THORLABS

LED UV Curing System

CS2010
Operation Manual

2016

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Item No.: M0009-510-518

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We aim to develop and produce the best solution for your application in the field of optical measurement technique. To help us to live up to your expectations and improve our products permanently we need your ideas and suggestions. Therefore, please let us know about possible criticism or ideas. We and our international partners are looking forward to hearing from you.

Thorlabs GmbH

Warning

Sections marked by this symbol explain dangers that might result in personal injury or death. Always read the associated information carefully, before performing the indicated procedure.

Attention

Paragraphs preceeded by this symbol explain hazards that could damage the instrument and the connected equipment or may cause loss of data.

Note

This manual also contains "NOTES" and "HINTS" written in this form.

Please read these advices carefully!

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1 General Information

The Thorlabs LED spot UV curing system is designed for curing (hardening) of certain inks, coatings, and adhesives which are formulated with photoinitiators and resins. When exposed to the correct energy and irradiance in the required band of UV light, polymerization occurs, and so the adhesives harden or cure. Usually, this reaction is very quick, a matter of a few seconds. This can be advantageous for any application that requires critical alignment or exact positioning.

Applications include glass and plastic bonding, optical fiber coatings and coating of flooring.

1.1 Safety

Attention

All statements regarding safety of operation and technical data in this instruction manual will only apply when the unit is operated correctly as it was designed for.

All modules must only be operated with proper shielded connection cables.

Only with written consent from *Thorlabs* may changes to single components be carried out or components not supplied by *Thorlabs* be used.

This precision device is only serviceable if properly packed into the complete original packaging including the plastic foam sleeves. If necessary, ask for a replacement package.

Warning

Do not look into the UV spot - this is hazardous to human eye!

Wear UV protection glasses anytime the instrument is used!

Do not expose human skin to the LED emission - this can lead to skin burns and skin cancer!

1.2 Ordering Codes and Accessories

CS2010	LED UV Spot Curing system, complete
CS20H1	Separate handset

Accessories:

CS20A1	Foot switch to CS2010 driver with 2.0m connection cable
CS20A2	Collimation Adapter for CS2010 (included with handset)
CS20A3	Focusing Adapter for CS2010 (optional)

Spare parts:

Power Supply ETC36-24 (24V DC 1.5A)

Hand set holder

UV protection shield

For purchasing above spare parts, please contact Thorlabs.

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1.3 Requirements

These are the requirements to the PC intended to be used for remote operation of the CS2010.

1.3.1 Hardware Requirements

CPU: 1 GHz or higher

RAM: 1 GB

Graphic card with at least 32 MB memory

Hard disc with at least 100 MB free storage space

Free USB2.0 port

USB cable according the USB 2.0 specification

1.3.2 Software Requirements

The CS2010 software is compatible with the following operating systems:

- Windows ® XP (32-bit) SP3
- Windows ® Vista (32-bit, 64-bit)
- Windows ® 7 (32-bit, 64-bit)

For operation of the CS2010, also an NI-VISA (version 5.0.2 or higher) is required. This NI-VISA engines comes with the Thorlabs CS2010 installation CD, but can be downloaded also from National Instruments' website www.ni.com.

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2 Installation

2.1 Parts List

Inspect the shipping container for damage.

If the shipping container seems to be damaged, keep it until you have inspected the contents and you have inspected the CS2010 mechanically and electrically.

Verify that you have received the following items within the package:

1. CS2010 driver
2. Wide range power supply (24V DC 1.5A) and power cord
3. CS2010 handset with CS20A2 Collimation Adapter and holder
4. Manual
5. Quick Start
6. CD with driver software
7. USB 2.0 cable

2.2 Getting Started

Note

Take care for air ventilation in order to avoid overheating of the driver. Please pay attention to the safety recommendations and the Occupational Health and Safety Regulations applying to your workplace.

- Connect the hand set to the driver (jack “LED” (2) on the rear panel)
- Connect the power supply to mains outlet, using the supplied power cord
- Connect the DC output of the power supply to the jack “24VDC 1.5A” (5) at the rear panel
- Switch on the driver, using the switch (1) at the rear panel.

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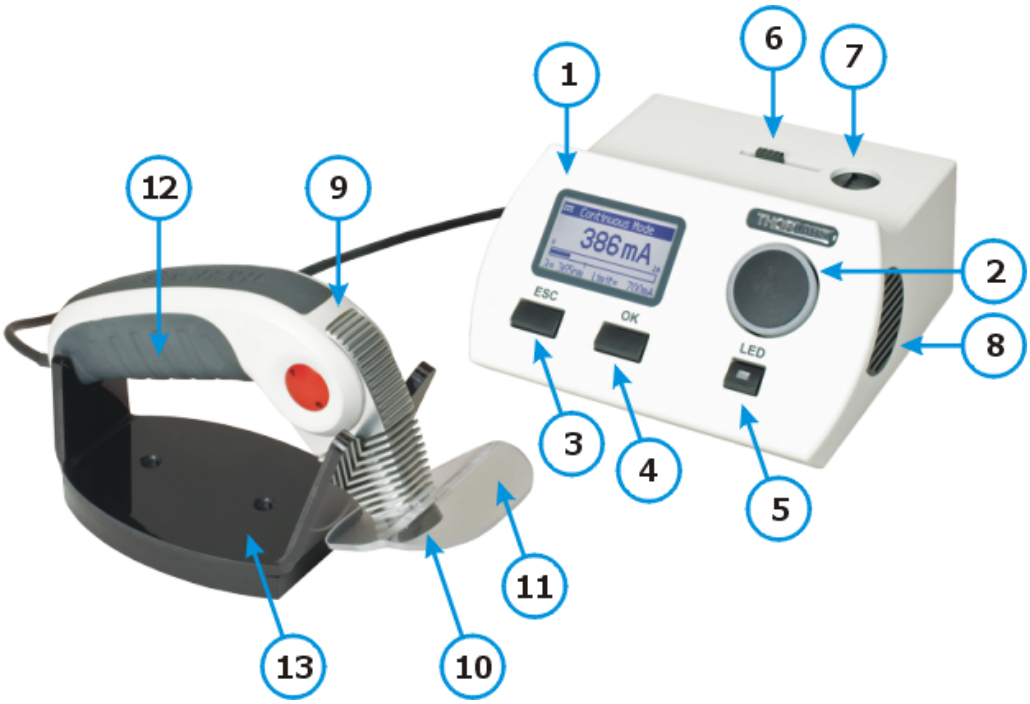
2.3 Operating Elements



1 LC Display with background illumination

2 Rotary knob

3 ESC button

4 OK button

5 LED ON/OFF button

6 Sliding lid for protecting the input aperture (7)

7 Input aperture for irradiance measurement

8 Ventilation outlet

9 Handset with slewing LED head

10 Collimated UV LED output - **Warning**

11 UV protection shield

12 LED ON/OFF switch on handset

13 Hand set holder

Warning **Do NOT look into the output! Do NOT direct the UV emission onto skin!**

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2.4 Rear Panel

1 Power switch

2 LED output (connector for hand set)

3 3.5mm jacket for foot switch

4 USB 2.0 connector (remote computer)

5 DC input

6 Serial number

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3 Operating Instruction

After startup screen, the display (1) shows the last used Operation Mode.

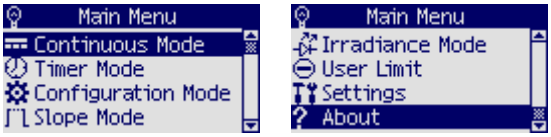
ESC button (3)
Leave the current active menu and return to the previously chosen menu or to Main Menu.

OK button (4)
Used to enter a submenu or to confirm setting / exit submenu

LED button (5)
Use switch LED or the button (12) in the hand set to switch ON/OFF the UV LED.

