.	Insert the LG with the system off, power on, if problem repeats return for service.
Intensity monitor railed high Intensity monitor railed low	Control loop feedback malfunction, out of CLF range. CLF will become inactive.	The system has detected that the optical filter installed is of an incorrect type.	Verify on the info page that the system has correctly detected the installed optical filter. If the detected filter does not match the installed one, ensure that the filter has been installed correctly according to the instructions provided in the manual.
Delivered dose did not meet target	Exposure Fault. Dose delivered did not meet the intended quantity.	The S2000 Elite incorporates advanced optical output monitoring to ensure precision. This error is generated if a discrepancy between the requested and delivered output is detected (due to factors like AC power fluctuations)	Ensure that the unit is securely plugged in. Although this occurrence is occasional, if you encounter repeated instances, contact our support team for further assistance.
Light guide removed during exposure	Light Guide was removed during exposure.	N/A	Ensure that the Lightguide is properly plugged in while running an exposure. The system will not allow an exposure to run without a lightguide.
System failed self-test routine	Self Test Failed!	The system's self-test during power-on has failed.	Make sure there are no NFC cards or other objects near the front of the unit that may interfere with the self-test. Power off the unit and then power it on again. If the self-test fails again contact our

S2000 Elite/ S1500 Pro - User Guide
035-00707 Revision 3

			support team for further assistance.
NFC/RFID Module Initialization Failed	The NFC/RFID module has failed to initialize. NFC/RFID functions may not function as intended.	NFC was unable to tune its antenna.	Make sure no NFC or other radio communications are near the device. Restart, if issue continues contact support. Unit will function properly with the NFC disabled if this problem occurs.
Iris not in correct position	The iris is not in the intended position. Reboot the system.	N/A	Power off the unit and then power it on again. If the problem persists, contact our support team for further assistance.
Iris Homing Failed	Iris Wheel failed to find Home!	N/A	Power off the unit and then power it on again. If the problem persists, contact our support team for further assistance.
Software update error	The software upgrade failed. Please try again.	N/A	Try again.
			Use a different update method if the problem persists.
Serial communications lost	N/A	The system lost communication with the serial port.	Ensure that the serial port connector is securely plugged in.
SD card error	The system has experienced an SD card fault.	N/A.	Reformat the SD card to a supported file system (FAT/ FAT32).
			If the problem persists, try a new SD card.
SD Card not formatted	The SD card is not formatted to the required format. Please format to ... and try again.	N/A	Format the SD card to FAT/ FAT32 file system using a external PC
Insert SD card	No SD card has been inserted. Insert an SD card and try again.	N/A	N/A
SD card full	The SD card is full.	N/A	N/A
N/A	Unable to Delete the File!	System does not allow users to delete data from the SD card	Use external PC to delete data stored on SD card
NVM Corruption	Issue retrieving system settings. Contact support.	Internal system issue. System was unable to retrieve configuration settings from NVM.	Power off the unit and then power it on again. If the problem persists, contact our support team for further assistance.
			System will continue to function, however, please verify all system settings before continuing operation.
NVM Save Failed	Issue saving data to system memory. Reboot the system.	Internal system issue. System was unable to save configuration settings to NVM.	Power off the unit and then power it on again. If the problem persists, contact our

