# LDC-1C LED Controller

## Installation and Operation Manual

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A HALMA COMPANY

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# Table of Contents

# About This Manual

## Document Purpose and Intended Audience

This document describes the LDC-1C and provides you with an installation and operation section to get your LED system up and running.

## Document Summary

| Chapter | Description |
|---|---|
| Chapter 1: **Overview** | Contains a list of package contents and unpacking instructions. Also describes the components on the front and back face of the unit. |
| Chapter 2: **Specifications** | Contains operating environment specifications, as well as other physical details of the product. |
| Chapter 3: **Operating Instructions** | Provides instructions for operating the LDC-1C and the LED Light Source Modules |
| Chapter 4: **Troubleshooting and Maintenance** | Contains Frequently Asked Questions (FAQs) and bulb replacement information. |

## Product-Related Documentation

You can access documentation for Ocean Optics products by visiting our website at **http://www.oceanoptics.com**. Select *Support* → *Documents*, then choose the appropriate document from the available drop-down lists.

Ocean Optics offers a Glossary of spectroscopy terms to help you further understand your state-of-the-art products and how they function, located at: **http://oceanoptics.com/glossary/**.

# Upgrades

Occasionally, you may find that you need Ocean Optics to make a change or an upgrade to your system. To facilitate these changes, you must first contact Customer Support and obtain a Return Merchandise Authorization (RMA) number.

# Important Safety Notices

1. Do not remove or modify any installed safety device on this equipment. Doing so will void your warranty and create an unsafe operating environment.
2. There are NO user serviceable parts inside the device.
3. Only allow qualified personnel to operate this unit.
4. Do not use the unit if it is damaged in any way. Contact your dealer for repair or replacement information.
5. Always screw in the fiber optic cable to the LSM before starting the instrument.

**WARNING**

Protective eyewear **must** be worn when using light source modules. **Never look directly into the light beam**, as this can cause eye damage.

# Warranty

The LDC-1C is covered by Ocean Optics' Exclusive Three Year Warranty. For details, please visit the following webpage:

**https://oceanoptics.com/wp-content/uploads/Warranty-Sheet.pdf**

**This instrument should not be used for any Clinical or Diagnostic purposes**. Data generated in these areas is not warranted in any way by Ocean Optics, Inc.

# Certifications and Compliance

## ISO CERTIFICATION

Ocean Optics, the industry leader in miniature photonics, has been certified for ISO 9001:2008 applicable to the design and manufacture of electro-optical equipment since 2009.

## WEEE COMPLIANCE

**The WEEE symbol on the product indicates that the product must not be disposed of with normal household waste. Instead, such marked waste equipment must be disposed of by arranging to return to a designated collection point for the recycling of waste electrical and electronic equipment. Separating and recycling this waste equipment at the time of disposal will help to conserve natural resources and ensure that the equipment is recycled in a manner that protects human health and the environment.**

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# Chapter 1

# Overview

Ocean Optics' LED Current Driver Controller (LDC-1C) is a compact single channel driver and controller for a next generation of LED Light Source Modules (LSMs). The LDC-1C is an easy to use, menu driven device. It automatically reads identification and operational information stored in the LSM and configures itself appropriately, thereby protecting the LSM from potential damage due to excessive current.

The LDC-1C is fully self-contained; no external input device is required for operation. The LDC-1C may also be connected to an external source such as a function generator or a modulation signal from a spectrometer or other electronic device.
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**LDC-1C LED Current Driver Controller**

The following sections provide instructions on unpacking and setting up your LDC-1C controller and LSMs.

# Unpacking the LED Equipment

► ***Procedure***

1. Unpack your LED controller and lamp module(s) carefully.
2. Inspect the outside of the devices and make sure that there is no damage. Do not use the device if damage is present.
3. Use this instrument in a clean laboratory environment.