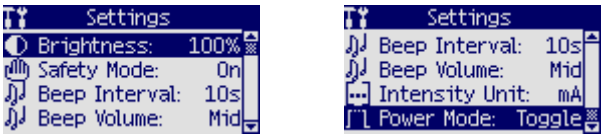
Rotary knob (2)
Used for scrolling through a menu, adjusting numeric values and selecting parameters

Main Menu



When in an operation mode, push ESC or OK button to enter Main menu. In the main menu, use OK button to enter the highlighted menu item and ESC to leave it. Below please find a brief explanation of the menu items.

3.1 Settings



Use rotary knob to choose a menu item and press **OK** to enter

Brightness	sets the display brightness in %
Safety Mode	When OFF the LED can be switched on at any time, when ON - only while displaying an operation mode.
Beep Interval	During LED on, a beep can be enabled. The beep interval can be set between Off and 99sec.
Beep Volume	Low, Mid and High
Intensity Unit	LED intensity can be set in mA, % (of the limit current) and mW/cm² (irradiance). This intensity unit will be displayed in all operation modes.
Power Mode	In Continuous Mode, this changes the function of the LED ON/OFF switches (5) and (12) between "Toggle" (push to switch on, push again to switch off) and "Hold" (the LED emits UV light only as long as the button is pushed).

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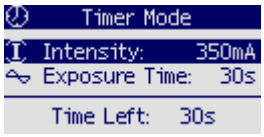
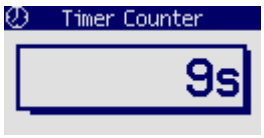
3.2 Continuous Mode

Adjust LED current and switch on/off the LED manually. The bottom line displays the wavelength of the LED. LED intensity can be adjusted using the rotary knob while LED is on or off. The "Max" LED intensity is equal to the set user limit.

3.3 Timer Mode



Adjust desired intensity and exposure time. LED button (5) and (12) switches on the LED and start the timer count down. The remaining time will be displayed:

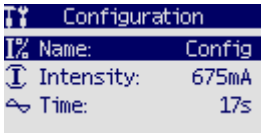


3.4 Configuration Mode

Up to 10 different preconfigured timer mode sets for intensity and exposure time can be programmed. Each **Config** can renamed; max. length - 12 characters.

Example:

- Choose a configuration set and press OK button (4). A submenu comes up an highlights the name of the selected configuration set:



- Press OK to enter edit mode:

- Use the rotary knob to select a number, a character, the underscore or the backspace (delete) ← button. When the desired set name is completed, select "Done" to confirm and return to the previous menu:

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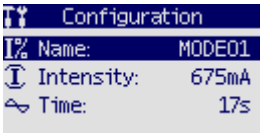
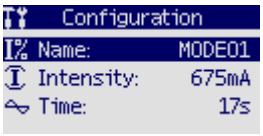
- Set the desired values for intensity and exposure time. Therefore, select the appropriate line using rotary knob (2), press OK to enter edit mode and change the set value using rotary knob. When done, press OK.



- Press ESC to return to the overview of all configurations:

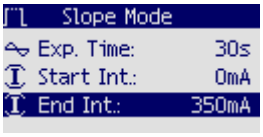
- To use a Configuration, select it and press OK button - the name and settings will appear.



By pushing the LED button on the controller or on the hand set, the LED switches on and the countdown timer starts, emitting a beep according to the set interval:

3.5 Slope Mode

In this mode, the LED intensity can changed during exposure. Entering this mode, exposure time, start intensity and end intensity can be set.



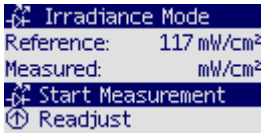
Pushing LED button executes the ramp and the timer counter appears, emitting a beep according to the set interval.

3.6 Irradiance Mode

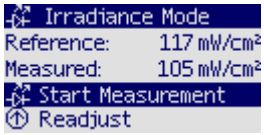
This mode allows to compensate ageing effects of the LED. As a result of long term operation the efficiency of the UV LED decreases, i.e., the UV power drops though the current is the same. As a result, the exposure of the probe (adhesive, coating etc.), which is the product of UV power and exposure time, drops and this way the curing process may not be completed. To compensate that, the power degradation can be measured and exposure time extended accordingly. This way the exposure remains constant, ensuring best curing results.

Procedure

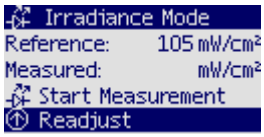
- Select Irradiance Mode from Main Menu. The submenu appears showing a Reference irradiance value. This value is originated from the last executed power density adjustment.
- Move the slider (6) on top of the controller to the left position, this way opening the power measurement aperture (7)
- Remove the optics (CS20A2 Collimation Adapter or CS20A3 Focusing Adapter) from the handset and place the LED output (10) of the handset firmly into the aperture (7)
- Choose "Start Measurement" and push OK button (4).



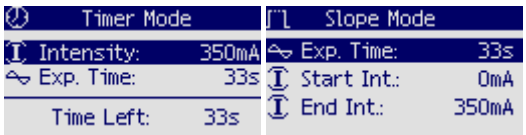
- A "Measured" Value will be displayed.



- Choose "Readjust" and push OK button (4).



The measured value will be displayed now as the new reference. Additionally, exposure time will be recalculated and corrected. This applies to all stored exposure time values in Timer Mode, Slope Mode and pre-configurations:



Note

The measured value corresponds to the irradiance in an 8mm distance from the LED without optics (equal to 5mm from the front of the handset).

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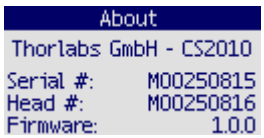
3.7 User Limit

The absolute LED limit current is programmed to the EEPROM in the handset and read out at power up. Any lower limit can be set.

Note: If the intensity value is set to %, 100% always refers to the LED current limit as set.

3.8 About

This menu item displays information on the hardware and firmware:



4 Computer Interface

The CS2010 curing system can be remotely controlled by a PC via USB interface. The control software is included with the attached CD. After installation of the software, the CS2010 can be connected to the computer using the attached USB cable.

4.1 Software Installation

Attention

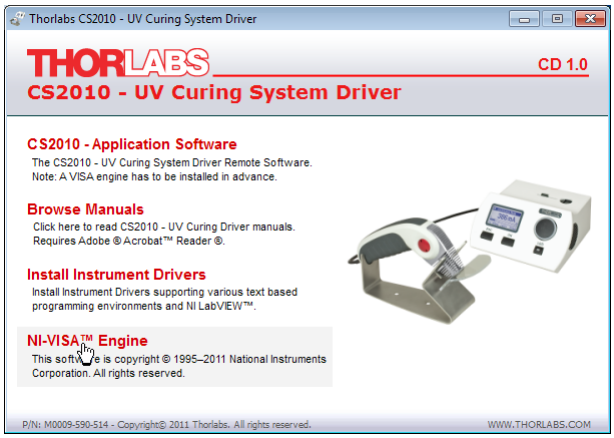
Install the software prior to connect the CS2010 to your computer! CS2010 Application Software requires a NI VISA Engine installed in advance.

Below, the installation procedure to a Windows7© (32 bit) operating system is illustrated. Insert the installation CD into your disk drive. Depending on your operating system settings, the startup screen should appear - if not, please start the installation by executing

[CD drive]:\Autorun\Autorun.exe.

4.1.1 Install NI-VISA

As a first step, the NI-VISA™ Engine shall be installed. If this software is already installed, please proceed with the installation of application software.



Click "**NI-VISA™ Engine**". The National Instruments Installer starts.

