NeuroLight Stimulator Quick Start Guide

This quick start guide describes how to install the NeuroLight Stimulator software package, assemble the hardware, and use the NeuroLight Stimulator application.

Software Installation

The NeuroLight Stimulator software package contains both the drivers and application for controlling the hardware.

1) Double-click on the software package icon.

🖏 NeuroLight Stimulator V1 Setup.exe

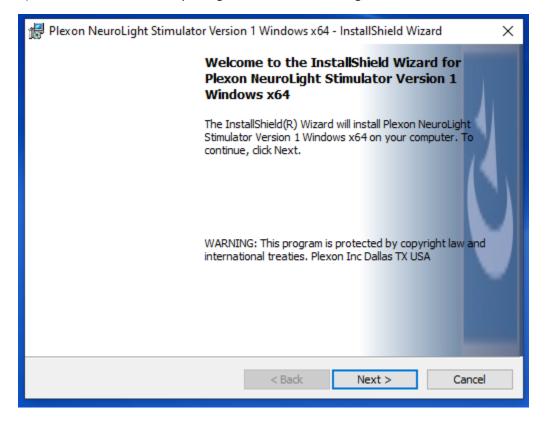
2) Click "Yes" when prompted if you want to make changes to your device.

User Account Control	×		
Do you want to allow this app to make changes to your device?			
NeuroLight Stimulator V1 Setup			
Verified publisher: Plexon Inc File origin: Hard drive on this computer			
Show more details			
Yes No			

3) Click "Install" if prompted to install the Microsoft Visual C++ 2019 Redistributable package.

Plexon NeuroLight Stimulator Version 1 Windows x64 - InstallShield Wizard
Plexon NeuroLight Stimulator Version 1 Windows x64 requires the following items to be installed on your computer. Click Install to begin installing these requirements.
Status Requirement
Pending Microsoft Visual C++ 2019 Redistributable Package (x64)
Install Cancel

4) After the redistributable package has finished installing, click "Next".



🖟 Plexon NeuroLight Stimulator Version	1 Windows x64	- InstallShield Wiz	ard X		
License Ag	preement		4.		
	YOU MAY NOT SELL, RENT, LEASE, OR SUBLICENSE THIS SOFTWARE.				
Plexon End User License	e Agreeme	ent	^		
PLEXON INC SOFTWARE END USER LICENSE AGREEMENT					
IMPORTANT: THIS SOFTWARE END USER LICENSE AGREEMENT ("EULA") IS A LEGAL AGREEMENT BETWEEN YOU AND PLEXON INC. READ IT CAREFULLY BEFORE USING THE SOFTWARE. IT PROVIDES A LICENSE TO USE THE SOFTWARE AND CONTAINS WARRANTY					
			·		
I accept the terms in the license agreement Print					
○ I do not accept the terms in the license agreement					
a contract of the					
InstallShield					
[< Back	Next >	Cancel		

5) Select "I accept the terms in the license agreement" and click "Next".

6) Click "Install".

🕼 Plexon NeuroLight Stimulator Version 1 Windows x64 - InstallShield Wizard 🛛 🗙
Ready to Install the Program The wizard is ready to begin installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard. Current Settings:
Setup Type: Custom
Destination Folder: C:\Program Files (x86)\Plexon Inc\NeuroLight Stimulator V1\
User Information: Name: Plexon Company:
InstallShield
< Back Install Cancel

7) A window for The Opal Kelly FrontPanel USB Driver Setup will pop up behind the NeuroLight installer. Click "Next".

٦	Opal Kelly Fro	ontPanel USB Driver Setup	_		×
	滑 Plexon N	Welcome to Opal Kelly euroLight Stimulator Version 1 Windows x64	Fronti	P <mark>anel</mark>	<
		Plexon NeuroLight Stimulator Version 1 Window ram features you selected are being installed.	ıs x64		Š
	1	Please wait while the InstallShield Wizard installs Plexo Stimulator Version 1 Windows x64. This may take seve			
		Status:			
2					
	InstallShield –				
		Nex	t >	Cano	el

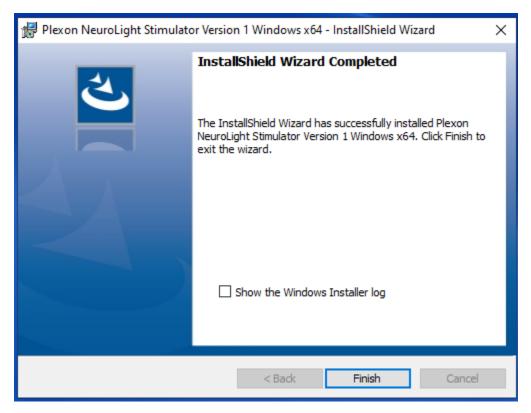
8) Click "I Agree" to the Opal Kelly license agreement.

