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Heliospectra LX60

User Manual





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1. About this Document

This document is the Heliospectra LX60 User Manual.

1.1. Purpose

This document provides a full user description of the LX60.

1.2. Scope

This document covers:

- Introduction to the Heliospectra LX60, see chapter 2 *Welcome to the LX60*
- Initial installation, see chapter 3 *Installation*
- Heliospectra System Assistant, see chapter 4 *Heliospectra System Assistant*
- Lamp configuration, see chapter 5 *Lamp Configuration*
- Maintenance and firmware upgrading, see chapter 6 *Maintenance*
- Technical specifications, see chapter 7 *Technical Specifications*
- Warranty information, see chapter 8 *Warranty Information*

The document is not intended to provide a complete description of all use scenarios possible with the LX60.

1.3. Intended Audience

This document is aimed towards those who wish to setup, configure and use the LX60 for daily operation.

1.3.1. Prerequisites

It is assumed the reader of this document is proficient with:

- Basic Microsoft Windows® operation and configuration
- Basic network configuration and troubleshooting

To configure the lamp the reader will need a modern and up to date Web Browser. The LX60 has been tested with Internet Explorer 10, Firefox 20.0.1 and Google Chrome 26.0.1410.64 m.



1.4. How to Read this Document

The typographic conventions used in this document are shown in *Table 1 Typographic Conventions*:

Table 1 Typographic Conventions

Format	Used For	Example
File Names	File names and paths	The schedule rows are exported to the file <code>schedule.txt</code> .
<i>Term</i>	Terms and concepts, references to sections, chapters and documents, general emphasis	The LX60 can execute and repeat up to 150 <i>light events</i> per day. For information about how to perform a firmware upgrade for a lamp, see section 6.2 <i>Firmware Upgrade</i> .
GUI Objects	Buttons, fields and other GUI objects	In the web UI, click the Operation tab.
<u>Hyperlinks</u>	Links to e-mail and web addresses	Download the latest firmware upgrade package from support section at www.heliospectra.com .
NOTE!	Notes containing important information	NOTE! If unsure of how to setup lamps in your network, contact your local network administrator.

1.5. Terminology

The terms and concepts used in this document are shown in *Table 2 Terms and Concepts*. New terms and concepts are always explained when introduced in the text. However, the reader may find it useful to be familiar with some central terms and concepts beforehand.

Table 2 Terms and Concepts

Term	Explanation
<i>Cluster</i>	A <i>cluster</i> is a group of lamps on the same network controlled by a <i>master</i> lamp.
<i>Light event</i>	A <i>light event</i> is a setting change of one or more of the light channels in the lamp.
<i>Master</i>	A <i>master</i> lamp controls one or several <i>slave</i> lamps in a <i>cluster</i> .
<i>Schedule</i>	A <i>schedule</i> is a sequence of <i>light events</i> repeated on a daily basis.
<i>Slave</i>	A <i>slave</i> is a lamp controlled by a <i>master</i> lamp.
<i>Web UI</i>	The <i>Web User Interface</i> is used for configuring and monitoring a lamp in a network.



2. Welcome to the LX60

The Heliospectra LX60 is a 600W, programmable LED light source for plant growth. It can also be used for research and teaching. The system is an excellent tool for use in greenhouses, including indoor and vertical farms but also walk-in chambers and growth cabinets.

The LX60 provides individual regulation of light intensity per wavelength allowing custom spectral distributions (from royal blue to far-red, max 450-735 nm). It comes complete with a built-in web user interface for easy web-based light configuration, scheduling and monitoring.



Figure 1 The Heliospectra LX60



3. Installation

This chapter covers initial installation of the LX60. The installation description covers the following areas:

- Unpacking, see section 3.1 *Unpacking the LX60*
- Overview of the LX60, see section 3.2 *LX60 Overview*
- Initial installation; see section 3.3 *Mounting the LX60*
- Network Setup, see section 3.5 *Network Setup*

3.1. Unpacking the LX60

The packing list is included in each shipment. It specifies the part numbers and descriptions of each part in your order. See *Table 3 Package List* for a listing of the contents of the LX60 package.

Table 3 Package List

Description	Amount
Heliospectra LX60 lamp unit	1
Hangers	2
Power cord	1
Ethernet cable	1
Quick start guide	1

Before continuing with installation:

1. Verify that all parts in each LX60 package have been received.
2. If any part is missing, contact your customer service representative.

NOTE! When unpacking the LX60 make sure to have a sturdy surface to work on. Damage to the unit can occur if dropped. Also note that if a custom order was placed the accessories in your package may be different than listed above.



3.2. LX60 Overview

Figure 2 and provide an overview of the LX60 lamp unit.



Figure 2 LX60 Main Connectors, air inlet / outlet, duct and indicator LED

Legend:

1. Mounting bracket
2. Ethernet port
3. Power socket
4. Air duct attachment
5. Heat sink and air inlet
6. Fans and air intake
7. Indicator LED



3.3. Mounting the LX60

For proper operation the LX60 must be mounted horizontally from a support structure. The support structure needs to be sturdy enough to support the weight of lamps and any additional equipment. It must also allow for air to flow freely into the unit (an additional fan duct is available upon request; contact your Heliospectra sales representative for more information).

Follow the instructions to mount the LX60:

1. Hangers to the mounting bracket ①; see Figure 2. The bracket has multiple hanging options including wire hangers, hooks and M6 bolts. When using M6 bolts verify that the bolt goes approximately 6 mm into the mounting holes and do not use excessive force when tightening the bolts.
2. Use chains or cables to suspend the lamp levelly from the support structure.
3. If other mounting hardware is used make sure that the bolts go all the way in the mounting holes (6 mm).
4. Verify that the unit is securely fastened.

NOTE! Verify that the air inlet ⑤ and outlet ⑥ are not covered and that air is allowed to flow freely around the unit. Otherwise, overheating may occur and cause the unit to dim to counteract heat buildup.