# Contents

Your LED Controller package contains the following:

- ❑ LDC-1C LED Current Driver Controller
- ❑ Power cord
- ❑ Cable for connecting to LSM
- ❑ LDC-1C Quick Start Guide

# Additional Accessories

The following are additional accessories available from Ocean Optics that you may need, depending on your system set-up:

- ❑ Rack mount wings for attaching to a 19” 2U rack (LDC-RACK-2U)
- ❑ DIN rail clip for LDC-1C and LSM (LDC-1C-DIN)

**WARNING**

**The beam emerging from the LSMs below 400nm contain UV radiation that can cause serious eye injury upon direct contact with the eye and UV safe eye protection should be worn if there is the possibility of exposure to the emissions of these devices when energized. Never look directly into the light source regardless of the wavelength attached.**

**The body of the LSMs and the SMA 905 Connector may get hot during operation. After lamp use, allow sufficient time to cool before handling.**

**There are no user-serviceable parts inside. Never open the unit.**

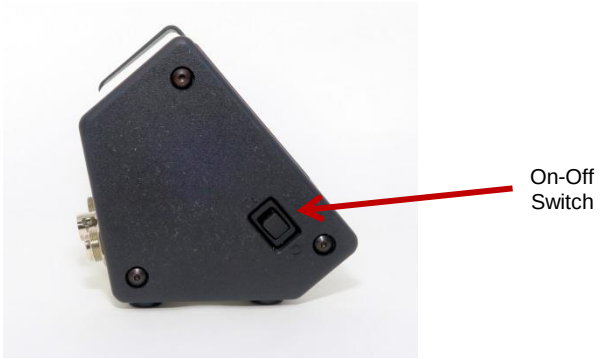
# Components

Components located on the front,  rear and side panels of the LDC-1C unit are described below.

## Front Panel

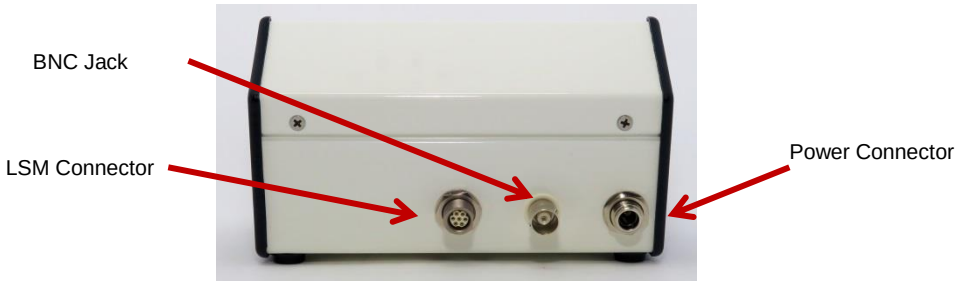

| Component | Description |
|---|---|
| Touchscreen | A multi-function display used for both a graphical display of LSM current as well as providing an input method for selecting desired functions. |
| Micro USB connector | Provides access for loading firmware to the controller. |

## Side Panel




| Component | Description |
|---|---|
| On/Off Switch | Applies power to the LDC-1C. (This does not turn on the LSM.) |

# Rear Panel




| Component | Description |
|---|---|
| LSM Connector | 7-pin locking connector for cable to the LMS. |
| Power Connector | Input terminal for power cord.<br>**Note:** Only connect the power cable to the controller when the On/Off Switch is in the OFF position. |
| 50 ohm BNC Jack | External Signal Mode - allows an external source such as a function generator or a modulation signal from a spectrometer or other electronic device to be attached. |
| | Internal Signal Mode – outputs frequency of waveform to an external device. |

# LSM

Your LDC-1C has been designed to operate seamlessly with Ocean Optics' LED Light Source Modules (LSMs). The diagram below shows the connectors on the LSM.

| Component | Description |
|---|---|
| SMA 905 Connector | Connects light source to sample cuvette holder. |
| Interface Connector | Connects LSM to the LDC-1C. |
| Mounting Point | Allows attachment to a standard optical bench with ¼-20 screws. |

# Chapter 2

# Specifications

This section provides information on the specifications, operating environment, and parts list for LED controller.

