

# X-Cite® 110LED User Guide

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## **X-Cite® 110LED User Guide**

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Made in Canada

Excelitas Canada Inc. 2015

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# 1 Introduction

Meet X-Cite 110LED - a compact white light LED source for routine fluorescence applications. Using X-Cite's traditional liquid light guides, X-Cite 110LED delivers superior optical power and exceptional field uniformity at the specimen level with the broadest spectrum of fluorescence excitation through manual, PC and TTL control. With LEDs rated to 25,000 hours and no lamps or modules to replace, X-Cite 110LED offers simplicity and convenience to researchers allowing them to focus on their experiments instead of equipment maintenance.

This product is intended for use in fluorescence microscopy illumination. It allows researchers the ability to excite fluorescence in samples being studied and characterize their location or behaviour.

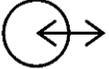
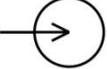
Excelitas Technologies Corp. is a global technology leader focused on delivering innovative, customized solutions to meet the lighting, detection and other high-performance technology needs of customers. X-Cite, formerly of Lumen Dynamics (which was acquired by Excelitas Technologies Corp. in November 2013) offers the Life Science and Analytical Instrumentation market a broad range of innovative lamp and LED fluorescence illumination and measurement solutions. Recognized as the industry standard in research microscopy, X-Cite also provides solid state LED technologies to instrument manufacturers, and combines maximum optical performance with flexible design, as well as best-in-class manufacturing quality and lead time.

Excelitas recommends reading this manual to discover all the features available in X-Cite 110LED.

Thank you for choosing X-Cite!

## 2 Safety

### 2.1 Glossary of Symbols

| Symbol   | Meaning   |
|--|---|
|   | CAUTION - Risk of danger: consult accompanying documents  |
|   | WARNING – Eye damage may result from directly viewing ultraviolet light. Protective eye shielding and clothing must be used at all times. |
|   | WARNING – UV light hazard.  |
|   | Input/Output Signals  |
|   | Input Signal  |
|  | CAUTION – Hot surface   |

### 2.2 Safety Precautions

Please observe the following safety precautions at all times during operation and maintenance of this product. Failure to do so may result in personal injury or property damage.

1. UV emitted from this product. Avoid eye and skin exposure to unshielded product. Do not look at operating lamp/LED. Eye injury may result.
2. Never look into the light emitting end of the light guide. The light could severely damage the cornea and retina of the eye if the light is observed directly. Eye shielding must be used at all times as well as clothing to protect exposed skin.
3. Always make sure the light guide and microscope adapter (if applicable) are securely attached to the microscope prior to turning on power to the unit. This will minimize the risk of exposure to the UV light.
4. Always use this product with the external power supply and power cord set provided. Ensure the external power supply cord is connected to a grounded 3-pin outlet only. Any substitution of these components will invalidate regulatory certification of this product and may impair operating safety.

5. Disconnecting of main supply source is done by putting the on/off button in the off position and unplugging the power cord.
6. It is recommended that ONLY QUALIFIED TECHNICAL PERSONNEL perform any testing or repairs of this unit. If servicing the unit, disconnect the external power supply before opening the cover of this unit. All cover screws must be replaced prior to applying power to the unit, or safety of the unit will be impaired. Note that opening the cover and/or altering the unit in any way may void the warranty (see section 10 for more details).
7. Monitoring the unit during manual operation  
The level of UV and visible energy supplied by this product is sufficient to ignite flammable substances. During manual operation, the unit must be attended at all times by a qualified operator. The unit must not be left unattended while turned on. If an operator leaves the work area of the unit, the power switch must be turned off.
8. Monitoring the unit during automated operation  
The level of UV and visible energy supplied by this product is sufficient to ignite flammable substances. Therefore, when the unit is operated unattended in an automated environment, an alarm function must be provided by the user to indicate a malfunction in the associated equipment used.
9. Should this X-Cite unit be used in a manner not specified by Excelitas, the protection provided by the equipment may be impaired.
10. This unit is designed for bench top use only! Always ensure that the unit is placed on a hard, stable surface, ensuring that ventilation openings are not obstructed. Any obstruction of these openings could result in a possible over-heating condition.
11. Any electronic equipment connected to this product must comply with the requirements of EN/IEC 60950.
12. To clean the exterior of the unit, use a slightly dampened cloth and a simple water/ detergent solution only. Avoid the optical surfaces and lenses. Cleaning of optics should only be attempted by qualified personnel using appropriate fluids and lens paper.