5. Connect the supplied Ethernet cable to the Ethernet port ②.
6. Connect the Ethernet cable to a free port in the switch (see Example Setup for more information).
7. To power up the lamp, connect the supplied power cord to the power socket ③, and then connect the cord to a grounded 120V/230V, 50/60Hz power outlet. The indicator LED ⑦ (see **Error! Reference source not found.**) will flash orange for approximately 15 seconds and then flash green. The lamp unit is now ready for use.

NOTE! If the indicator LED does not flash green after 60 seconds, verify that all cables are securely attached and that the unit and switch are powered on. Also verify that DHCP is enabled in your network. If the problem persists, power cycle the lamp by removing and reinserting the power cable.

8. Repeat steps 1–7 to mount additional lamp units.

NOTE! For proper performance of the LX60 the ambient air temperature shall be no higher than 40 °C (104 F).

The duct attachment allows for separating the cooling air from the plant growth environment. No more than two lamps may be connected in series. The cooling air to the first lamp shall have a temperature of no more than 21 °C (70 F).



3.4. Flow of cooling air

The LX60 has a built in fan to cool the lamp when needed. When connecting the LX60 to an air duct it is important to blow air in the same direction as the built in fan. Figure 3 shows that air is sucked in on the power connector side and pushed through the Indicator LED side.

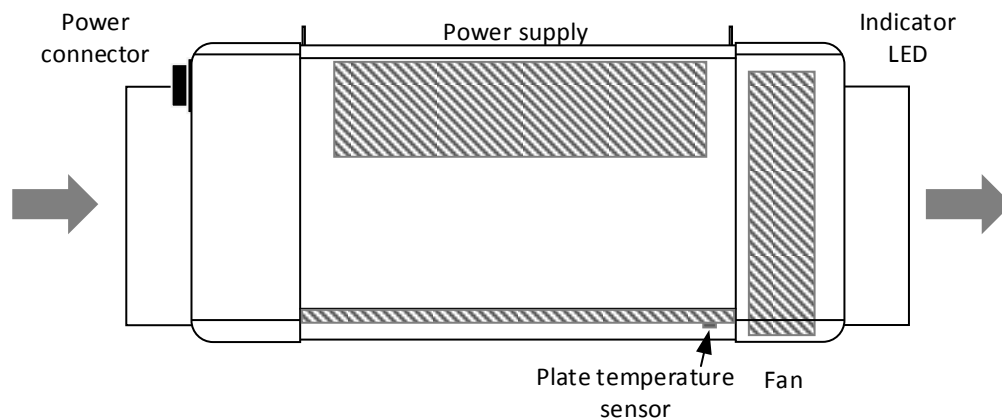


Figure 3 LX60 air flow

3.4.1. Over temperature protection

If the airflow through the lamp is restricted or the ambient temperature is too high the LX60 may not be able to cool itself sufficiently. If the internal temperature of the lamp becomes too high the light will dim and flicker and finally shut off to prevent damaging the lamp.

The protective mechanism is triggered at different stages depending on which components risk overheating. In general, an internal temperature above 70°C (160F) or an ambient air temperature above 50°C (120F) when running the LX60 at full power will trigger the protective mechanism.



3.5. Network Setup

By default, the LX60 lamp uses the Dynamic Host Configuration Protocol (DHCP) to automatically receive an IP address from a router in the network. This is a commonly available feature in computer networks. The IP address is used when configuring and monitoring the lamp, see chapter 5 *Lamp Configuration*. A lamp can also be configured to use a static IP, see section 4.3 *Static IP Configuration*.

If it is vital that each lamp always is assigned the same IP address, consider using DHCP and MAC address reservation (refer to your router documentation for more information how to setup static DHCP addresses).

If unsure whether your network supports DHCP or if to use static IP address configuration, contact your local network administrator.

3.5.1. Example Setup

When setting up several lamp units it is recommended to assign them to a dedicated network that is not shared with normal office equipment or similar. An example lamp network is shown in *Figure 4 Network Example Setup*:

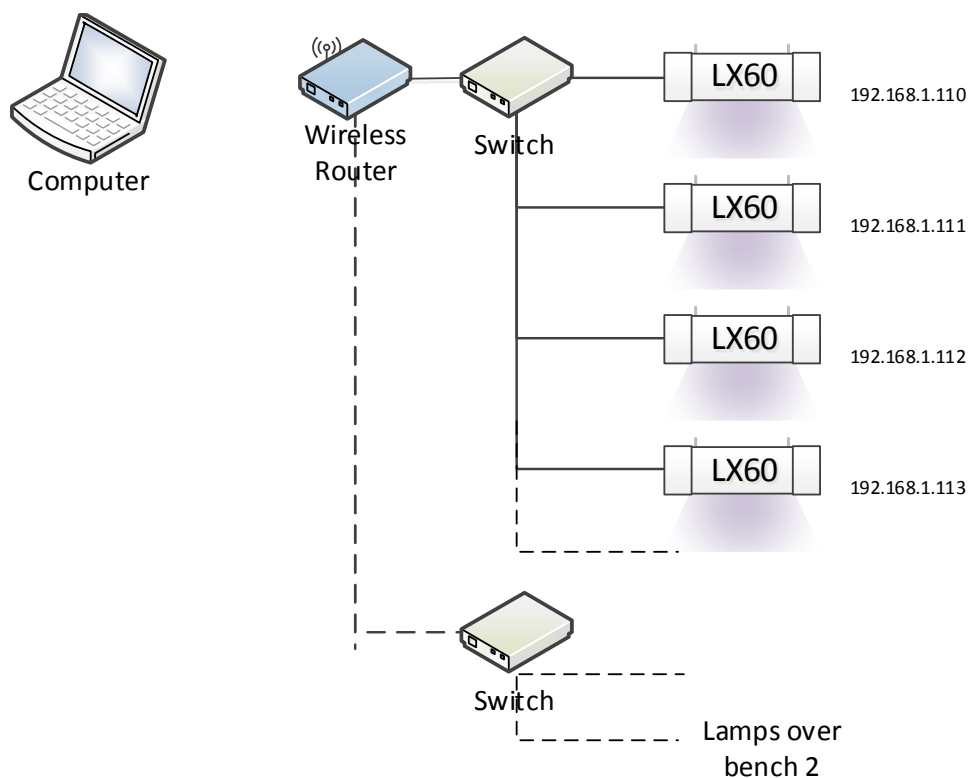


Figure 4 Network Example Setup

In the example setup each area or bench is placed some distance apart. Therefore, each set of lamps is connected to a different switch. Each lamp in the example has been assigned a unique IP address via DHCP in the private 192.168.1.X range. The switches are in turn connected to a wireless router. A control computer is used to connect to the wireless router to access lamps for configuration and monitoring purposes.