## Unit Specifications

| | |
|---|---|
| Dimensions | 90.8mm L X 142.6mm W x 87.5mm H |
| Weight | 0.82 kg |
| Power requirements | 15 VDC wall transformer (included) |
| Power consumption | 2A (maximum) at 15 VDC |
| BNC Source Current when Output | 150mA maximum @ 3.3V<br>100mA @5V |

## Operating Environment

| | |
|---|---|
| Humidity | ≤ 95% Relative humidity, non-condensing |
| Altitude | 0 m to 3050 m (0 ft. to 10,006 ft.) |
| Temperature | 0°C to 35°C (+32°F to +95°F) |

# Parts List

| Part Number | Description |
|---|---|
| LDC-1C | LED Current Driver Controller, single channel |
| LDC-CABLE | Replacement cable to connect LDC-1C and LSM |
| LDC-RACK-2U | 19” 2U rack mount attachment |
| LDC-1C-DIN | Clip for 35mm DIN Rail |

# Chapter 3

# Operating Instructions

## Connecting the LDC-1C Controller and Light Source

Follow the steps below to set up your LDC-1C and LSM for use.

► ***Procedure***

1. Insert the appropriate plug into the 15 VDC power supply.
2. Plug the power supply into a power outlet, then connect the barrel connector of the power supply to the power input on the rear of the LDC-1C.
3. Connect the LDC-1C to the LSM using the provided cable. The connectors on both the LSM and LDC-1C are keyed to facilitate the correct attachment.
4. Connect a fiber cable to the SMA 905 connector on the LSM and then attach to your sample.
5. Move the On/Off switch on the side of the LDC-1C to the On position. The Touchscreen will display the main screen.
6. Optionally, you may connect an external source such as a function generator or other input signal to the BNC connector on the rear of the LDC-1C.

Your LDC-1C is now ready for use.

## Navigating the LDC-1C

Navigating the menus on your LDC-1C is accomplished via the touch screen icons. The table below describes each of the icons. You may use your finger or a soft tipped stylus for selecting items on the touch screen. Do not use a sharp instrument as this will damage the touch screen.

**Touch Screen Icons**

| | |
|---|---|
|  | LSM OFF/ON - Applies current to the LSM |
|  | LIGHT OFF - Turns display off. Touching anywhere on the screen will resume the display. |
|  | DOWN TRIANGLE - Reduces value in selected field |
|  | UP TRIANGLE - Increases value in selected field |
|  | SCROLL ARROWS – Scrolls to display additional information |
|  | INFORMATION – Displays information on LSM and LDC-1C |
|  | SETTINGS - Configuration Settings for the LDC-1C |
|  | SOUND ON/OFF - Turns audible feedback on/off |
|  | CHECK – Accepts input |
|  | CANCEL – Abandons any changes that were entered |
|  | DISPLAY MODE INDICATOR – Allows the user to select if current input is in Percent Mode or Current Mode |

# Configuring the LDC-1C

The LDC-1C is easily configured via a series of menus displayed on the touch screen.

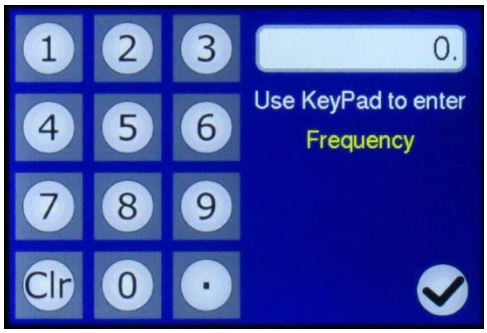
When the LDC-1C is powered on, the main screen is displayed.

Depending on the waveform type that has been selected (see **Configuration Settings**), you may change the Current, Frequency and Duty Cycle for your test. The table below shows which parameters can be changed via the touchscreen based on the selected waveform.

| Parameter | Internal DC | Internal SINE Wave | Internal TRIANGLE Wave | Internal SQUARE Wave | External Signal |
|---|---|---|---|---|---|
| Current | Yes | Yes | Yes | Yes | Yes |
| Frequency | No | Yes | Yes | Yes | No |
| Duty Cycle | No | No | No | Yes | No |