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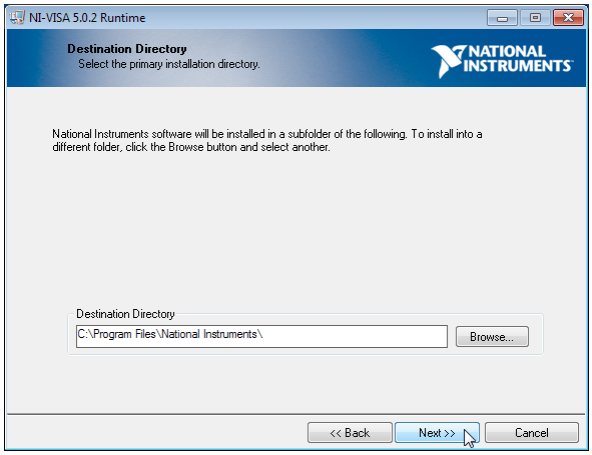
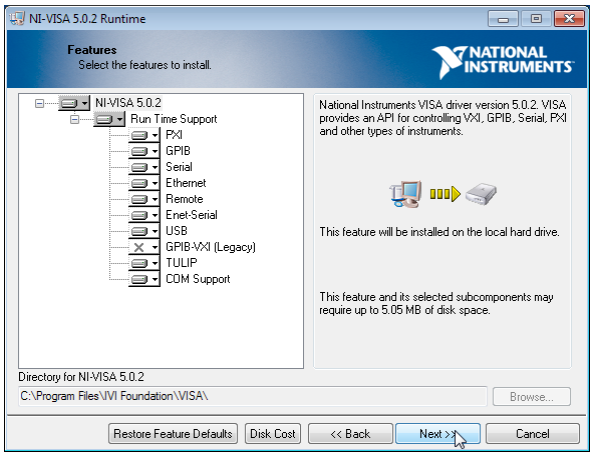
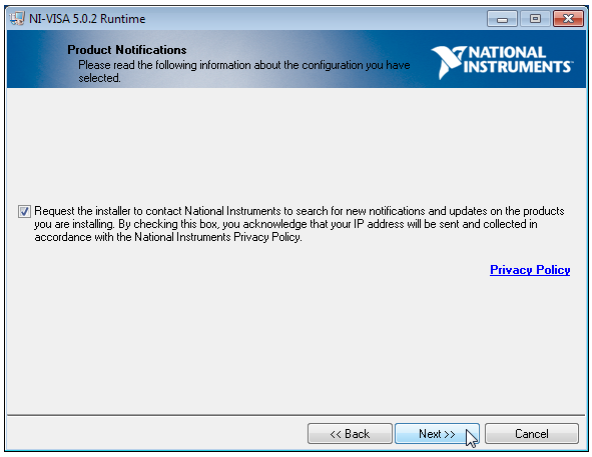
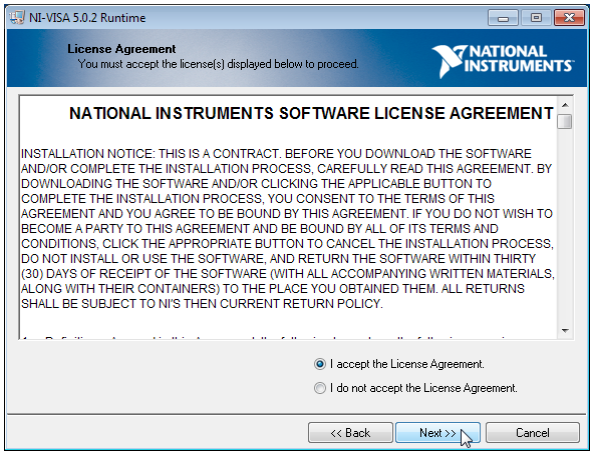
Please click "**Next**" in following screens to continue:

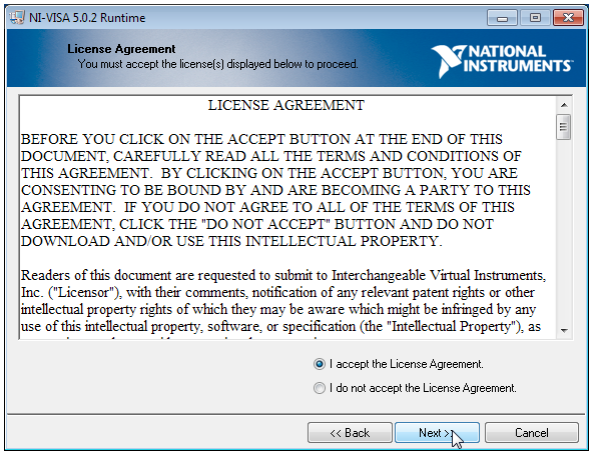




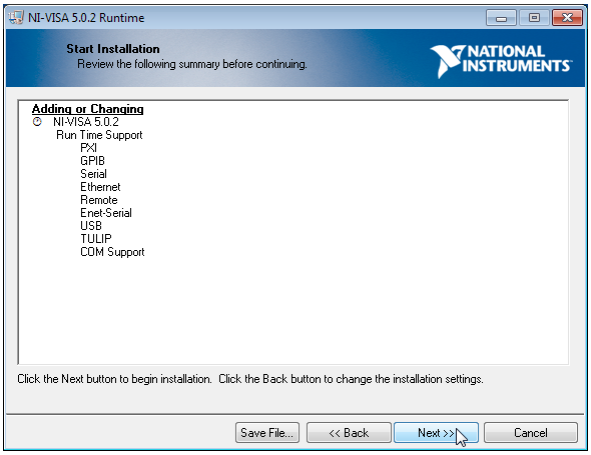


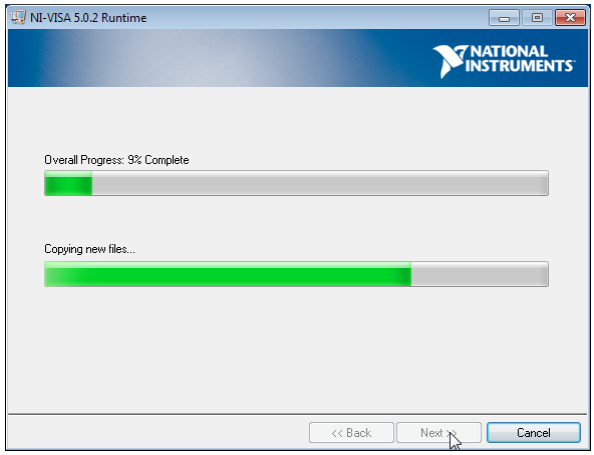
In the following 2 steps, please select "**I accept the License Agreement**" if you do so and click **Next**:



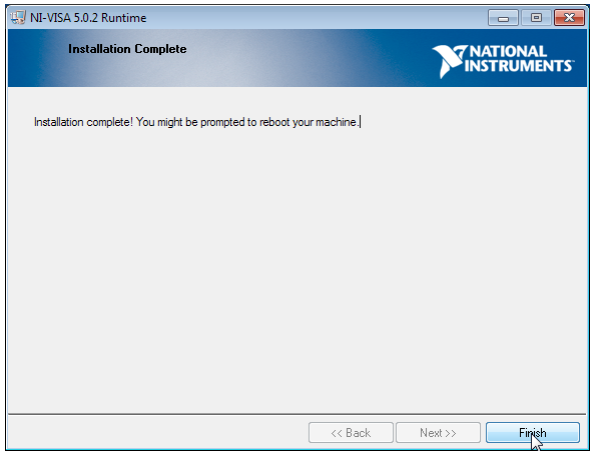


The installer will sum up the components to be installed. Click **Next** to continue installation:

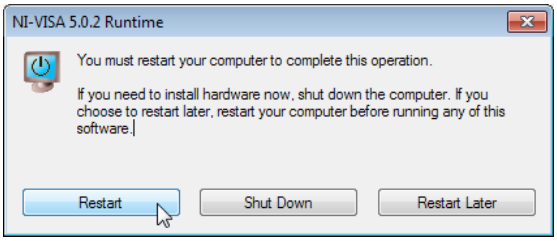




After installation of NI-VISA™ Software, click **Finish**.