Several variants of this setup are possible, for example:

- The areas are placed close together, allowing fewer switches with more ports to be used to connect lamps to the router.
- A wired router is used with a stationary computer acting as control.

NOTE! If unsure of how to setup lamps in your network, contact your local network administrator.

3.5.2. Recommended Network Devices

The following devices have successfully been used for setting up a network of lamps, but any generic router and switch supporting DHCP and 100 Mbit/s works with the LX60:

- Switches from the *FS105/108/116* and *GS105/108/116* NETGEAR® series
- Wireless routers from the *WNR1000* NETGEAR® series



4. Heliospectra System Assistant

The Heliospectra System Assistant is an administrative standalone tool for the LX60, enabling easy identification of and access to configuration and monitoring functions of individual lamps in the network. The tool is also used for setting static IP to and upgrading lamp firmware.

4.1. Setup

First verify the following:

- Lamps are correctly installed and running on a dedicated network.
- The control computer is running *Microsoft Windows XP/Vista/Windows 7/Windows 8®* and is connected to the lamp network.

Steps to setup System Assistant

1. Retrieve System Assistant from the support section at www.heliospectra.com or request it from your Heliospectra representative. Save the file to your control computer. System Assistant is a self-contained executable file so nothing has to be installed.

NOTE! If the control computer does not have Internet access, download the executable file to another computer and transfer it to the control computer with an USB pen drive.

2. Double-click the Heliospectra System Assistant file and verify that the application starts. It is recommended to create a shortcut to the System Assistant file and place it on the desktop.

NOTE! The Heliospectra System Assistant needs access to the network. Verify that no firewall is blocking traffic to or from the tool.

4.2. Using Heliospectra System Assistant

Figure 5 Heliospectra System Assistant Main Window provides an overview of the main window of the Heliospectra System Assistant. The main window contains the following general functions and information:

- The **Action** menu contains the **Scan**, **Blink** and **Launch** actions. These actions are also accessible by clicking the **Scan**, **Blink** or **Launch** buttons.
- The **System** menu contains the following menu options:
 - The **Settings** option covers lamp blink and scan configuration.
 - The **Update system** option is used for updating the firmware in one or several lamps.
 - The **Change configuration** option allows for setting the network configuration of a lamp.
- The **About** menu contains version information of Heliospectra System Assistant and where to find more information.



- The **lamp list** field shows the lamp on the network with detailed information about each lamp (**Name, MAC and IP address, Assignment, Mode, Schedule, Firmware** version and **Status**).
- Select lamps by clicking on a row in the lamp list. To select multiple lamps hold the Ctrl key pressed while selecting.

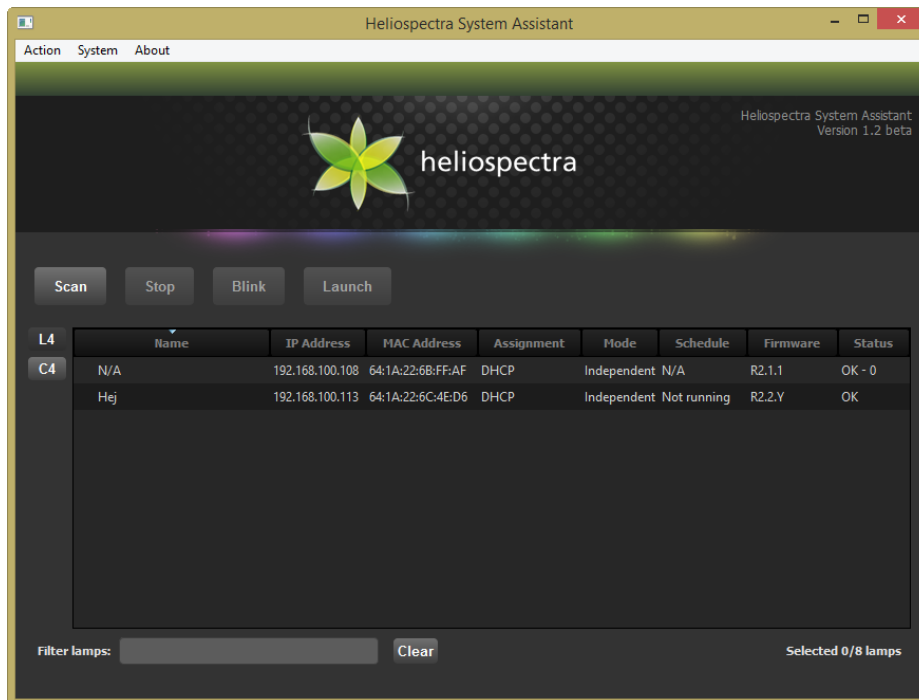


Figure 5 Heliospectra System Assistant Main Window

4.2.1. Lamp Identification

Follow the instructions to identify a lamp in the network:

1. Start the Heliospectra System Assistant from the control computer.
2. Click **Scan**; see *Figure 5 Heliospectra System Assistant Main Window*. A list of available lamps on the network is shown.
3. Select row of the lamp to identify.
4. Click **Blink**.
5. The LEDs of the selected lamp will blink, enabling identification.

NOTE! It is recommended to clearly label each lamp for future reference.