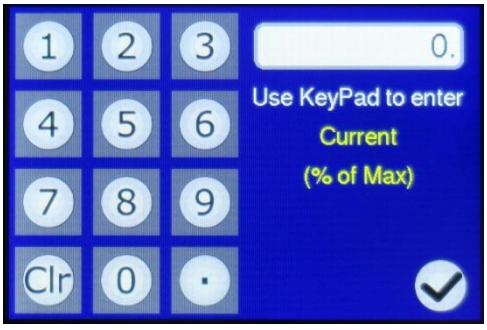
Values for Current, Frequency and Duty Cycle may be changed by using the UP/DOWN TRIANGLES in the menu bar, or by keypad entry. To change a value using the icons, double-tap the box of the desired component. If the double-tap occurs in the Frequency or Duty Cycle box, the box will be highlighted as shown below. If a box is not highlighted, Current is selected by default. Press  or  in the menu bar to increase or decrease the value.


To change the value via a keypad, touch and hold the Current, Frequency or Duty Cycle box on the touchscreen for 2 seconds. The appropriate keypad will be displayed.



Enter the desired value and press to save it.

The Current keypad also will indicate if the value being entered is a percentage of the maximum allowed current (% of Max) as shown in the keypad below, on the left. When this indication is not present, as shown in the keypad on the right, the value being entered is in milliamps.



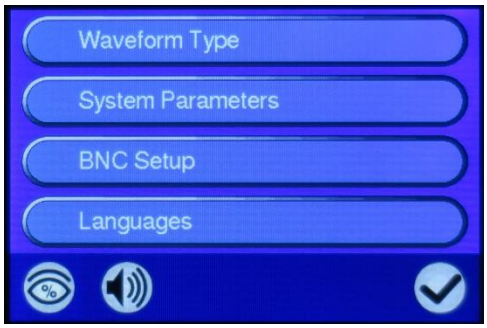


Once all the parameters are set, press on the main menu bar to apply current to the LSM. The icon highlights to indicate that the LSM is active.

# Configuration Settings

Settings -> Configuration Settings

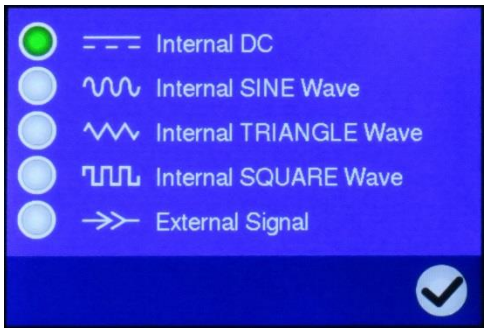
Pressing on the menu bar results in the main Configuration Settings screen. Each selection is discussed below. You may exit the screen by pressing .



## Waveform Type

Settings -> Configuration Settings -> Waveform Type

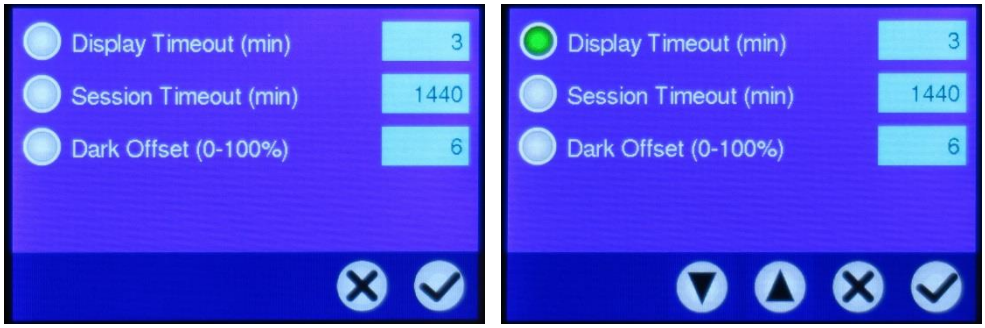
There are 5 options for waveform type, selectable via the radio button. Once the desired option is selected, press to save and exit.




## System Parameters

Settings -> Configuration Settings -> System Parameters

This menu allows you to adjust various parameters on your device. Note that the icons for increasing or decreasing the values do not appear until one of the parameters is selected.