🌍 Opal Kelly FrontPanel USB Driver Setup 🦳 🗌	×		
• Opal Kelly License Agreement Please review the license terms before installing Opal Kelly FrontPanel USB Driver.			
Press Page Down to see the rest of the agreement.			
FrontPanel® License Agreement Copyright © 2005-2018 Opal Kelly Incorporated	^		
IMPORTANT The product, including the software, firmware, and other electronic data contained within the product, is licensed, not sold, and available for use only under the terms of this license agreement. By clicking the "I Agree" button below and continuing with the installation, you are consenting to be bound by this license agreement. If you do not agree to the terms of the license agreement, click the "CANCEL" button. If you do not agree to the terms of this license agreement, and wish to return this product, please contact us at support@opalkelly.com.			
I If you accept the terms of the agreement, click I Agree to continue. You must accept the agreement to install Opal Kelly FrontPanel USB Driver.			
Opal Kelly Incorporated	cel		
Court Agree Can	.ci		

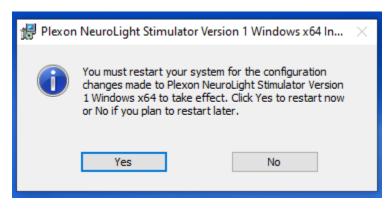
9) Click "Finish" to complete the Opal Kelly driver setup.

🌍 Opal Kelly FrontPanel USB I	Driver Setup — 🗆 🗙
	Completing Opal Kelly FrontPanel USB Driver Setup
	Opal Kelly FrontPanel USB Driver has been installed on your computer.
	Click Finish to close Setup.
	Visit the Opal Kelly website for the latest news and support.
	< Back Finish Cancel

10) Click "Finish" to complete the NeuroLight software installation.



11) When prompted, restart the PC.



Hardware Assembly

- 1) Connect the power supply to the NeuroLight Stimulator control box
- 2) Connect the USB cable to the PC
- 3) Connect the headset cable to the control box
- 4) Connect the headset to the headset cable
- 5) Connect the headset to the test board

Starting the NeuroLight Stimulator Application

The NeuroLight Stimulator application is where you can define patterns, apply them to channels, and start/stop channels.

1) Turn on the power to the NeuroLight Stimulator. If this is the first time that the stimulator has been connected to the PC, it might take a moment to be detected and ready for use.

You may see this dialog on your PC.

•= Windows Security	X
Would you like to install this device software?	
Name: Opal Kelly FrontPanel devices Publisher: Opal Kelly Incorporated	
Always trust software from "Opal Kelly Incorporated".	Install Don't Install
You should only install driver software from publishers you device software is safe to install?	u trust. <u>How can I decide which</u>

Click "Install" to finish this step.

2) Open the NeuroLight Stimulator application.



3) If the NeuroLight Stimulator hardware is correctly detected by the PC and software, the application will start and show the software version and hardware firmware number in the "Message Log" window. If the hardware was not detected, an error message will pop up and the software will close.

Mar NeuroLight Stimulator	X
File Settings Control All Help	
Channel Selection Pattern Editing S1L1 Stopped	Patterns
Choose Pattem: Add Constant Add Ramp	New Pattern
No Pattern V Start Stop Am Repetitions: Delay (mS):	Delete Pattern
S1L2 Stopped	
Choose Pattern:	
No Pattern V Start Stop Arm	
S1L3 Stopped	
Choose Pattern:	
No Pattern V Start Stop Arm	
S2L1 Stopped	Selection Options
Choose Pattem:	Channel Name: S1L1 Control Group: None ~
No Pattern V Start Stop Arm	
S2L2 Stopped	Digital Input Channel: 0 ~
Choose Pattern:	Digital Output Channel: 0 🗸
No Pattern V Start Stop Arm	
S2L3 Stopped	
Choose Pattem:	Message Log
No Pattern V Start Stop Arm	NeuroLight Stimulator GUI 1.0.0.0 Stimulator detected with firmware 14-10-A-07-P27
S3L1 Stopped	Sumblator detected with him ware 14-10-4-074 27
Choose Pattern: No Pattern V Start Stop Arm	
S3L2 Stopped Choose Pattern:	
No Pattern V Start Stop Arm	
S3L3 Stopped Choose Pattern:	
No Pattern V Start Stop Arm	
S4L1 Stopped Choose Pattern:	✓
V V	

Basic Usage of the NeuroLight Stimulator Application

1) Create a new pattern by clicking "New Pattern" in the "Patterns" section.