4.2.2. Accessing the Web User Interface

The LX60 lamp is configured and monitored through its *Web User Interface* (web UI). Follow the instructions to access the web UI for a lamp:

1. Start the Heliospectra System Assistant from the control computer.
2. Click **Scan**. A list of available lamps on the network is shown.
3. Select the row of a lamp to configure or monitor.
4. Click **Launch**.
5. A web browser window with the chosen lamp web UI will open. For more information about lamp configuration options, see chapter 5 *Lamp Configuration*.

4.3. Static IP Configuration

If DHCP is unavailable in the lamp network the Heliospectra System Assistant may be used to assign a lamp a static IP address. IP configuration may also be changed through the lamp web UI (if already assigned an IP address; see section 5.4.2 *Configuring Network Settings* for more information). Follow the instructions to assign a static IP to a lamp:

1. Start the **Heliospectra System Assistant** from the control computer.
2. Click **Scan**. A list of available lamps on the network is shown.
3. Select the row of a lamp to assign a static IP.
4. Select the **Change Configuration** option in the **System** menu.
5. Enter **IP address**.
6. Enter **Subnet**.
7. Enter default **Gateway**.
8. Enter primary DNS in the **DNS1** field.
9. Enter secondary DNS in the **DNS2** field.
10. Click **Update**.
11. Repeat steps 1–10 to assign static IPs to additional lamps.

NOTE! For a simple address scheme consider assigning ranges of chosen IP addresses to different cabinets, for example: 192.168.1.110, ...111, ...112 and ...113 to the lamps in the first cabinet, 192.168.1.120, ...121, ...122 and ...123 to the second cabinet and so on. It is recommended to clearly label each lamp for future reference.

4.3.1. Firmware Upgrade

For information about how to perform a firmware upgrade for a lamp, see section 6.2 *Firmware Upgrade*.



5. Lamp Configuration

LX60 lamp *Web User Interface* (web UI) is used to configure and monitor each lamp. The web UI is accessed through the Heliospectra System Assistant or directly from a web browser (if the lamp IP address is known; see section 4.2.2 *Accessing the Web User Interface*).

Configuration of the LX60 lamp covers the following steps:

- Lamp discovery with the Heliospectra System Assistant, see section 4.2.1 *Lamp Identification*
- *(Optional)* Lamp static IP address configuration, see section 4.3 *Static IP Configuration*
- Lamp system time, tags and name configuration, see section 5.3.1 *Configuring Lamp Name and Tags*
- *(Optional)* Lamp schedule configuration, see section 5.3.3 *Configuring a Schedule*
- Lamp Operation Mode Configuration, see section 5.4.3 *Configuring Lamp Operation Mode*

5.1. Using the Web User Interface

The Web UI of the LX60 is made up tabs providing *information*, *operation* and *configuration* options, each described in the following sections. All pages in the web UI also contain the following general information:

- The current **Status** of the lamp is shown on the top left-hand corner of the page.
- The current **System Time** and **Name** of the lamp (if configured) is shown on the top right-hand corner of the page.
- **General information** for the lamp, such as **model**, **CPU firmware version**, **driver firmware version**, **MAC** and **IP** address is shown on the bottom of the page.

Click the **Show Description** link next to a web UI element to find out more information about its use.



5.2. Information Tab

The **Information** tab shows current information about the selected lamp, see *Figure 6 Information Tab*.

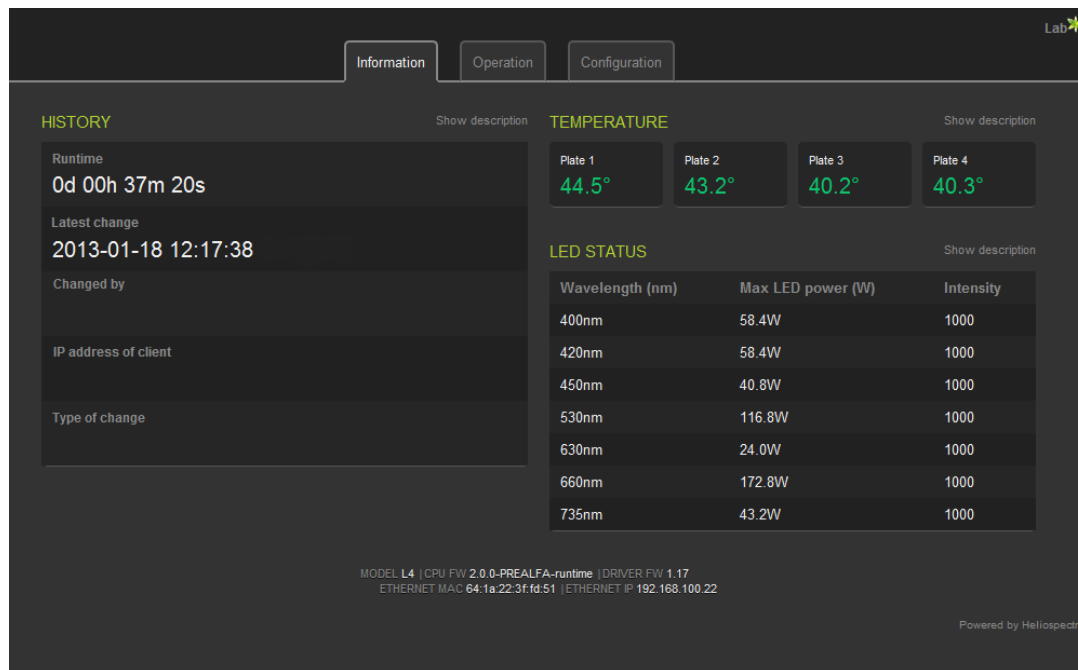


Figure 6 Information Tab

5.2.1. History

The **History** field shows information about the lamp such as:

- **Runtime:** The time that has elapsed since system start
- **Latest change:** When the latest change to the lamp was made
- **Changed by:** How the latest change was applied (through TCP or web client)
- **IP address of client:** Address of the device that made the change
- **Type of change:** What was changed?
- **Show changes:** A text with the latest changes is received

5.2.2. Temperature

The **Temperature** field shows the current temperature of the LED plate in the lamp.