Please restart your computer to complete the installation of National Instruments Software



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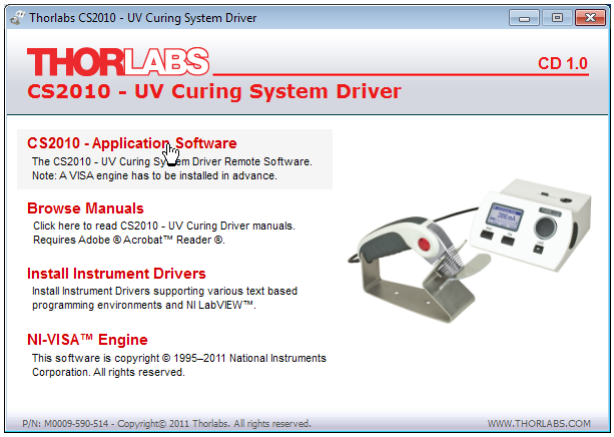
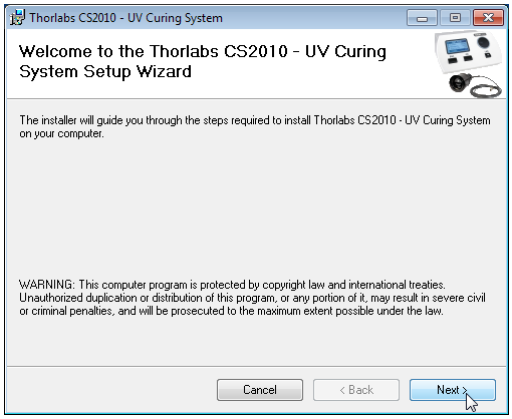
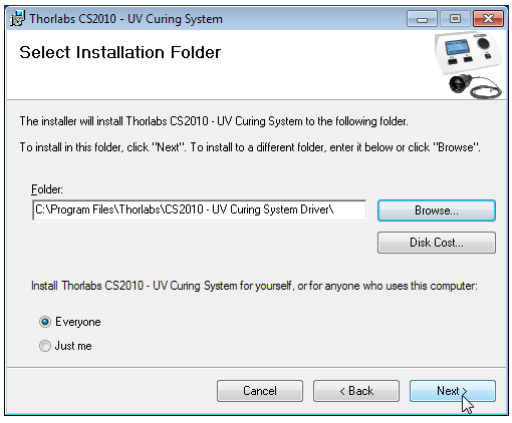
4.1.2 Install Application Software



Click to "**CS2010 - Application Software**"

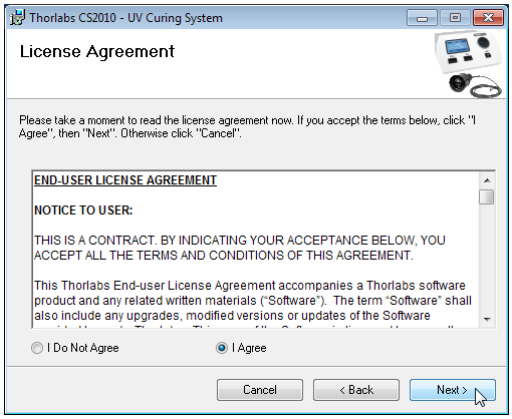


Click "**Next**" to continue.

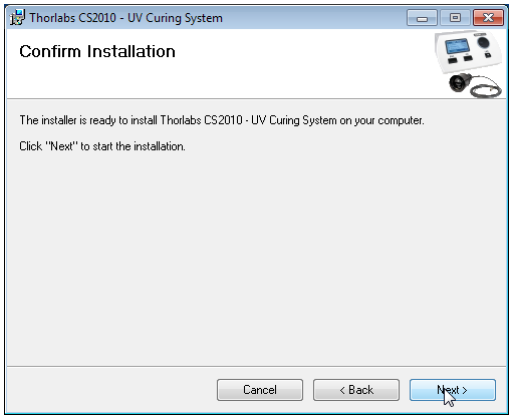


Accept the proposed installation folder, or browse for an alternative location. "**Disk Cost**" will calculate the required free disk space.

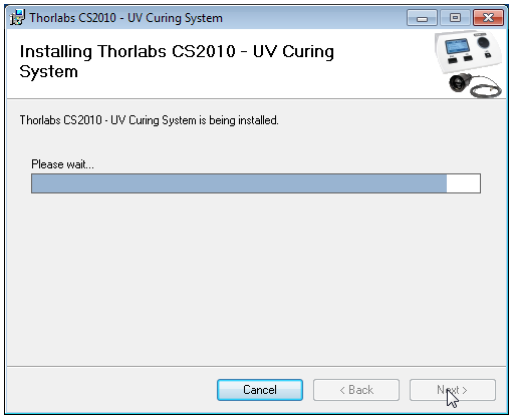
Then click "**Next**" to continue.



Check the "**I Agree**" button, if you do so, and click "**Next**" to continue.



Click "**Next**" to continue.



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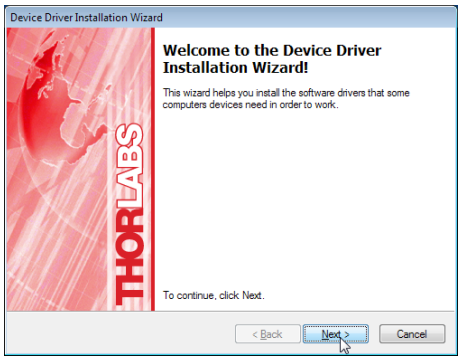
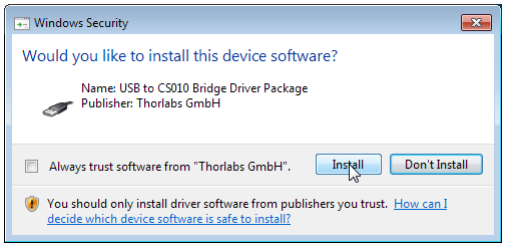
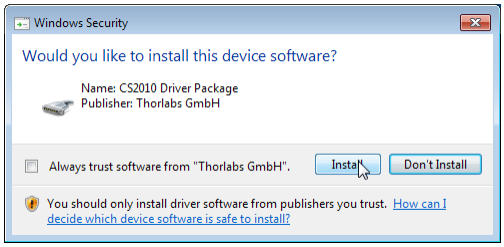
During the installation, another window opens in order to install the device driver:



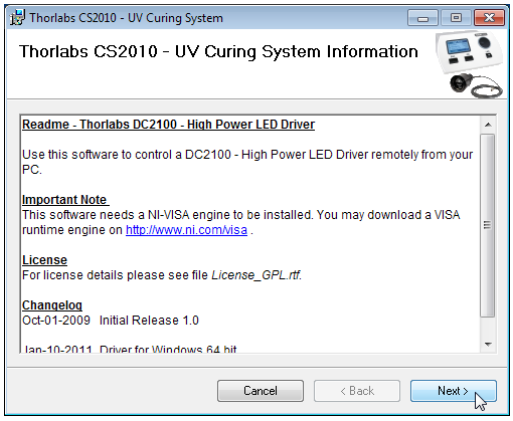
Click "**Next**" to continue. Windows Security may alert you about potential risks:

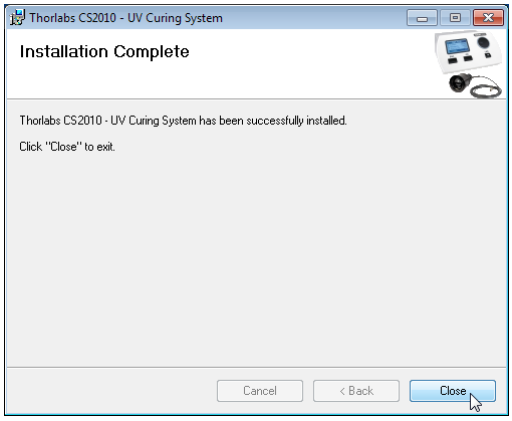




Please click to the "**Install**" button to complete the device driver installation.

Click "**Finish**" to proceed.