Patterns	
Pattem 0	New Pattern
	Delete Pattern

2) Create a new constant in the pattern waveform by clicking "Add Constant" in the "Pattern Editing" section.

Pattern Edit	ing
Add Constant	Add Ramp
Repetitions: 1	Delay (mS): 0

3) Set the "Start Current" in the newly created constant to 100 uA, and the "Duration" to 50 mS.

Constant			Х
Start Current (uA)	100.00		
Duration (mS)	50	Repetitions	1

4) Create another new constant to the waveform by clicking "Add Constant".

Pattern Edit	ing
Add Constant	Add Ramp
Repetitions: 1	Delay (mS): 0

5) Set the "Start Current" in the newly created constant to 0 uA, and the "Duration" to 50 mS.

Constant			X
Start Current (uA)	0.00		
Duration (mS)	50	Repetitions	1

6) Set the "Repetitions" of the pattern to 5, and set the "Delay" in between repetitions to 500 mS.

Pattern Editin	g					
Add Constant	Add Constant Add Ramp					
Repetitions: 5	Dela	ay (mS) 500				
Constant				X		
Start Current (uA)	100.00					
Duration (mS)	50	Repetitions	1			
Constant				X		
Start Current (uA)	0.00					
Duration (mS)	50	Repetitions	1			
			_			

3) Set a channel to use the pattern.



4) Arm the channel.

S1L1	Stopped			
Choose Pattern:				
Pattern 0	\sim	Start	Stop	Arm

5) Start the channel.

S1L1			Runnin	g
Choose Pattern:				
Pattern 0	~	Start	Stop	Arm

Creating and Deleting Patterns

A pattern is comprised of the defined waveform, the number of repetitions, and delay in between repetitions.

To create a new pattern, click the "New Pattern" button.

Patterns	
Pattem 0	New Pattern
	Delete Pattern

To delete a pattern, select the pattern in the pattern list (which will highlight it in blue), and click "Delete Pattern".

Patterns		
Pattern 0		New Pattern
	-	Delete Pattern
Pattern 1		
Pattern 2		

A pattern can only be deleted if no channels have the pattern selected.

Adding and Deleting Pattern Primitives

A waveform is composed of pattern primitives. To add a pattern primitive, click on one of the pattern primitive buttons.

Pattern Edit	ing
Add Constant	Add Ramp
Repetitions: 10	Delay (mS): 500

To delete a pattern primitive, click the "X" on it.

Ramp			x
Start Current (uA)	0.00	End Current (uA)	100.00
Duration (mS)	100	Repetitions	1
Constant			X
Start Current (uA)	100.00		
Duration (mS)	100	Repetitions	1
Ramp			x
Start Current (uA)	100.00	End Current (uA)	0.00
Duration (mS)	100	Repetitions	1

Pattern Values

Repetitions is the number of times the pattern repeats.

Delay is the delay in between repetitions, and is in milliseconds. During this time, the output current will be 0 microamps.

Pattern Primitive Types and Values

There are currently two types of pattern primitives: constants and ramps.

A Constant is a single current value held for a set period of time.

A Ramp sweeps from the start current to the end current across a set period of time.

Repetitions is the number of times the pattern primitive will repeat.

The start or end current values are in microamps, and can be set to a minimum of 0 microamps and a maximum of 100 microamps. By default, the start or end current values entered will be quantized to the actual value that the LED will receive. For example, entering a value of 50 microamps will get quantized to 49.80 microamps.

The duration value is in milliseconds.

Saving and Loading Configurations

NeuroLight Stimulator settings files contains the patterns, primitives, application settings, and channel pattern assignments.

To save settings, go to File and click "Save Settings".

To load settings, go to File and click "Load Settings".

The application will warn you if there are any unsaved changes when exiting, and give you an opportunity to cancel exiting and save the configuration.

NeuroLight Stimulator S — 🗆 🗙
Channel Count
12 12
0 16
○ 32
Interface Options
Quantize output current values
Playback Options
Stop command waits for waveform to finish
Digital Input Options
Disable digital inputs
Digital Output Options
DO high when pattern is playing
O DO high when waveform is playing
O DO high when output is not zero
Save Cancel

Settings

Channel Count: currently can only be set to 12 channels.