5.2.3. LED Status

The **LED Status** field shows the current intensity setting of each LED wavelength in 0-1000 units (0-100 % of max LED output).



5.3. Operation Tab

The **Operation** tab is the main tab used for daily work with the LX60, see *Figure 7 Operation Tab*. The tab provides functions to:

- Configure the *lamp name* and user-defined *tags* describing the lamp, see section 5.3.1 *Configuring Lamp Name and Tags*
- Configure *wavelength intensities* for the lamp, see section 5.3.2 *Setting Wavelength Intensities*
- Configure a *schedule* for the lamp, see section 5.3.3 *Configuring a Schedule*

Information Operation Configuration

Lab*

TAGS Show description

Key	Value
+ [input field]	[input field]
Edit Name	Lab

INTENSITIES (0 - 1000) Show description

WAVELENGTH	400nm	420nm	450nm	530nm	630nm	660nm	735nm
+100	▲	▲	▲	▲	▲	▲	▲
+10	▲	▲	▲	▲	▲	▲	▲
+1	▲	▲	▲	▲	▲	▲	▲
INTENSITY	1000	1000	1000	1000	1000	1000	1000
-1	▼	▼	▼	▼	▼	▼	▼
-10	▼	▼	▼	▼	▼	▼	▼
-100	▼	▼	▼	▼	▼	▼	▼

All min All max Add to schedule Lock ratio

SCHEDULE Show description

Stop schedule [input field] Choose... Import Export Reset schedule

	HH:MM:SS	400nm	420nm	450nm	530nm	630nm	660nm	735nm
+ [input field]	08:00:00	1000	1000	1000	1000	1000	1000	1000
Edit -	00:00:00	0	0	0	0	0	0	2
Edit -	02:23:23	200	0	200	500	400	400	300
Edit -	07:00:00	200	0	200	500	400	400	300

MODEL L4 | CPU FW 2.0.0-PREALFA-runtime | DRIVER FW 1.17
ETHERNET MAC 64:1a:22:3f:fd:51 | ETHERNET IP 192.168.100.22

Powered by Heliospectra

Figure 7 Operation Tab



5.3.1. Configuring Lamp Name and Tags

Each lamp can be *named* and marked with *tags* for easy identification. Tags are user-defined keys with values that describe lamp specific features (for example, what crop that grows under the lamp, what experiment it is used for, and who is responsible for the lamp).

Follow the instructions to add a name and custom tags for the lamp:

1. In the web UI, click the **Operation** tab.
2. In the **Tags** field, edit the lamp **Name** by clicking **Edit** next to the **Name** field.
3. **Add** a tag **Key** and **Value** in the respective fields.
4. Repeat step 3 to add additional tags for the lamp.

NOTE! The Name tag is a protected key / value pair. Unlike other tags the Name cannot be removed. The value is used as the web UI title and as an identifier when setting up clusters of lamps (see section 5.4.3.2 *Master/Slave Configuration*).

5.3.2. Setting Wavelength Intensities

Individual wavelength intensities of the LX60 can be independently set. Typically, this is used as part of a schedule.

Follow the instructions to set wavelength intensities for the lamp:

1. In the web UI, click the **Operation** tab.
2. In the **Intensities (0-1000)** field, set the intensities for the individual wavelengths of the lamp:
 - Use the differently shaded green up and down arrows to increase or decrease wavelength intensities in increments of 1, 10 or 100 units or enter a value directly in the **INTENSITY** text field for each wavelength.
 - Click **All 0** or **All 1000** to set all wavelength intensities to 0 or 1000, respectively.
 - Click **Add to schedule** to add the current wavelength intensities as a light event to a schedule (see section 5.3.3.1 *Adding Light Events to a Schedule*).
 - Select the **Lock ratio** check box to lock the ratio between the wavelength intensities. Use this option when the desired wavelength spectrum is already configured and only overall intensity level need to be changed.
3. The lamp is not set to use the current wavelength intensities. The values will hold until they are changed or a schedule event occurs (see section 5.3.3 *Configuring a Schedule*). If power to the lamp is cycled the values settings will be lost.

NOTE! The LX60 uses PWM dimming when channels are dimmed below 200 units. Above 200 units constant current dimming is used. This may need to be taken into account when doing research at low light levels with single lamps.




5.3.3. Configuring a Schedule

The LX60 can execute and repeat up to 150 *light events* per day. A light event is a setting change of one or more of the light channels in the lamp. For example, a schedule could comprise the following light events:


- At 07.00, set 400 and 420 nm LEDs to full power (1000 units). Set the 660 nm LED to 500 units.
- At 11.00, add set the 530 nm LED to 600 units output.
- At 23.00, turn off all light channels (0 units).

5.3.3.1. Adding Light Events to a Schedule

Follow the instructions to add light events to a schedule:

1. In the web UI, click the **Operation** tab.
2. In the **Intensities (1-1000)** field, set the desired intensity levels for each wavelength (see section 5.3.2 *Setting Wavelength Intensities*).
3. Click **Add to schedule**. The intensity values are copied to the first schedule row.
4. In the **Schedule** field, enter a start time for the light event in the **HH:MM:SS** field.
5. Click the  button to add the light event to the schedule. A new light event row is added to the schedule.
6. Repeat steps 2–5 to add additional light events to the schedule.

Light events can also be edited and removed once added to the schedule:

- Click the  button next to a schedule event row, then confirm by clicking **OK** in the popup to remove the row.
- Click **Edit** next to an event row to update start time and intensities for an individual light event. Click **Save** to update the settings.
- Click **Delete schedule**, then confirm by clicking **OK** in the popup to remove all light events from the schedule.
- Click **Start schedule** to start the current schedule. Click **Stop schedule** to stop the current schedule.

NOTE!