			support team for further assistance.
			System will continue to function, however, please verify all system settings before continuing operation.
N/A	The calibration has expired. Exposures will default to relative mode.	Calibration is expired	Re-calibrate the system to switch back to Absolute mode
N/A	R2000 SetPoint exceeds Maximum calibrated value.	Setpoint provided exceeds the maximum calibrated system output	Change the setpoint to a value lower than the maximum calibrated value
N/A	Please calibrate the system to use Irradiance/Power setpoints.	User is requesting an output in Absolute mode on an uncalibrated system	Calibrate the system using a R2000
N/A	The system is locked or disabled.	N/A	Unlock the system using either of the unlock methods to access system functions
StepCure Cleared due to Error	StepCure cleared due to program error:	Programmed StepCure profile is invalid	Re-check the programmed StepCure profile
StepCure Cleared due to Error	StepCure cleared due to program error: Exposure unit mismatch	The requested output units do not match the system configuration.	Ensure that the system is configured correctly to match the desired intensity output. If you intend to use a relative (%) value, make sure that the calibration is cleared. Conversely, if you require an absolute (W or W/cm2) output, ensure that the system is calibrated accordingly.
N/A	Exposure Settings Cannot be adjusted when a StepCure Profile is Set!	User is trying to adjust the exposure intensity or duration from the run screen when a StepCure profile is active	Clear the active StepCure profile to revert the system to normal operation mode or Modify the StepCure profile to desired exposure settings
N/A	StepCure invalid I/O and action selected.	The selected I/O is not compatible with the selected action.	Refer to StepCure section of the user guide to learn about compatible I/O and action combinations
N/A	Duration (DU) element is required before Exposure Action to set exposure duration.	Warning message.	Note To associate an exposure duration with the exposure action, a DU block must be placed before the exposure block.
System does not run an exposure		1) LG Not inserted	1) Make sure LG is inserted.
		2) StepCure program set, and it does not use input being tried.	2) Check StepCure Program
		3) StepCure Pause input is activated.	3) Check the PLC Pause input for incorrect connection or signal.

SD card not detected	SD cards that are formatted by FAT16 and FAT32 are supported.	Insert the SD card into a PC, in file explorer, under this PC, right click on the SDHC drive and select properties. If it does not say the file system is FAT16 or FAT32 the card will not be detected by the S2000Elite. Right click on the card again and select Format, set filesystem to FAT32. Warning, make sure you selected the SDHC card for formatting, also formatting the SD card will erase all files currently on the SDHC card.
Forgot PIN	The PIN for the system has been forgotten.	The PIN can be retrieved by the website or command line interface. Select command line, send CONN and click enter, send SLP? and click enter. The PIN will be returned. The system can also be unlocked by typing in ULOC and clicking enter.
Intensity is always at the same percentage point, no matter what I set it to from front panel/website or command line.	Whatever the intensity is set to, it always returns to the same point.	The Analog intensity input signal always takes precedence over all other methods of setting the intensity. If this occurs, remove the voltage being applied to the analog input pin on the PLC connector.
System does not power on		Verify the power source: Ensure that your system is properly connected to a working power outlet and that the power cable is securely plugged into the back of your system. Test the fuse, Replace the fuse if necessary.

15 Technical Specifications

The following topics describe the system's technical specifications.

Specifications may vary slightly and are subject to change without notice.

- [Mechanical Specifications](#)
- [Orientation](#)
- [Exposure Specifications](#)
- [Lamp Module](#)
- [System Specifications](#)
- [I/O Ports \(including RS-232\)](#)
- [Environmental Conditions](#)
- [Radio specifications](#)
- [Noise and the OmniCure S2000 Elite/ S1500 Pro](#)
- [Miscellaneous](#)