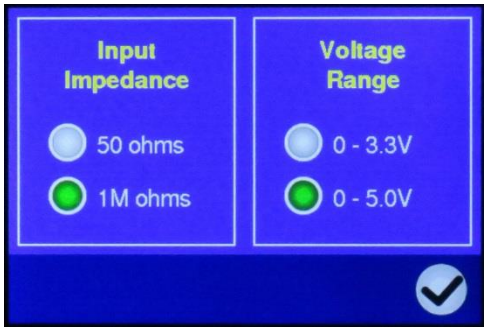

The first two options allow you to modify the Display Timeout and Session Timeout values. Display timeout simply turns the display off after the allotted time runs out. Session timeout shuts down the unit after the allotted time runs out.

Select the desired timeout to modify, then use or in the menu bar to increase or decrease the value. When the displayed value is "1" and is pressed one more time, "-------" is displayed, which indicates an unlimited timeout. To save the values, press . To cancel out of the screen, press .

On rare occasion, some LEDs may stay on even at the zero setting. In this case The LDC-1C may also be used to calibrate the dark offset of the LSM. This allows the user to adjust the current through the LED so that it is completely off. Select the radio button to activate the DARK OFFSET field; then use the triangle keys to increase or decrease the Dark Offset until the LED is completely off. When completed, press in the menu bar.

## BNC Setup

Settings -> Configuration Settings -> BNC Setup




This screen allows you to select Input Impedance and Voltage Range of the BNC. Press the radio button next to the desired value, then press in the menu bar to save.

The function of the BNC differs depending on what type of waveform has been selected.

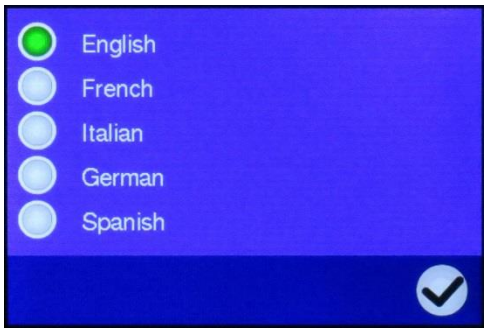
When the Waveform Type is EXTERNAL SIGNAL, the BNC setup is treated as an ***input*** with the Voltage Range as indicated in this menu. The voltage applied to the BNC in this mode is ratiometric to the percentage of current applied to the attached LED. For example, if the range selected is 0 – 5.0V, a 2.5V signal applied at the BNC will drive the LED at 50% of its rated continuous current.

When the Waveform Type is “INTERNAL SQUARE WAVE, the BNC is used as a SQUAREWAVE ***output*** to an external device. The high going edge of the output is coincident with the start of the “ON” period of the LED and the signal returns low during the LED “OFF” period. Outputs for internal mode selections other than INTERNAL SQUARE WAVE are indeterminate. NOTE: When the LSM ON/OFF is in the OFF position, square waves may still be present on the BNC Connector.

## Languages

Settings -> Configuration Settings -> Languages

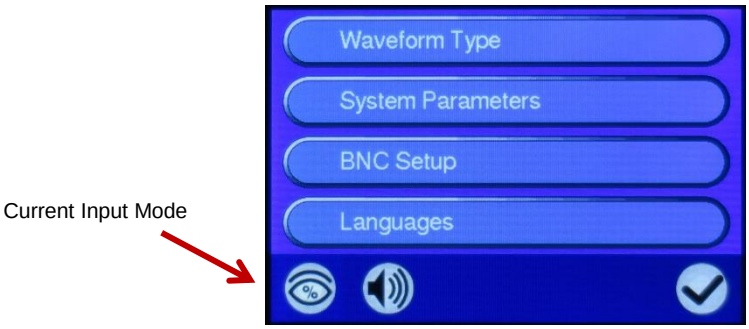
Text on the LDC-1C may be configured to English, French, Italian, German or Spanish by selecting the radio button next to the desired language. Once you have made your selection, press in the menu bar.