- The schedule relies on the lamp system time. Verify that the lamp system time is set correctly.
- The clock in the LX60 will keep its time up to 48 hours without external power. After 48 hours the clock will be reset. Verify that the clock is set correctly if the lamp has been without power for any significant amount of time.
- Schedule events override manual events.

Example:



In a lamp light events are scheduled for 1300 and 1400. The schedule is running. At 1315 a manual change to the setting is made. The new setting will hold until 1400 at which time the next schedule event will be set.

5.3.3.2. Exporting and Importing a Schedule

Once a schedule is configured, it can be exported and imported to other lamps. This simplifies setting up several lamps quickly.

Follow the instructions to export a schedule:

1. In the web UI, click the **Operation** tab.
2. In the **Schedule** field, click **Export**.
3. Click **Export**. The schedule rows are exported to the file `schedule.txt` for later use in other lamps. The default download directory for your browser is used as destination path for the schedule file.
4. Click **Export to CSV** to export a schedule to the file `schedule.csv` for later use in any software supporting Comma Separated files (for example any spreadsheet application).

NOTE! It is recommended to rename the exported schedule to a descriptive name, for example: `<DATE>-<EXPERIMENT_NAME>-schedule.txt`.

Follow the instructions to import a schedule:

1. In the web UI, click the **Operation** tab.
2. In the **Schedule** field, click **Choose file**.
3. Select a schedule file to import.
4. Click **Open**. The schedule rows are updated.

NOTE! Only the `schedule.txt` file from one lamp can be imported into another lamp. The `schedule.csv` file is formatted for ease of reading but is not compatible for lamp import.



5.4. Configuration Tab

The **Configuration** tab is used for configuring *lamp system time, IP address settings, and operation mode for the lamp*, see *Figure 8 Configuration Tab*.

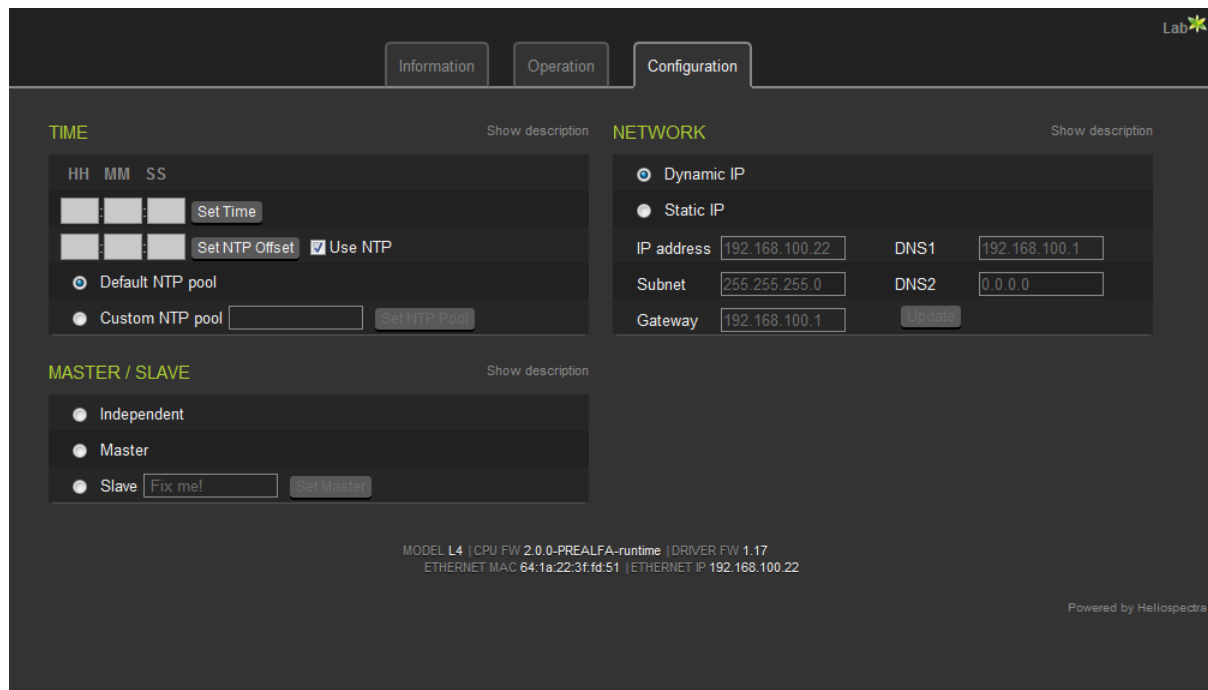


Figure 8 Configuration Tab

5.4.1. Setting System Time

By default, the LX60 uses a Network Time Protocol server for setting the lamp system time. The system time can also be configured manually if no NTP server is available. If unsure, it is recommended to use the default settings.

5.4.1.1. Setting Additional NTP Settings

Follow the instructions to set additional NTP settings for the lamp:

1. In the web UI, click the **Configuration** tab.
2. In the **Time** field, verify that the **Use NTP** check box is selected.
3. If necessary, configure NTP Offset in the adjacent **HH:MM:SS** text field. Then click **Set NTP Offset**.
4. To set a custom NTP server, select the **Custom NTP** pool radio button, then enter the address to the NTP server in the adjacent text field, for example “se.pool.ntp.org” (refer to www.pool.ntp.org for an updated list of public NTP servers).
5. Click **Set NTP Pool** to update the settings.



NOTE! Without an offset NTP operates on UTC. Under normal conditions setting the hour of the NTP offset suffices to work in local time. The LX60 clock does not automatically adjust for daylight savings time.

5.4.1.2. Setting System Time Manually

Follow the instructions to set the system time manually:

1. In the web UI, click the **Configuration** tab.
2. In the **Time** field, verify that the **Use NTP** check box is cleared.
3. Enter the current time in the format HH:MM:SS in the field next to the **Set Time** button.
4. Click **Set Time** to update the system time.

5.4.2. Configuring Network Settings

The network field is used to configure the lamp to use either static or dynamic IP addresses. By default, the lamp is configured to use a dynamic IP address. If unsure, it is recommended to use the default settings.