15.1 Mechanical Specifications

Dimensions

Height: 265mm

Depth: 289mm

Width: 139mm

Unit Weight: 3kg

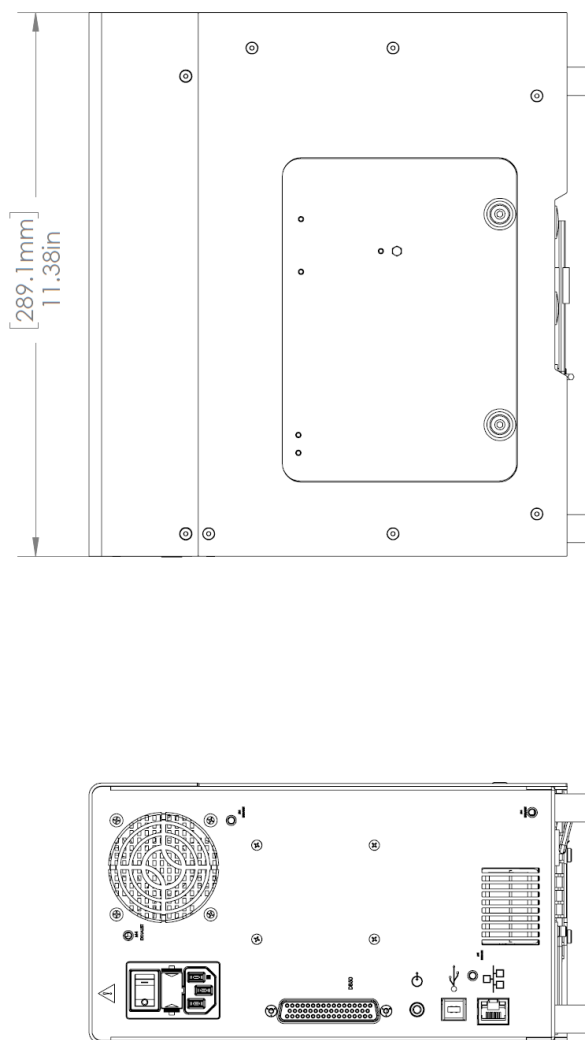
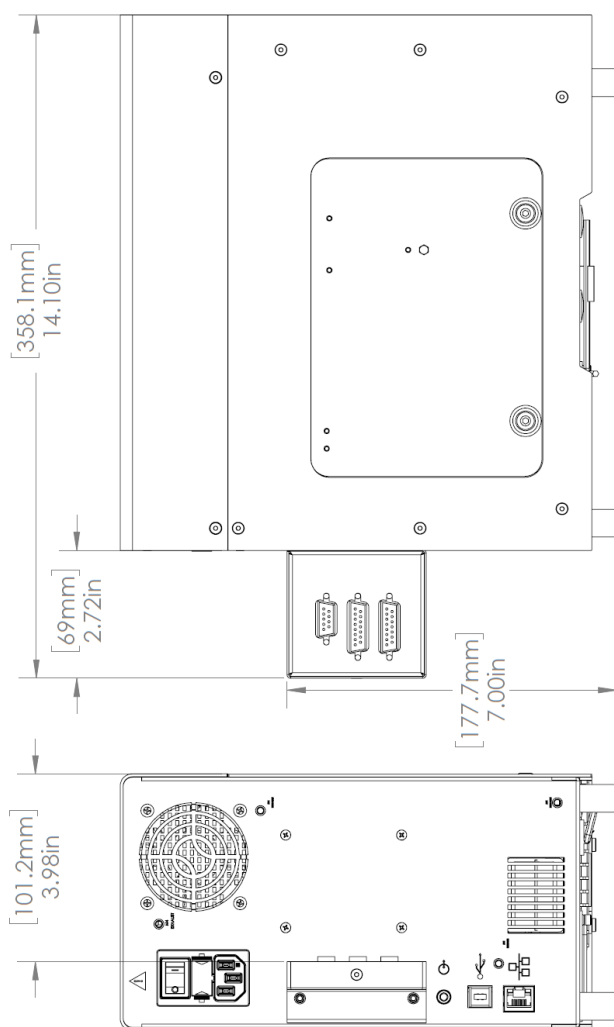
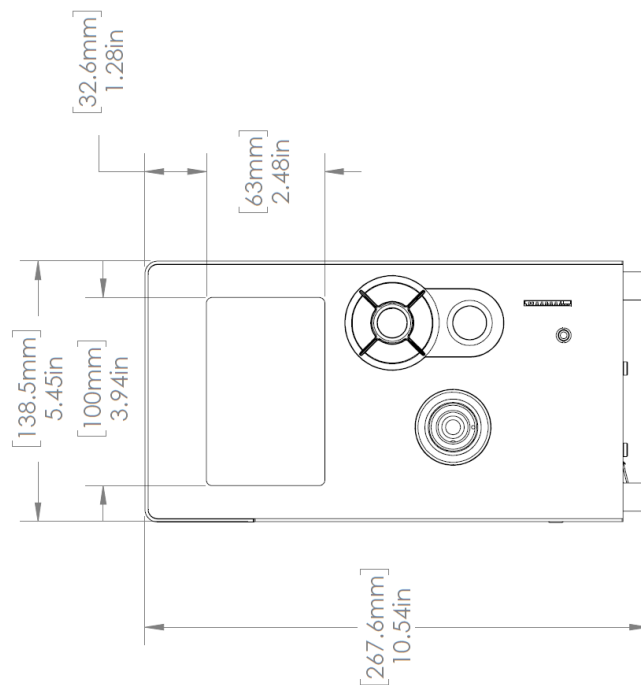