## 3 Getting Started

### 3.1 System Components

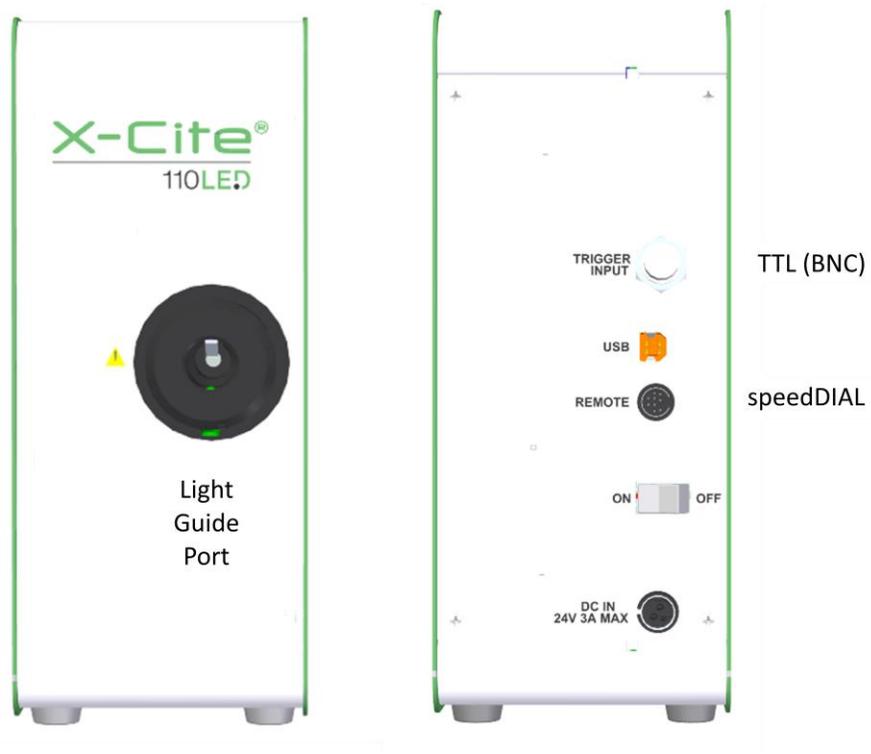
This X-Cite system contains the following components:

1. X-Cite 110LED unit
2. SpeedDIAL Manual Controller
3. Power Supply and Power Cord
4. Microscope Adaptor (if ordered)
5. Accessories Box, containing:
  - a. Quick Start Instruction Sheet  
(user guide, software and driver downloads:  
<http://www.excelitas.com/Pages/Product/X-Cite-110LED.aspx>)
  - b. Liquid Light Guide
  - c. USB Cable
  - d. Hex tool, 3mm

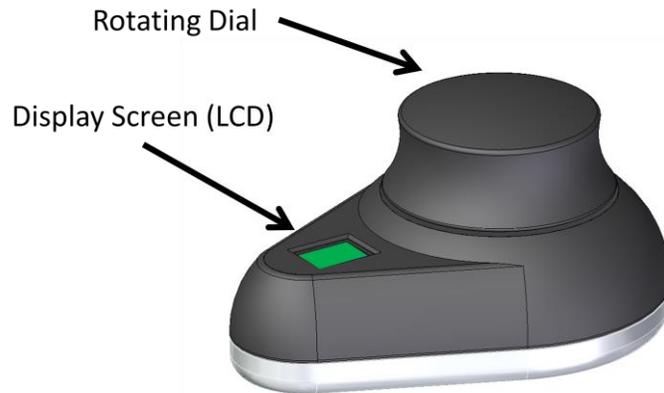
If any components are missing or appear damaged, please contact Excelitas immediately.



**Figure 1 System Components**



**Figure 2 Front and Rear Panel Connections**



**Figure 3 SpeedDIAL**

### 3.2 Installation/Set-up

1. Unpack
  - a. Carefully unpack the unit and accessories from the shipping carton.

- b. When unpacking the light guide (liquid or quartz fibre), take care not to bend sharply or kink.
  2. Install the Microscope Adaptor (if applicable)
    - a. Remove the protective wrap from the Microscope Adaptor, being careful not to touch the lens surface.
    - b. Insert the flange portion of the Microscope Adaptor into the light port on the microscope, and secure it using the hardware provided on the microscope. (Refer to relevant microscope user manual for complete instructions on mounting a standard epi-fluorescence lamphouse.) General guidelines:
      - i. Carl Zeiss – Tighten the hex fastener on the side of the light port with the 3mm Hex Tool .
      - ii. Leica - Tighten the hex fastener on the side of the light port with the 3mm Hex Tool .
      - iii. Nikon – Line up the “notch” with the pin on the microscope fitting, hold the adaptor firmly against the light port, and twist the collar to lock the components together.
      - iv. Olympus - Tighten the hex fastener(s) with the 3mm Hex Tool. Depending on the model, there may be one (1) fastener on the side, or two (2) fasteners located at the 10:00 and 2:00 positions.
3. Install the Light Guide
  - a. Remove the red plug from the light guide port located on the front panel.
  - b. Remove the red caps from the ends of the light guide.
  - c. Insert the larger end of the light guide into the light guide port. For X-Cite 110LED, the light guide must be inserted up to the “B” line printed on the grey ferrule, see Figure 4. [Note: If using an X-Cite 3mm or 5mm light guide with only one “insertion line” on the grey ferrule, this line will be 20mm away from the light guide port.]
  - d. Insert the smaller end of the light guide into the Microscope Adaptor (or light guide port on the microscope/imaging instrument). Ensure that the light guide is fully inserted and lock it in place with the thumbscrew (or appropriate fastener).