Follow the instructions to setup a static IP address for the lamp:

1. In the web UI, click the **Configuration** tab.
2. In the **Network** field, select the **Static IP** radio button.
3. Enter **IP address**.
4. Enter **Subnet**.
5. Enter default **Gateway**.
6. Enter primary DNS in the **DNS1** field.
7. Enter secondary DNS in the **DNS2** field.
8. Click **Update**.

5.4.3. Configuring Lamp Operation Mode

The LX60 lamp can operate in any of the roles and modes described in *Table 4 Lamp Roles and Operation Modes*:

Table 4 Lamp Roles and Operation Modes

Role/Mode	Schedule driven	Manual control	Master driven
Independent	Yes	Yes	No
Master	Yes	Yes	No
Slave	No	No	Yes



- **Independent:** An independent lamp is controlled through its web UI. Its light intensity settings can either be configured manually or automatically through a schedule. An independent lamp cannot be controlled by another lamp.
- **Master:** A master lamp controls a cluster of one or several slave lamps either by the use of a schedule or by setting light intensity levels manually in the master lamp web UI. This feature reduces the number of lamps that need to be configured in a fixed lamp installation.
- **Slave:** A slave lamp mirrors the change in light output of a master lamp (regardless of whether the master lamp changes are due to schedule events or manual changes). A slave can only be controlled via the master lamp.

5.4.3.1. Independent Configuration

By default, the LX60 Lamp is configured to run in independent mode. If changed, follow the instructions to reset the lamp to independent mode:

1. Start the Heliospectra System Assistant to access the web UI for the lamp to be configured in independent mode (see section 4.2.2 *Accessing the Web User Interface*).
2. Click the **Configuration** tab.
3. In the **Master/Slave** field, select the **Independent** radio button. The lamp now runs in independent mode.

5.4.3.2. Master/Slave Configuration

Configuring a cluster of master and slave lamps involves the following steps:

- Name and assign a master for the cluster
- *(Optional)* Configure a schedule for the master
- Name and assign slaves to the cluster master

Master Configuration

Follow the instructions to configure a master lamp:

1. Start the Heliospectra System Assistant to access the web UI for the lamp that should be configured as a master (see section 4.2.2 *Accessing the Web User Interface*).
2. Click the **Operation** tab.
3. In the **Tags** field, enter lamp name and custom tags for the master (see section 5.3.1 *Configuring Lamp Name and Tags*).
4. *(Optional)* Configure or import a schedule of light events for the master, see section 5.3.3 *Configuring a Schedule*.
5. Click the **Configuration** tab.
6. In the **Master/Slave field**, select the **Master** radio button. The master lamp will now inform other lamps on the network that it is a master. All light intensity changes in the master are broadcasted to the network. Other lamps may now tune in and follow the master.

NOTE! Several master lamps can be configured in the same network, see section *Multiple Master/Slave Cluster Configuration*. The master lamp will override any schedule or manual setting of its assigned slave lamps.



Slave Configuration

Once a master lamp has been configured, configure and add one or several slave lamps to the cluster. Follow the instructions to add a slave to a cluster with a preconfigured master:

1. Start the Heliospectra System Assistant to access the web UI for the lamp that should be configured as a slave (see Lamp Configuration and Monitoring).
2. Click the **Operation** tab.
3. In the **Tags** field, enter a descriptive lamp name for the slave and custom tags (see Configuring Lamp Name and Custom Tags).
4. In the **Master/Slave** field select the **Slave** radio button.
5. Choose which master to use from the drop-down list. If several masters are present in the network choose the applicable master, see section *Multiple Master/Slave Cluster Configuration*.
6. Click **Set Master**. The **Slave** is now configured.
7. Repeat steps 1–6 to configure additional slaves in the cluster. A maximum of eight slave lamps may be controlled by a single master.

Multiple Master/Slave Cluster Configuration

The master/slave mechanism of the LX60 allow for dynamic cluster allocation with several master lamps and assigned slaves in the same network. In the example shown in *Figure 9 Multiple Master/Slave Configuration Example* slave lamps in Cluster 1 and 2 are controlled by Master 1 and Master 2.

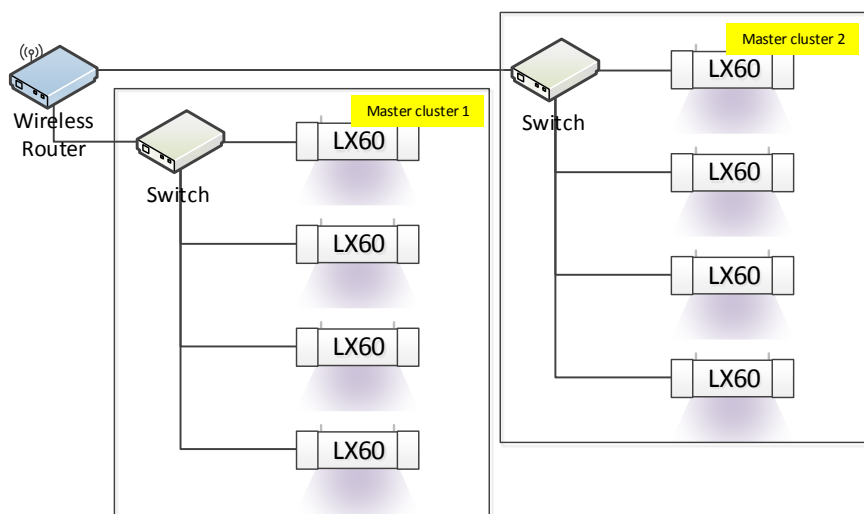


Figure 9 Multiple Master/Slave Configuration Example

6. Maintenance

The following chapter covers maintenance schedules and practices for the LX60. It also covers firmware upgrade of the lamp unit.



6.1. Cleaning

Clean the LX60 regularly to ensure proper operation:

- If the clear plastic plate covering the LEDs becomes dirty it should be wiped off with a soft damp cloth. A mild detergent can be used if the plate has finger prints or similar smudges. Check monthly.
- If the air inlet or outlets become clogged with dust or large particles they can be carefully vacuumed. Check monthly.