Figure 15-1 System Dimensions with PLC Adapter

Figure 15-2 System Dimensions

15.2 Orientation

The OmniCure S2000 Elite/ S1500 Pro is meant to operate in an upright orientation. Do not place the unit on it's side when in operation as it may lead to failure.



Avoid tilting the system more than 15° from the upright orientation as it may lead to accelerated lamp degradation and lamp failures.

15.3 Ducting fans

The S2000 Elite/ S1500 Pro features 2 exhaust ports with provision for mounting screw holes (M4) for ducts as shown below.

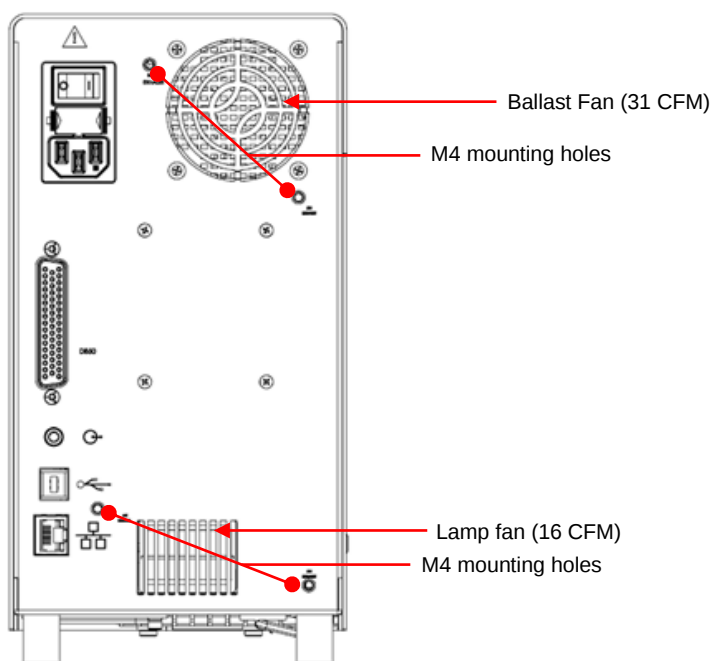


Figure 15-3 Duct mounts

15.4 Exposure Specifications

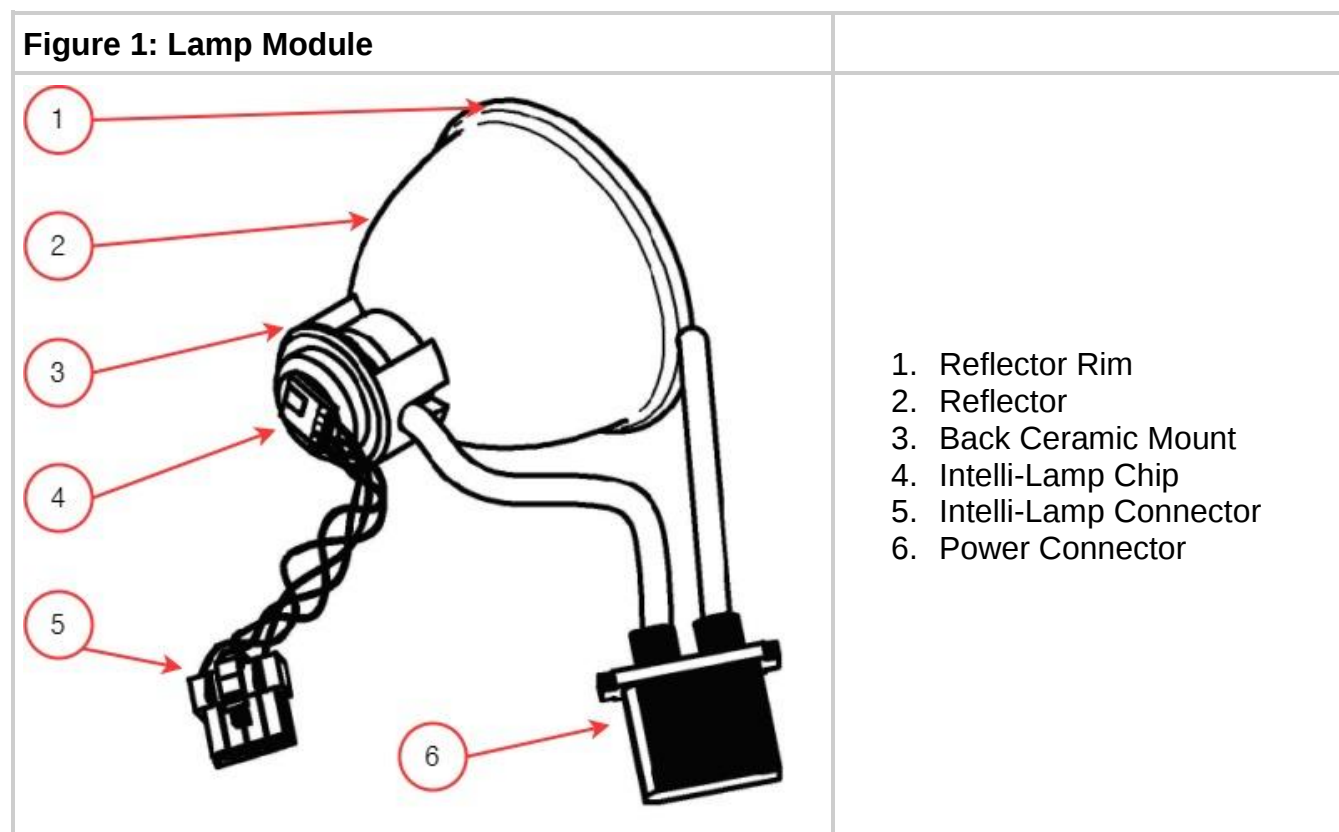
S2000 Elite/ S1500 Pro Exposure Timer Tolerance: +/- 250ms or +/- 1% of the exposure time setting, whichever is greater.

S2000 Elite Output Accuracy (with close-loop feedback activated): +/-5% or 200mW/cm², whichever is greater.

S2000 Elite Minimum Adjustable Irradiance Level: 0.5W/cm²

S2000 Elite Closed-Loop Feedback shut-off @exposure: 1% or 100% intensity

15.5 Lamp Module



Lamp Module	Excelitas Canada 200W Mercury DC: Standard or Surface Curing
Focal Point of Spot	52.875 mm
Lamp Module Life	2000 hours (guaranteed), 4000 hours typical.
Warm Up	4 minutes (min)
Lamp Voltage (new bulb)	60VDC nominal
Lamp Voltage (range)	36VDC to 95VDC
Lamp Current	3.33A typical, 5.7A maximum



Hg – LAMP CONTAINS MERCURY, Manage in Accord with Disposal Laws.

The method in which lamps are disposed of must comply with local rules & regulations for disposal of hazardous materials. Lamps may be returned to Excelitas Canada providing they are returned in its original packaging. Excelitas Canada will dispose of them in the appropriate manner.

15.6 System Specifications

Light Delivery: Flexible High Power fiber Light Guides will be available in a variety of lengths with a variety of core diameters.

Power: 480VA Maximum.

Input Power Supply: Power Factor Corrected, Universal Input

Input Voltage: 100 - 240VAC, 50/60Hz.

Current: 3.5A max at 120VAC 2.0A max at 240VAC.

Input Surge: 50A max. (cold start).