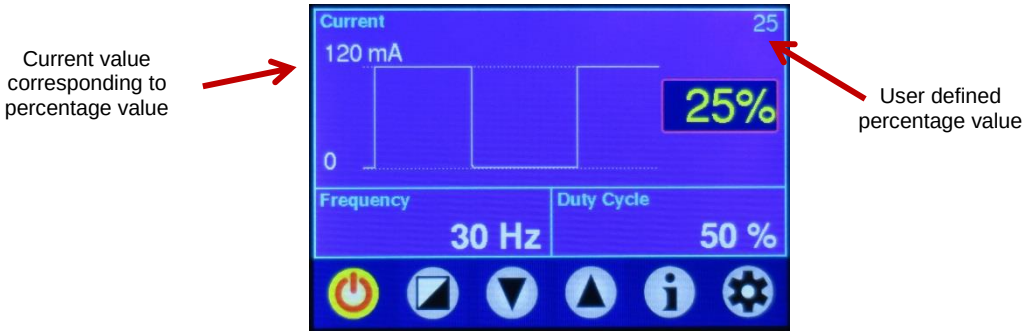

## Current Input Mode

Settings -> Configuration Settings

The icon in the bottom left corner allows the user to select if current is to be defined as a percentage of the maximum current, or if an absolute current value in milliamps is to be entered.

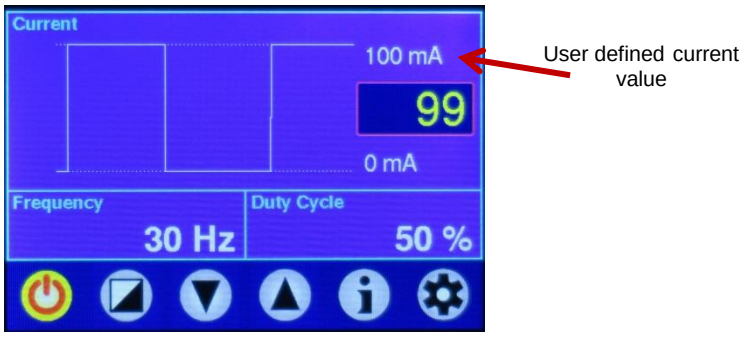



When the icon displays the percent sign  , any input via either the arrow keys or the keypad will be a percentage of the maximum current for the connected LED. The percentage value can only be changed in increments of 1, not fractions. The corresponding current value will be displayed in the upper left corner of the main screen.



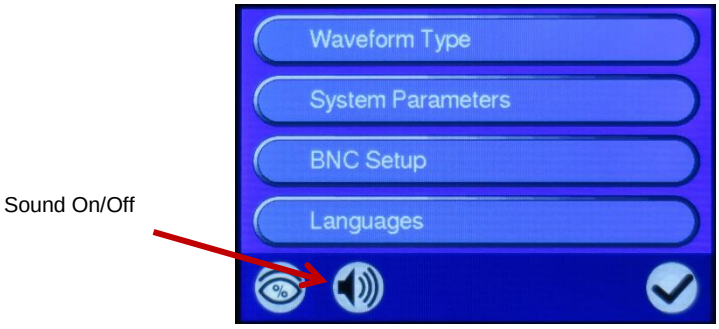
The default mode for the CURRENT INPUT icon is %. Most users will find the percentage values to be suitable for their needs. In special circumstances, added granularity in adjustment could be useful. This can be accomplished by selecting the absolute current value mode.

When the icon is toggled to displays "I", the user will be entering an absolute current value. The value entered may not exceed the maximum current allowed by the LSM.




## Sound On/Off

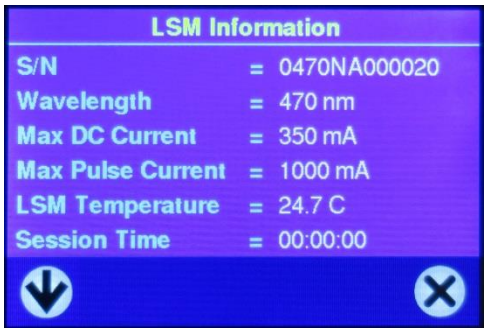
Settings -> Configuration Settings



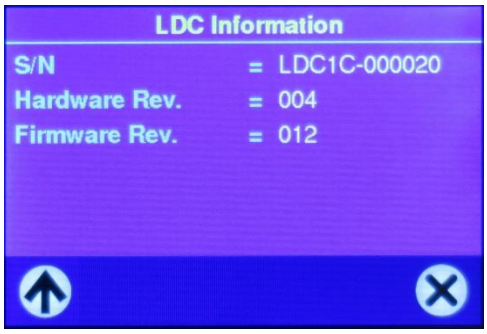

Audible feedback when entering values on the touchscreen may be turned OFF or ON using the icon.