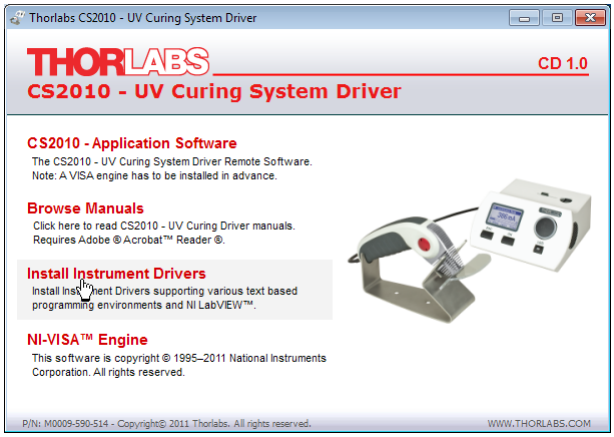




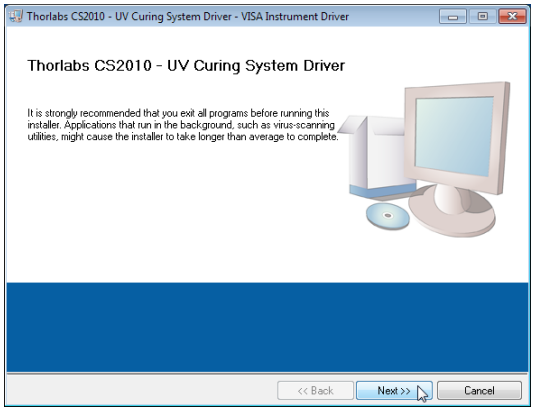
Click "**Next**" and in the following screen to "**Close**" to complete the installation process.

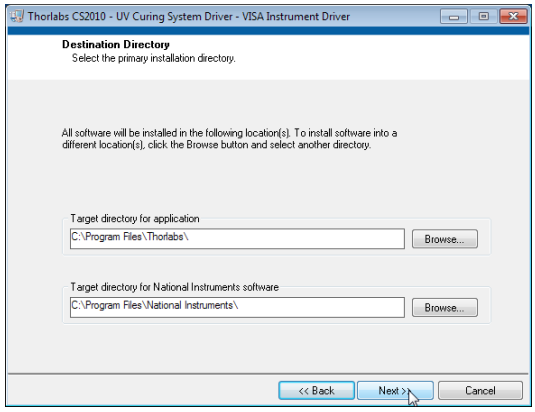
4.1.3 Install Device Drivers

Thorlabs provides beside the application software a driver package, which can be used by C/C ++/LabVIEW and every programming language supporting DLLs. To install the driver package, click to "**Install Instrument Drivers**"

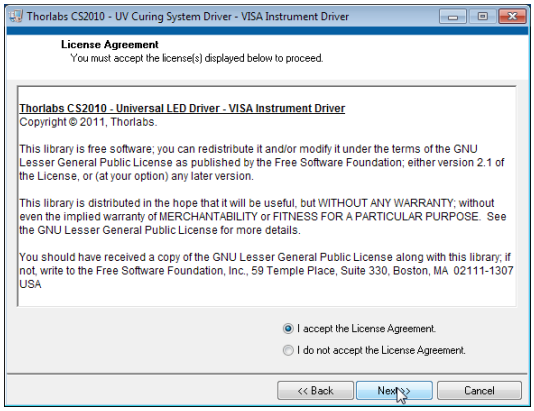


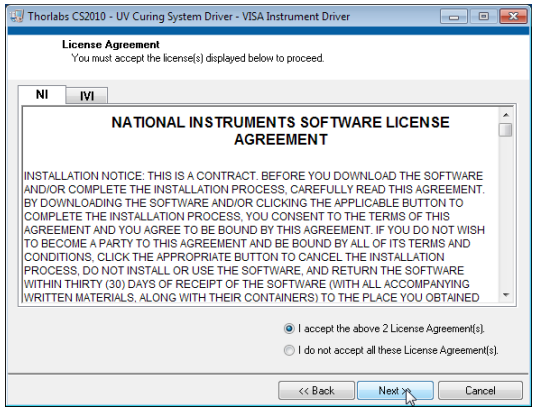
In the next two screens click "**Next**" to continue:





In the following 2 steps, please select "**I accept the License Agreement**" if you do so and click "**Next**":





The installer will sum up the components to be installed. Click "**Next**" to continue installation:

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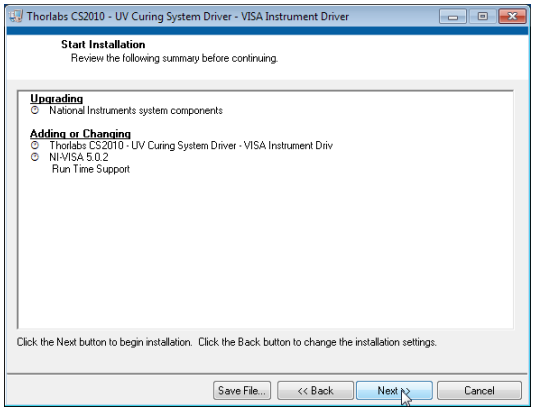
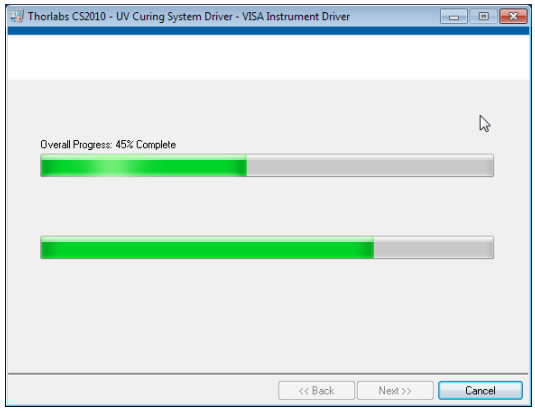
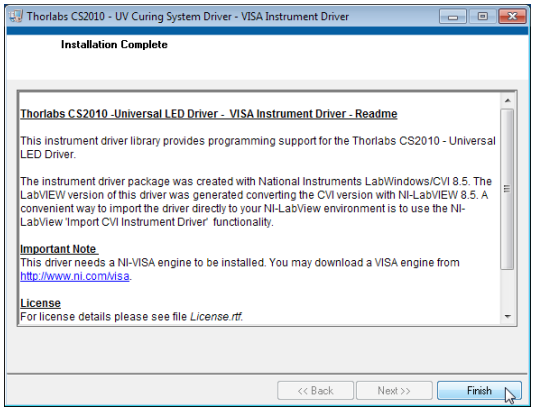




To complete instrument driver installation, click "**Finish**".



Note

- Please be aware that you need a VISA engine installed on your system to use the CS2010 - VISA Instrument Driver.
- Please refer to the manuals, which are copied on your system when installing the device driver.

The CS2010 sample applications will be copied to your VXIPNP directory during the driver package installation and can be found at

C:\VXIPNP\WinNT\Thorlabs CS2010\Samples or

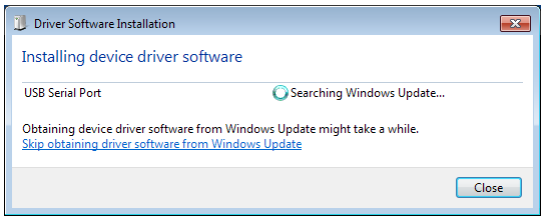
C:\Program Files\IVI Foundation\VISA\WinNT\Thorlabs CS2010\Samples

5 Connect CS2010

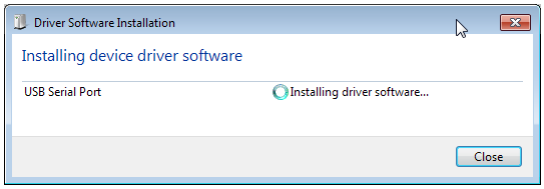
Please make sure you have the instrument software installed (see section Software Installation) prior to connect hardware.

- Connect the handset to the CS2010 driver
- Connect power supply to AC power and to CS2010
- Switch on the UV curing system
- Connect the driver to the control PC using the USB2.0 cable.