Protection:

- Short circuit auto-recovery
- Overvoltage (up to 135%, +/- 5% of nominal)
- EMI filtering integrated into the power supply
- Power supply has integrated thermal cut-off

Fuse Rating: Dual fuse system: each fuse rated at F4.0A 250V, 5x20mm type located in the AC receptacle.

15.7 I/O Ports (including RS-232)

The S2000 Elite/ S1500 Pro has five different I/O ports, four located on the back of the unit:

1. Simple 2-wire, audio style jack that can be connected to a foot pedal (supplied with each unit) or any other electro-mechanical triggering device. This is an exposure trigger input used to start an exposure.
2. DB50 port for PLC and RS-232 interfacing. See Table 7-4 PLC DB50 Pin-out table for more information.
3. Full-Speed USB 2.0 port for connection to a computer.
4. Ethernet port to connect the system to a network - 10/100Base-T¹
5. RS-232 port located on the side of the front panel which is used to connect to the R2000 Radiometer for calibration of the S2000 Elite/ S1500 Pro.¹

¹ Not available on S1500 Pro

15.8 Environmental Conditions

Operating Conditions

Ambient Temperature: 15°C to 40°C.

Altitude: 2000m max.

Atmospheric Pressure: 700 to 1060 hPa.

Relative Humidity: 15% to 85% (non-condensing).

Installation Category: II

Pollution Degree: 2

Transport and Storage Conditions

Temperature: -40 to +70°C.

Relative Humidity: 10% to 100%.

Atmospheric Pressure: 500 to 1060 hPa.

15.9 Radio specifications

High performance multi-protocol NFC frontend IC supports the following operating modes:

Transmitter:

Center Frequency: 13.56 MHz +/- 0.01%

Modulation:

ISO_14443 Type A

ASK Percentage: 100%

ISO_14443 Type B

ASK Percentage: 10%

Receiver:

Carrier Frequency: 13.56 MHz

Subcarrier Frequency: 847.5 kHz

Subcarrier Data:

ISO_14443 Type A

Modified Manchester

ISO_14443 Type B

NRZ_L BPSK

15.10 Noise and the OmniCure S2000 Elite/ S1500 Pro

Using the S2000 Elite/ S1500 Pro in a Noisy Environment

What is Noise?

"Electrical noise" is a term used to describe unwanted electronic emissions. Noise is comprised of RFI (Radio Frequency Interference), EMI (Electro-Magnetic Interference) and other similar sources of energy. Electronic equipment may behave in a non-standard manner (exhibit erratic operation) with high levels of noise. They will continue to behave erratically if the noise is present unless protected with noise suppressors.

What are Sources of Noise?

Sources of noise are any electronic equipment that utilize or generates a high-frequency AC current and voltage. Specifically, equipment such as metal halide arc lamps, mercury short-arc lamps, xenon arc lamps, switch-mode power supplies, pulsed lasers, x-ray equipment, welding equipment and RFI generators are a few classic examples of large noise-producing equipment.

Determining the Noise Level in Your Environment

If the S2000 Elite/ S1500 Pro and other pieces of equipment operate abnormally, intermittently or continuously, significant noise levels may be present. It is recommended before installing the S2000 Elite/ S1500 Pro, the user examine any equipment nearby. If any of the equipment falls into the previously listed categories, it is further advised that the user examine the ratings and description labels on each piece of equipment. Any equipment that does not have a label indicating that it meets Industry Canada, FCC, or IEC- EMC requirements is a possible noise source. If any equipment is deemed a noise source, or even suspected to be a noise source, then additional noise protection should be incorporated during the installation of the S2000 Elite/ S1500 Pro.

Shielding

Any wire or cable assembly entering or exiting the S2000 Elite/ S1500 Pro may act like an antenna that picks up noise and transmits it to the internal electronics. This may cause the S2000 Elite/ S1500 Pro to operate erratically.