# Information

Selecting  on the main SETTINGS screen displays LSM information which the LDC-1C reads from the LSM when initially connected.




Pressing  in the menu bar cycles the display to LDC-1C information.




Pressing  in the menu bar cycles back to the LSM information.

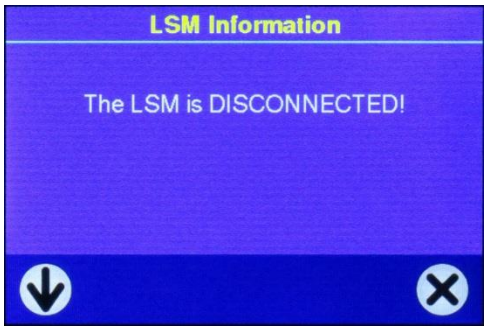
From either screen you may press  in the menu bar to exit.

# Chapter 4

# Troubleshooting and Maintenance

## Warning Messages

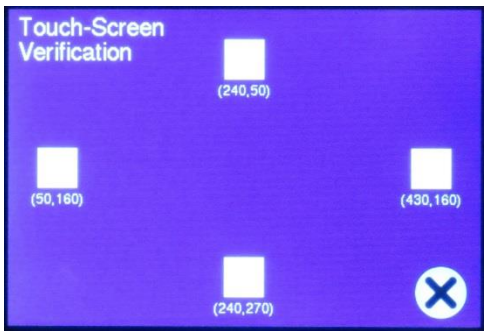
If the LSM is not connected to the LDC-1C at startup, or if it is disconnected while the LDC-1C is powered on, the following screen will be displayed.




The only screen option the user has at this point is to scroll to view the LDC-1C information. Once a LSM is connected, the data will be read from the unit and the LDC-1C will display the main screen. If you have hooked up the LSM to the LDC-1C and see the disconnected message, check the connectors to make sure they are fully engaged.

# Touch Screen Verification

If the user is touching the touchscreen while powering unit, the LDC-1C will display the Touch Screen Verification screen.




Although it is not necessary to do this after unit production, you can use either your finger or stylus and touch points on the screen. Corresponding x-y coordinates will be displayed. Press  to exit and move to the main screen.

# FAQs

**The display of my sine wave shows the pattern clipped at the bottom. Why?**

The LED current cycles on and off. When it turns off, the bottom of the sine wave becomes clipped.

**I set my current to a value, but a different number is displayed. Why?**

The value above the box is the set value. The value in the box is the measured value.

**My light source has a max pulse current of 1300mA, but I can only set it to 1000mA in external input mode. Why?**

When using an external signal source, the LDC-1C sets the maximum current to the maximum DC/continuous current. This prevents the light source from being over-driven, since the LDC-1C has no knowledge of the external waveform characteristics such as frequency and duty cycle.

**I have been using my LED light source for several hours, however in the information screen, it only reports several minutes of use. Why?**

The "Session Time" in the information screen reports the time of the most recent activation of the LED (equivalent to the time the ON/OFF icon on the main screen is highlighted.)

**My LED is not producing light. What happened?**

1. Make sure you have activated the LED using the ON/OFF icon on the LDC-1C's touchscreen.
2. If using an external source to configure the LSM, make sure you have activated the source prior to pressing the ON/OFF icon on the menu bar.

**How can I operate the controller remotely?**

Remote control is not a feature of the LDC-1C. The USB interface is only used for software updates.

# LED Replacement

All service, including LED replacements, must be performed by Ocean Optics, Inc.

To initiate service, navigate to: **https://oceanoptics.com/support/rma/** to obtain a RMA (Return Merchandise Authorization) number.

**It is very important that you obtain a RMA number.**

Please **DO NOT SHIP** merchandise to Ocean Optics, Inc. without prior authorization.

# Index