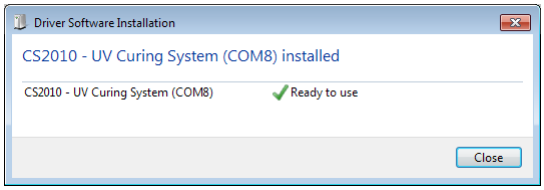
The operating system will recognize the new hardware and starts searching a driver from Windows update. You may skip this search.



As a next step, the driver software will be installed to the operating system.



After finishing, please click "**Close**" to finish.



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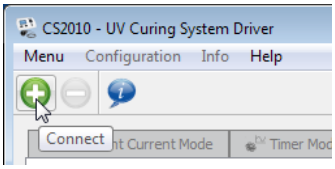
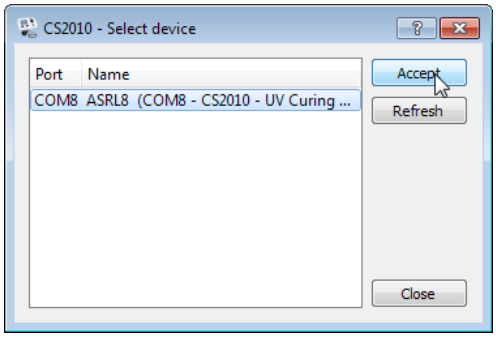
6 Graphic User Interface (GUI)

Start the remote software by clicking to the

icon on the desktop. To connect the software to your CS2010 UV curing system, click to the green "**Connect**" item:



A request to select the instrument will appear:



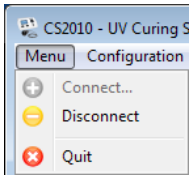
Select the instrument, then "**Accept**". The GUI (Graphic User Interface) activates. The display (1) of the CS2010 will show the same menu as selected in the software. The software reads out settings of the hardware and displays them. The following parameters and settings cannot be changed remotely:

- Brightness of the display (1)
- Safety mode
- Beep interval and volume
- Power Mode (from software it's always "**Toggle**" - see chapter Settings)

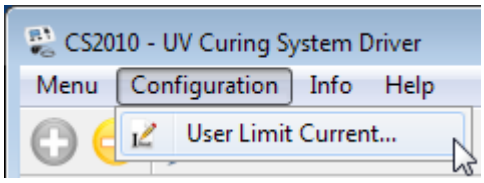
The function Irradiance Mode is not available via software.

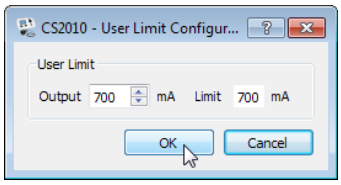
6.1 Menu Bar

Select "**Menu**" to connect or disconnect the CS2010 and to exit the program:



Select **Configuration** to set user current limit:

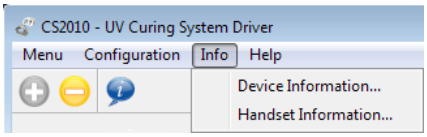


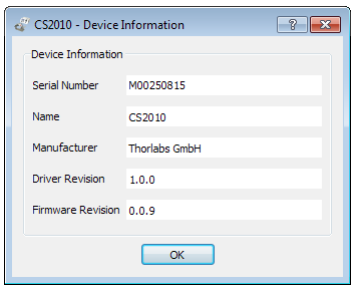


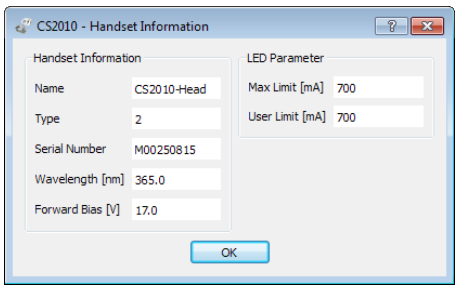
Note

The numeric value for **Limit** (to the right) is the hardware limit, read out from the EEPROM in the handset and cannot be changed. Any lower limit can be entered to the box **Output**.

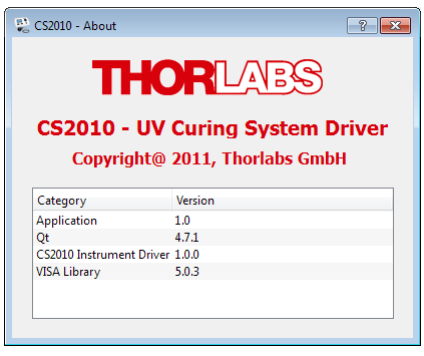
Select **Info** to get information about the CS2010 driver and the handset:







Via **Help** topic information about the CS2010 software can be retrieved:



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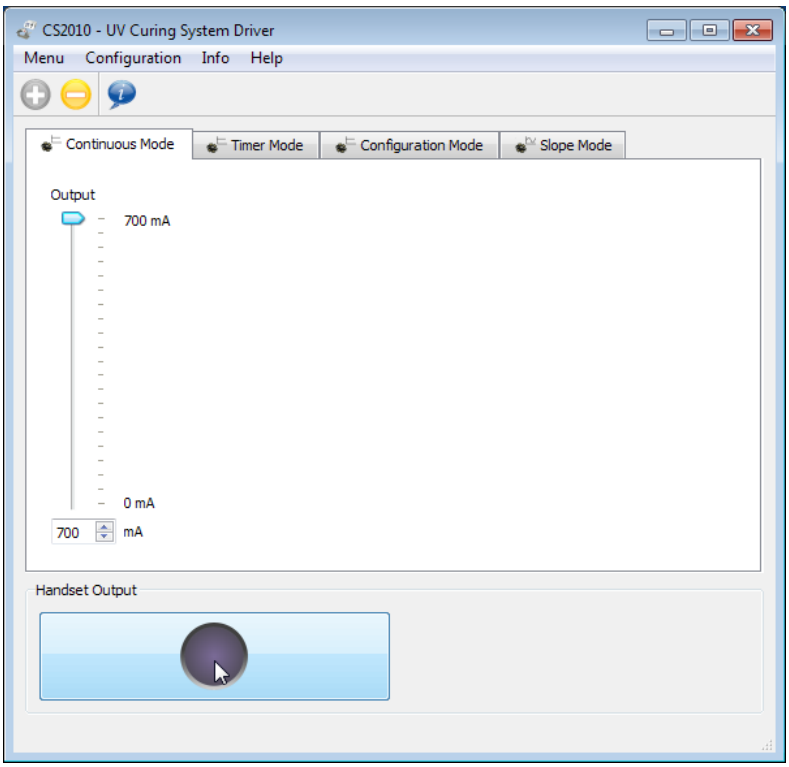
6.2 Continuous Mode

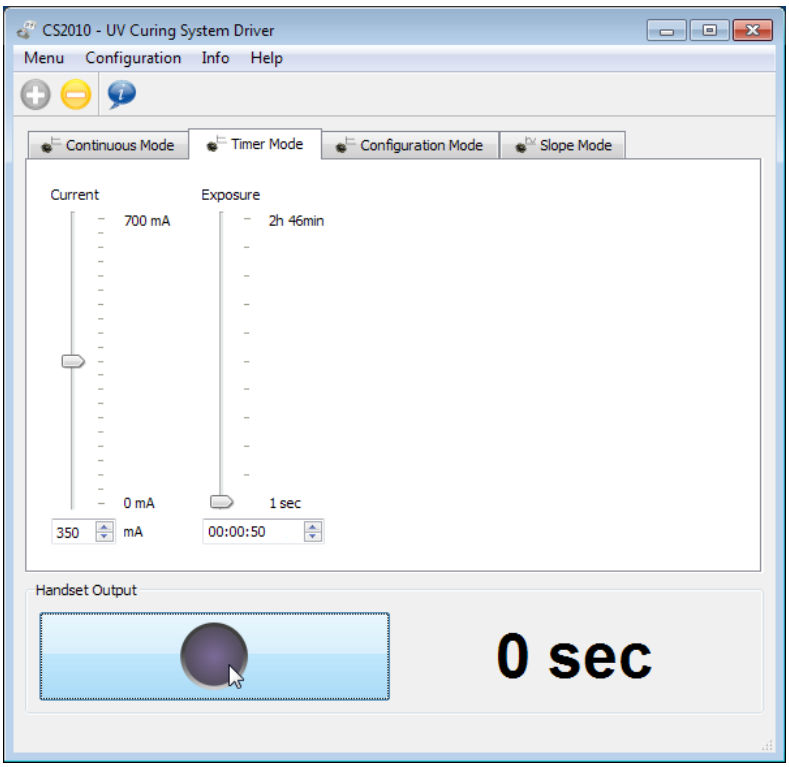
The software Continuous Mode is equivalent to the hardware Continuous Mode:



Set the desired Output intensity by either moving the slider or by entering a numeric value and control the LED by clicking to **Handset Output** button. Intensity change is possible with LED ON or OFF.