There are several ways in which the S2000 Elite/ S1500 Pro can be shielded (protected). Excelitas Canada recommends using shielded cables for all cable assemblies: the AC line cord, the I/O cables and the footswitch. Furthermore, it is advised that clamp-on ferrite shield beads be added to every cable assembly. Suitable ferrite shield beads are P/N: 0443164251 by Fair-Rite Products Corp. (or) P/N: 28A2025-0A0 by Steward.

S2000 Elite/ S1500 Pro - User Guide

035-00707 Revision 3

Noise suppression products are also available in the form of AC power bars that incorporate surge suppression and noise suppression circuitry. Either type will help in protecting the S2000 Elite/ S1500 Pro from noise. Providing the S2000 Elite/ S1500 Pro with an AC line that is separate from any other noise-producing equipment will also be beneficial.

Depending on the noise level in the environment, any combination of all of the above shielding recommendations may be necessary to protect the S2000 Elite/ S1500 Pro from noise and ensure smooth operation. We can help you to shield the S2000 Elite/ S1500 Pro from electrical noise. Please contact Excelitas Canada for further assistance.

15.11 Miscellaneous

Display: 4.3" LCD touch screen.

Keypad: 6 tactile buttons, 4 navigation, 1 select, 1 start/stop.

16 Regulatory Compliance

The following topics describe S2000 Elite/ S1500 Pro regulatory compliance.

- [FCC Part 15 Subpart B, Class A - Unintentional Radiators](#)
- [FCC Part 15 Subpart C, Intentional Radiators](#)
- [CE Marking](#)
- [WEEE Directive](#)
- [China RoHS](#)
- [Optical Safety Data](#)

16.1 FCC Part 15 Subpart B, Class A - Unintentional Radiators

FCC Class A Digital Device or Peripheral - Information to User

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications made to this equipment not expressly approved by the party responsible for compliance may void the FCC authorization to operate this equipment.

16.2 FCC Part 15 Subpart C, Intentional Radiators

This device contains license-exempt transmitter(s)/receiver(s) that comply with intentional radiator requirements of Part 15, Subpart C.

FCC ID: 2AXSI-SSERIES

IC ID: 26590-SSERIES

Canada

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference; and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent ap-pareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.



Changes or modifications not expressly approved by Excelitas Technologies could void the user's authority to operate the equipment.

16.3 CE Marking

Council Directive 2014/35/EU	Low Voltage Directive	
Council Directive 2014/30/EU	EMC Directive	
Council Directive 2012/19/EU	WEEE Directive	
Council Directive 2011/65/EU as amended by (EU) 2015/863	RoHS	
Council Directive 2014/53/EU	Radio Equipment	

16.4 WEEE Directive



The symbol above indicates that this product should not be disposed of along with municipal waste, that the product should be collected separately, and that a separate collection system exists for all products that contain this symbol within member states of the European Union.

The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

To avoid dissemination of those substances in our environment and diminishing the pressure on natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment materials in a sound way.

The crossed-out wheeled bin symbol indicated above invites you to use those systems.

Please contact your local or regional waste administration if you need more information on the collection, reuse, and recycling systems.

16.5 China RoHS



The following table contains substance information for the OmniCure S2000 Series as required by China RoHS regulations.

Part Name	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr (VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
200W Lamp	X	X	O	O	O	O
Printed circuit board assemblies	X	O	O	O	O	O

This table is compiled according to SJ/T 11364.

O : Indicates that the content of the hazardous substance in all homogeneous materials of the part is below the limit requirement of GB/T 26572.

X : Indicates that the content of the hazardous substance in at least one of the homogeneous materials of the part exceeds the limit requirement specified by GB/T 26572.

16.6 Optical Safety Data

IEC 62471: Photobiological Safety of Lamps and Lamp Systems

Resulting Classification and Labelling



17 Warranty

Excelitas Canada warrants the original purchaser for one (1) full year, calculated from the date of purchase that the equipment sold is free from defects in material and workmanship. All repairs are warranted for 90 days.

In the event of a claim under this warranty, the equipment is to be sent postage and carriage paid to the [Excelitas Canada Service Centre](#). Returned equipment will not be received without a Return Authorization (RA) Number, issued by the appropriate Service Centre.