NOTE! Do not use any strong detergents on the plastic housing or LED plates. They can be damaged by certain household cleaners or solvents such as kerosene.

6.2. Firmware Upgrade

The firmware of the LX60 is upgraded with the Heliospectra System Assistant. Follow the instructions to perform a firmware upgrade:

1. Download the latest firmware upgrade package from support section at www.heliospectra.com or contact your Heliospectra representative.
2. Start the **Heliospectra System Assistant** from the control computer on the lamp network.
3. Click **Scan** to update the lamp list.
4. Select one or several lamps to upgrade from the list.
5. Select **System > Update system** from the menu.
6. Select the firmware package downloaded in step 1, then click **Open**.
7. Click **Upgrade**. A progress bar will show the progress of the firmware upgrade process.
8. Wait until the upgrade process completes.

NOTE! Do not turn off the lamp or close the Heliospectra System Assistant during the upgrade process.

9. Click **Scan** to refresh the lamp list.
10. Verify that the **Firmware** column shows the new firmware version number for the updated lamps.



7. Technical Specifications

7.1. Electrical

- Max power consumption 600W
- Operating voltage 120V/230V, 50/60Hz

7.2. Control

- RJ 45, 10/100Mbit IPv4 Ethernet
- HTTP web interface for simple management
- DHCP for IP address management
- TCP and UDP for external control and monitoring
- 32-bit microprocessor (80MHz)
- Status LED for power/system status indication

7.3. Physical

- Weight: 8 kg (17.6 lbs)
- Size: 199 x 219 x 425/494* mm (78.3 x 86.2 x 167.3/194.5* in) (height x width x depth)
- Temperature: Operating -10–40 °C (14-104 F), Storage -20–70°C (-4 – 158 F)
- Operation humidity 90 % (max) relative humidity, non-condensing
- Storage humidity 95 % (max) relative humidity, non-condensing
- Durable plastic and metal housing
- Highly light transmissive polycarbonate optics
- Ingress protection: IP 54, for indoor use only, according to IEC 60529
 - The fixture provides protection against contact with live or moving parts.
 - Dust cannot enter in an amount sufficient to interfere with satisfactory operation.
 - Water splashed against the machine from any direction shall have no harmful effect.

**wo/w duct attachment*

7.4. Certification and Safety

- CE, UL (pending)
- Risk group 2 certified in accordance with SS-EN 62471

7.5. Package Contents

- Heliospectra LX60 lamp unit
- Hangers
- 2m power cord with connector
- 2m Ethernet cable
- Quick installation guide



8. Warranty Information

The following chapter covers warranty information for:

- Equipment
- Software
- Disclaimers

8.1. Equipment Warranty

Heliospectra warrants that for a period of 1 year from the shipment date, the Equipment will be free from defects in material and workmanship under normal use. This limited warranty extends only to the original user of the Product.

Equipment support is defined as “Return to Factory” which means the customer is responsible for obtaining an RMA number and shipping the unit to Heliospectra’s principal place for logistics. Heliospectra will either repair and return the original unit or provide a reconditioned unit within 30 days of receipt of the defective unit. The customer is responsible for shipping costs associated with shipping the unit to Heliospectra. Heliospectra will provide for return shipment free of charge (excluding Tax & Duty). The warranty period for the Equipment starts the day it is shipped from Heliospectra.

8.2. Software Warranty

Heliospectra warrants that for a period of ninety (90) days from the shipment date, the media on which the software embedded in the Equipment (“Software”) is recorded shall be free from defects in material and workmanship under normal authorized use consistent with the product instructions. This limited warranty extends only to the customer who is the original licensee. In no event does Heliospectra warrant that the Software is error free or that the customer will be able to operate the Software without problems or interruptions. This warranty does not apply if the Software, Product, or any other equipment upon which the Software is authorized to be used (a) has been altered, except by Heliospectra or its authorized representative, (b) has not been installed, operated, repaired, or maintained in accordance with instructions supplied by Heliospectra, (c) has been subjected to abnormal physical or electrical stress, abnormal environmental conditions, misuse, negligence, or accident; or (d) is licensed for beta, evaluation, testing or demonstration purposes.

8.3. Disclaimers

To the full extent permitted by law, Heliospectra will not be liable to the customer for any loss or damage arising from the use of the Equipment, or any defect, in the Equipment, however it may arise.

Apart from the above Equipment and Software warranties, Heliospectra has no obligation to provide support, maintenance, upgrades, modifications or new releases. Heliospectra disclaims all liability



and responsibilities pertaining to and arising under this Agreement as a result of Customer integrating, connecting or networking the Equipment in any manner whatsoever. If technical advice or support is given or offered in connection with the use or implementation of the Equipment, it will be solely as an accommodation to the Customer and without charge unless otherwise agreed upon. Heliospectra shall have no responsibilities or liabilities whatsoever for the content or use of such advice.

In no event will Heliospectra be liable to Customer or any other person for special, consequential, indirect or incidental loss or damage of any kind or any direct loss or damage of any kind suffered or incurred by the Customer or any other person in connection with the Equipment provided hereunder.

THE ABOVE STATE HELIOSPECTRA'S ENTIRE RESPONSIBILITY AND CUSTOMER'S SOLE AND EXCLUSIVE REMEDY WITH RESPECT TO ANY BREACH OF ANY WARRANTY REGARDING THE HARDWARE AND SOFTWARE. HELIOSPECTRA, ON BEHALF OF ITSELF AND ITS AFFILIATES AND SUPPLIERS HEREBY EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES, WHETHER EXPRESS, IMPLIED, OR STATUTORY REGARDING OR RELATING TO THE HARDWARE, DOCUMENTATION, SOFTWARE, MEDIA, OR THE SERVICES FURNISHED OR PROVIDED TO CUSTOMER. HELIOSPECTRA SPECIFICALLY DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.



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