6.3 Timer Mode

The software Timer Mode is equivalent to hardware Timer Mode :



In the **Timer Mode** tab, the desired LED intensity and exposure time can be selected. Clicking to the **Handset Output** button starts / aborts the timer count down.

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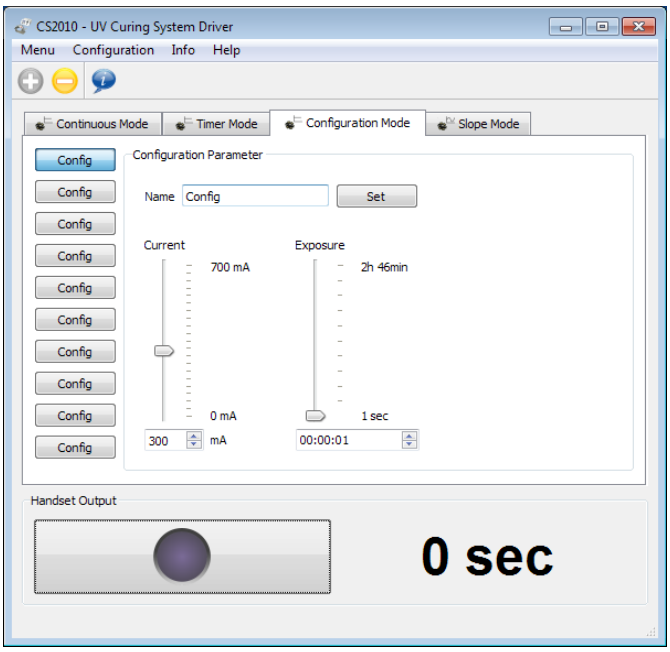
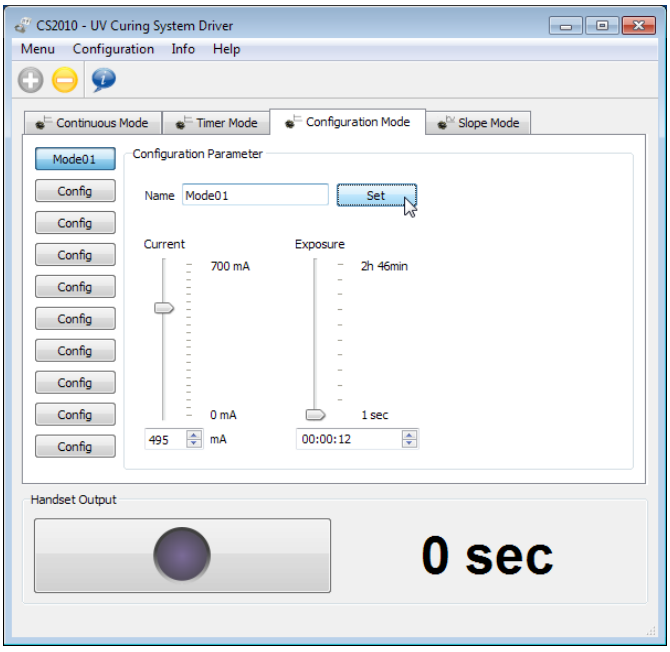
6.4 Configuration Mode

The tab Configuration Mode provides a more easy to handle tool to program up to 10 different pre-settings for intensity and exposure time.



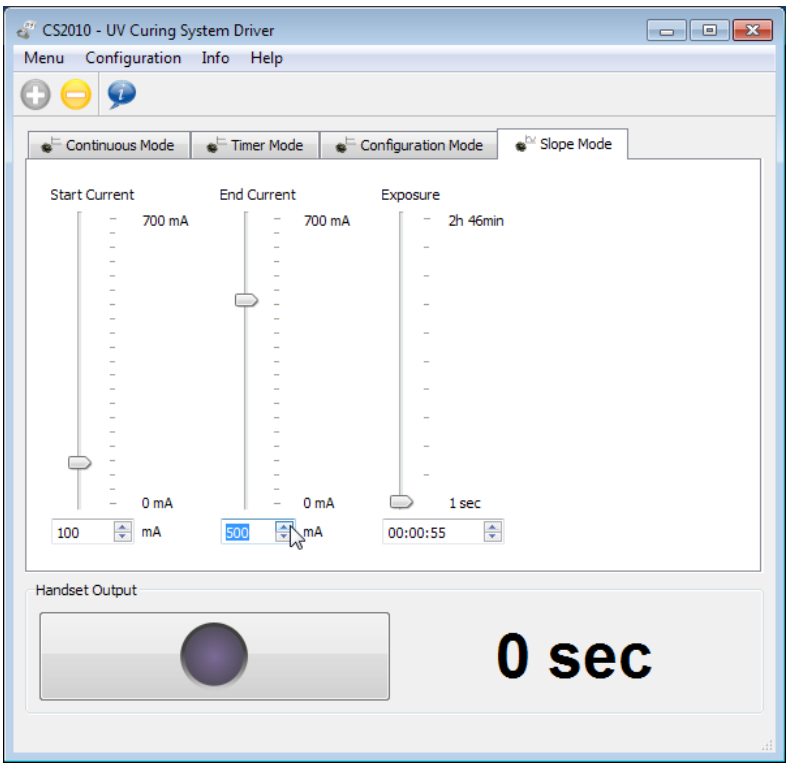
Select a button from the row to the left, enter the desired name (max. to 12 characters, valid characters are numbers, upper and lower case letters), set intensity and exposure time, then click **Set** to save settings:



To operate the CS2010 with a configuration, just select it and click the **Handset Output** button to start/abort exposure.

6.5 Slope Mode

The tab Slope Mode in CS2010 software is equivalent to the topic Slope Mode of the driver.



Select the values for start and end intensity of the slope and the exposure time. The button **Handset Output** starts and terminates the exposure.

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7 Maintenance and Service

Protect the CS2010 from adverse weather conditions. The CS2010 is not water resistant.

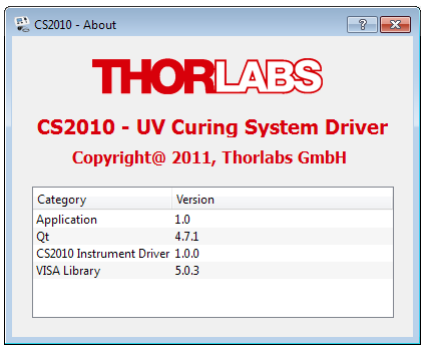
Attention

To avoid damage to the instrument, do not expose it to spray, liquids or solvents!

The unit does not need a regular maintenance by the user. It does not contain any modules and/or components that could be repaired by the user himself. If a malfunction occurs, please contact Thorlabs for return instructions.

Do not remove covers!

7.1 Version Information



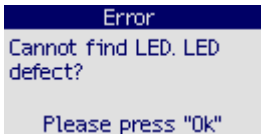
7.2 Troubleshooting

- **After switching on, an error message as below appears:**

  ⇨ Check if a hand set is properly connected. Switch the driver OFF and ON again.

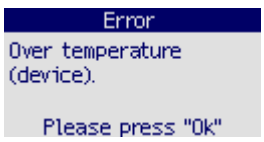
  ⇨ If the error persists, please contact Thorlabs for advice

- **During operation the error below appears:**



  ⇨ The LED or the handset are defective. Please contact Thorlabs for return instructions.