In order for us to serve you better, include a written description of the fault and the name and telephone number of a contact person who may be contacted for additional service-related questions.

Any claims for units received with defects in material or workmanship must be reported to an authorized [Excelitas Canada Service Centre](#) within 30 days from the original date of receipt and returned within 30 days of reporting to a an authorized [Excelitas Canada Service Centre](#). Excelitas Canada will repair or replace these reported defects free of charge. The equipment must be sent postage and carriage paid.

Package the equipment in its original shipping case or as appropriate to prevent damage during transport.

In the case of damage caused by wear and tear, careless handling, neglect, by the use of force or in the case of interventions and repairs not carried out by an [Excelitas Canada Authorized Service Center](#), the warranty ceases to be valid. This warranty may not form the basis for any damages claims, particularly not for compensation of consequential damages.

This warranty is not transferable.

No warranty is extended to perishable items (if purchased separately or included in systems). These may include, but are not limited to, fuses, air filters, optical filters, cables, light guides and light guide adapters.



Apart from lamps, fuses, air filters, or optical filters, there are no field serviceable parts within the equipment. Opening the main equipment's enclosure will void the warranty.



Blank Filter 019-00392R is only compatible with Surface Cure lamp 012-69000R. Using a Blank Filter with Standard lamp 012-68000R is not supported. Using this unsupported configuration may result in system errors if intensity is set too high and will accelerate Light Guide and System degradation. This configuration is not supported by the System and Light Guide warranty.

17.1 Replacement Lamp Warranty

If the S2000 Elite/ S1500 Pro Lamp fails to strike during the warranty period of 2000 hours, it can be replaced under warranty. In the event of a claim under this guarantee, the lamp is to be sent postage and carriage paid, including a description of the fault, to the [Excelitas Canada Service Centre](#). Returned equipment will not be received without a Return Authorization (RA) Number, issued by the appropriate Service Centre. Lamps must be purchased from an authorized Excelitas Canada Representative or Distributor to be eligible for the warranty replacement. This warranty is non-transferable.

In the case of damage caused by careless handling, neglect, by the use of force or in the case of interventions and repairs not carried out by an Excelitas Canada Service Centre to the S2000 Elite/ S1500 Pro system, the guarantee ceases to be valid.



In the case of damage caused by careless handling, neglect, by the use of force or in the case of interventions and repairs not carried out by an Excelitas Canada Service Centre to the S2000 Elite/ S1500 Pro system, the guarantee ceases to be valid.

The lamp requires full completion of Phase 1 and Phase 2 of the ignition sequence described in [Powering Up and Powering Down](#). Interrupting Phase 1 or Phase 2 more than once in the lamp's lifetime will void the lamp's warranty and will show "VOID" in the lamp information screen.

17.2 Returning your S2000 Elite/ S1500 Pro to Excelitas Canada

Please note the problem encountered, the steps followed to isolate the problem and the result of any troubleshooting steps taken.

Telephone the nearest Excelitas Canada Service Centre to obtain a Return Authorization (RA) Number to complete repairs quickly and efficiently. In North America, request for a RA (Return Authorization) number from the website: https://www.excelitas.com/ox_service_request_form

Enclose details of the problem with the unit and return both to the Excelitas Canada Service Centre. The unit should be returned in its original packaging if possible. Please do not ship the unit with the lamp installed.

Include a phone number and contact person who may be reached for any additional service-related questions.

18 Contact Information

Excelitas Canada
2260 Argentia Road
Mississauga, Ontario
L5N 6H7 CANADA

Tel.: +1 905 821-2600
Toll.: +1 800 668-8752 (USA and Canada)
Fax: +1 905 821-2055

<https://www.excelitas.com/omnicure-x-cite-inquiries>

Technical Assistance

techsupport@excelitas.com

https://www.excelitas.com/ox_service_request_form

For a complete listing of Authorized OmniCure Distributors and Service Centers, please go to the main web site: <https://www.excelitas.com/dealer-search>