Interface Options: When "Quantize Output Current Values" is selected, the values typed into a pattern primitive current value will be quantized to the actual current value the LED will receive.

Playback Options: When "Stop command waits for waveform to finish playing" is selected, the Stop button waits until the current repetition of the defined waveform has completed before stopping the channel. Otherwise the channel is immediately stopped.

Digital Input Options: When "Disable Digital Inputs" is selected, the digital inputs will be disabled.

Digital Output Options: Sets how the digital output behaves during pattern playback.

Channel Controls

Each channel has controls for settings the pattern, arming, starting, and stopping.

S1L2			Stoppe	d
Choose Pattern:				
No Pattern	\sim	Start	Stop	Arm

Start - Starts playback of the pattern. This control is only enabled when the channel has a pattern selected and is armed.

Stop - Stops playback of the pattern.

Arm - Arms the currently selected pattern.

Choose Pattern: Chooses a pattern from the available patterns.

A channel can only be started if it's armed. Changing the selected pattern, or editing the selected pattern will cause the channel to dis-arm.



The Control All menu provides controls for starting, stopping, and aborting all channels.

Start All – Start all armed channels.

Stop All – Stop all running channels (channels stop after their current repetition is finished).

Abort All – Abort all running channels immediately.

Arm All – Arms all channels that have a pattern selected.

Selection Options

The "Selection Options" area of the main window displays options for the currently selected channel or pattern.

When a channel is selected, options for the channel's name, digital input and output assignments, and group assignment are presented.

Selection Options			
Channel Name:	\$1L2	Control Group:	None 🗸
Digital Input Channel:	1 ~		
Digital Output Channel:	1 ~		

Channel Name – Changing the text here will change the selected channel's name

Digital Input Channel – This dropdown selects which digital input channel controls the selected channel.

Digital Output Channel – This dropdown selects which digital output channel will respond to the currently selected channel. Select "None" to disable the digital output for this channel. See "Known Issues" at the end of this document for more information.

Control Group – This dropdown selects which control group the currently selected channel is assigned to. See the section on control groups for more information.

When a pattern is selected, options for the pattern (currently only the pattern's name) are presented.

Selection Options	
Pattern Name:	Pattern 1

Pattern Name – changing the text here will change the selected pattern's name.

Control Group

Control groups allow for starting and stopping multiple channels from the user interface at the same time.

Control groups do not affect how channels respond to digital input. Control groups only apply to user interface controls.

When multiple channels are set to the same control group, the control buttons on each of those channels work as follows.

Start – Starts every channel in the group that is eligible to be started (meaning any channel that has a pattern assigned and is armed).

Stop – Stops every running channel in the group.

Arm currently only affects the currently selected channel. This may change in the future.

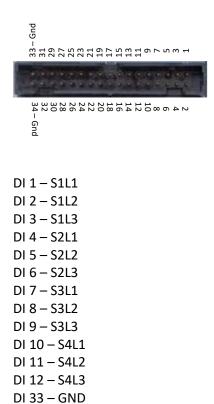
Note that channels in a group can have different patterns assigned to them. A channel that stops on its own when its pattern ends won't stop other running channels in the same group.

Digital Input

The NeuroLight Stimulator channels can be started and stopped through the digital input pins on the stimulator hardware.

Each channel has a corresponding digital input pin. A high (+3.3V) level on a pin will start the channel assigned to that pin, and a low (0V) level will stop the channel.

The channel will only start if it's armed.

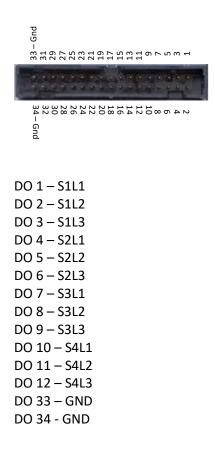


DI 34 - GND

Digital Output

The NeuroLight Stimulator channels can be monitored through the digital output pins on the stimulator hardware.

By default, the DO pin for each channel goes high (+3.3V) when that channel is playing, and low (0V) when it is stopped. This behavior can be altered in the settings.



Known Issues in NeuroLight Stimulator 1.0.7

- Leading O's in text fields don't get removed
- Digital input is not disabled when "No Pattern" is selected on a channel
- Digital Output channels can't be assigned to multiple LED channels. The interface will currently let you assign the same DO channel to multiple LED channels, however the DO channel will only actually be assigned to the LED channel farthest down on the list of LED channels.
- Channel can be started when pattern is changed but not re-armed if Start is clicked after editing pattern field
- If the headset is unplugged from the control box, the application must be restarted