- **Over temperature protection**



  ⇨ The CS2010 driver overheated during operation. Make sure that ventilation gaps (8) in the cabinet are not blocked.

8 Appendix

8.1 Technical Data

Operation Properties	
Continuous Mode	Power: 0 - 100%
Timer Mode	Power: 0 - 100% Time: 1s - 2h 46min 39s
Config Mode	10 Configurations in Timer Mode
Slope Mode	Time: 1s - 2h 46min 39s Start Power: 0 - 100% Stop Power: 0 - 100%
Optical Properties	
Wavelength	365 nm
UV LED Power	270 mW (min) 360 mW (typ)
Irradiance	
LED Chip	27 W/cm² (min)
Collimated using CS20A2	150 mW/cm² (min)
Focused using CS20A3 [1])	10 W/cm² (min)
Divergent without Optics (Distance 20 mm)	25 mW/cm² (min)
Beam diameter	
LED Chip	1 x 1 mm²
Collimated using CS20A2	12 mm
Focused using CS20A3 [1])	1 mm
Divergent without Optics (Distance 20 mm)	30 mm
General	
Operating Temperature Range [2])	0 - 40 °C
Storage Temperature Range	-40 to 70 °C
Dimensions (W x H x D) Main Unit	160 mm x 80 mm x 150 mm
Dimensions (W x H x D) Hand Held Unit	95 mm x 180 mm x 32 mm
Warm Up Time for Rated Accuracy	<10 min
Weight	<1 kg

[1]) not included in base package

[2]) non-condensing

All technical data are valid at 23 ± 5°C and 45 ± 15% rel. humidity (non condensing)

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8.2 Certifications and Compliances

Category	Standards or description
EC Declaration of Conformity - EMC	Meets intent of Directive 2004/108/EC [1] for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:
EN 61326:2006	EMC requirements for Class A electrical equipment for measurement, control and laboratory use, including Class A Radiated and Conducted Emissions[2,3,4] and Immunity. [2,3,4]
IEC 61000-4-2	Electrostatic Discharge Immunity (Performance criterion B)
IEC 61000-4-3	Radiated RF Electromagnetic Field Immunity (Performance criterion A)
IEC 61000-4-4	Electrical Fast Transient / Burst immunity (Performance criterion B)
FCC EMC Compliance	Emissions comply with the Class A Limits of FCC Code of Federal Regulations 47, Part 15, Subpart B [2,3,4].
EC Declaration of Conformity - Low Voltage	Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities: Low Voltage Directive 2006/95/EC [5]
EN 61010-1:2001	Safety requirements for electrical equipment for measurement, control and laboratory use.
UL 61010-1 2nd ed.	Safety requirements for electrical equipment for measurement, control and laboratory use.
CAN/CSA C22.2 No. 61010-1 2nd ed.	Safety requirements for electrical equipment for measurement, control and laboratory use.
IEC 61010-1:2001	Safety requirements for electrical equipment for measurement, control and laboratory use.
Equipment Type	Test and measuring
Safety Class	Class I equipment (as defined in IEC 60950-1:2001)

[1] Replaces 89/336/EEC

[2] Compliance demonstrated using high-quality shielded interface cables.

[3] Emissions, which exceed the levels required by these standards, may occur when this equipment is connected to a test object.

[4] Minimum Immunity Test requirement.

[5] Replaces 73/23/EEC, amended by 93/68/EEC.

8.3 Warranty

Thorlabs warrants material and production of the CS2010 for a period of 24 months starting with the date of shipment. During this warranty period Thorlabs will see to defaults by repair or by exchange if these are entitled to warranty.

For warranty repairs or service the unit must be sent back to Thorlabs. The customer will carry the shipping costs to Thorlabs, in case of warranty repairs Thorlabs will carry the shipping costs back to the customer.

If no warranty repair is applicable the customer also has to carry the costs for back shipment.

In case of shipment from outside EU duties, taxes etc. which should arise have to be carried by the customer.

Thorlabs warrants the hard- and software determined by Thorlabs for this unit to operate fault-free provided that they are handled according to our requirements. However, Thorlabs does not warrant a fault free and uninterrupted operation of the unit, of the software or firmware for special applications nor this instruction manual to be error free. Thorlabs is not liable for consequential damages.

Restriction of warranty

The warranty mentioned before does not cover errors and defects being the result of improper treatment, software or interface not supplied by us, modification, misuse or operation outside the defined ambient stated by us or unauthorized maintenance.

Further claims will not be consented to and will not be acknowledged. Thorlabs does explicitly not warrant the usability or the economical use for certain cases of application.

Thorlabs reserves the right to change this instruction manual or the technical data of the described unit at any time.

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8.4 Copyright and Exclusion of Reliability

Thorlabs has taken every possible care in preparing this Operation Manual. We however assume no liability for the content, completeness or quality of the information contained therein. The content of this manual is regularly updated and adapted to reflect the current status of the software. We furthermore do not guarantee that this product will function without errors, even if the stated specifications are adhered to.

Under no circumstances can we guarantee that a particular objective can be achieved with the purchase of this product.

Insofar as permitted under statutory regulations, we assume no liability for direct damage, indirect damage or damages suffered by third parties resulting from the purchase of this product. In no event shall any liability exceed the purchase price of the product.

Please note that the content of this User Manual is neither part of any previous or existing agreement, promise, representation or legal relationship, nor an alteration or amendment thereof. All obligations of *Thorlabs* result from the respective contract of sale, which also includes the complete and exclusively applicable warranty regulations. These contractual warranty regulations are neither extended nor limited by the information contained in this User Manual. Should you require further information on this product, or encounter specific problems that are not discussed in sufficient detail in the User Manual, please contact your local *Thorlabs* dealer or system installer.

All rights reserved. This manual may not be reproduced, transmitted or translated to another language, either as a whole or in parts, without the prior written permission of *Thorlabs.*

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8.5 Thorlabs 'End of Life' Policy

As required by the WEEE (Waste Electrical and Electronic Equipment Directive) of the European Community and the corresponding national laws, Thorlabs offers all end users in the EC the possibility to return “end of life” units without incurring disposal charges.

This offer is valid for Thorlabs electrical and electronic equipment

- sold after August 13th 2005
- marked correspondingly with the crossed out “wheelie bin” logo (see figure below)
- sold to a company or institute within the EC
- currently owned by a company or institute within the EC
- still complete, not disassembled and not contaminated

As the WEEE directive applies to self contained operational electrical and electronic products, this “end of life” take back service does not refer to other Thorlabs products, such as

- pure OEM products, that means assemblies to be built into a unit by the user (e. g. OEM laser driver cards)
- components
- mechanics and optics
- left over parts of units disassembled by the user (PCB’s, housings etc.).

Waste treatment on your own responsibility

If you do not return an “end of life” unit to Thorlabs, you must hand it to a company specialized in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.

WEEE Number (Germany) : DE97581288

Ecological background

It is well known that waste treatment pollutes the environment by releasing toxic products during decomposition. The aim of the European RoHS Directive is to reduce the content of toxic substances in electronic products in the future.

The intent of the WEEE Directive is to enforce the recycling of WEEE. A controlled recycling of end-of-life products will thereby avoid negative impacts on the environment.

Crossed out "Wheelie Bin" symbol

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8.6 List of Acronyms

The following acronyms and abbreviations are used in this manual:

AC	Alternating Current
CD	Compact Disc
DLL	Dynamic Link Library
FCC	Federal Communications Commission
GUI	Graphical User Interface
IEC	International Electrotechical Commission
LED	Light Emitting Diode
LC	Liquid Crystal
PC	Personal Computer
RoHS	Restriction of the use of certain hazardous substances in electrical and electronic equipment
SW	Software
USB	Universal Serial Bus
UV	Ultra Violet
WEEE	Waste Electrical and Electronic Equipment Directive

8.7 Thorlabs Worldwide Contacts

USA, Canada, and South America

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Fax: 973-300-3600
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