**Figure 4 Correct position for fully inserted X-Cite LLG and LLG with A and B insertion lines**

4. Check Position of the Equipment
  - a. The X-Cite unit should be positioned to avoid sharp bends and strain on the light guide. Ideally, the unit should be positioned so that:
    - i. The light guide has as few bends as possible.
    - ii. Bends have the largest bend radius possible.
    - iii. There is some slack in the light guide.
  - b. All air vents on the side panel of the unit should be clear of obstruction. Recommended clearance is 20cm (8 inches).
  - c. Note that the main power switch is located on the rear panel of the unit. The unit should be placed so that the switch is convenient for the operator to access.
  
5. Connect speedDIAL to main unit
  - a. Important: Ensure that main unit is powered OFF before attempting to connect speedDIAL, or damage to the device may result.
  - b. Insert the mini DIN plug into the “Remote” port on the rear of the unit. Ensure the arrow mark on the connector is on the right (i.e. at the 3:00 position). Note: Never force the connector – this can damage the pins. If connector does not insert smoothly, stop and check for bent pins.
  - c. Place speedDIAL next to the microscope, or another easily accessible location.
  
6. Connect USB (if using)
  - a. Insert “B” (square) end into the “USB” port on rear of the main unit.
  - b. Insert “A” (flat) end into an available port on the computer.
  - c. Note: For best performance, use the supplied USB cable or one of equivalent quality and length. Using a longer USB cable than the one supplied may result in intermittent communication errors.

7. Connect AC Power
  - a. Connect Power Supply: Insert the power supply's 4-pin connector into the "Power" port on rear of the main unit. Ensure that the orientation is correct, or else damage to the pins may result. The arrows on the plug should be on the right (i.e. at the 3:00 position).
  - b. Connect Power Cord: Connect female end of the power cord to AC port on the power supply. Connect male end to a properly grounded electrical outlet.
  - c. For safe operation, use only the power cord supplied or one with an equivalent rating.

## 4 Operation – Manual Control

### 4.1 The Basics

1. Start the unit
  - a. Flip the rocker switch on rear of the main unit to turn X-Cite system on.
  - b. The system will have a brief initialization period (approximately 5 seconds). The speedDIAL display will show "X-Cite" during this time.
  - c. When the display shows "x%", it is ready to use.
  - d. Note: If speedDIAL will be used for manual control, it must be connected before turning system on. SpeedDIAL can be damaged if it is plugged into, or unplugged from, the system while it is powered on.
2. Illuminate a specimen
  - a. Click the dial (shutter button) on speedDIAL to turn on/off the excitation light.
3. Adjust intensity
  - a. Turn the dial to adjust intensity - clockwise to increase, counter-clockwise to decrease.
  - b. The dial is speed sensitive – turning slowly will allow adjustments in smaller increments, turning quickly will increase the step sizes.
  - c. Intensity can be adjusted in 1% increments from 5 to 100%.

### 4.2 SpeedDIAL Home Screen

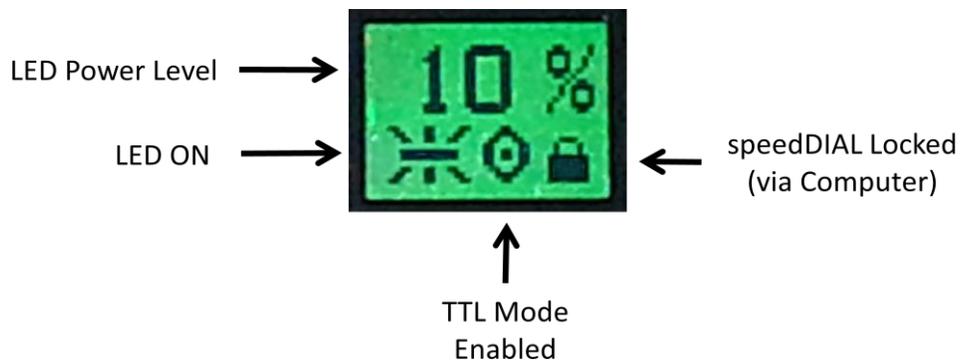


Figure 5 SpeedDIAL Home Screen Icons

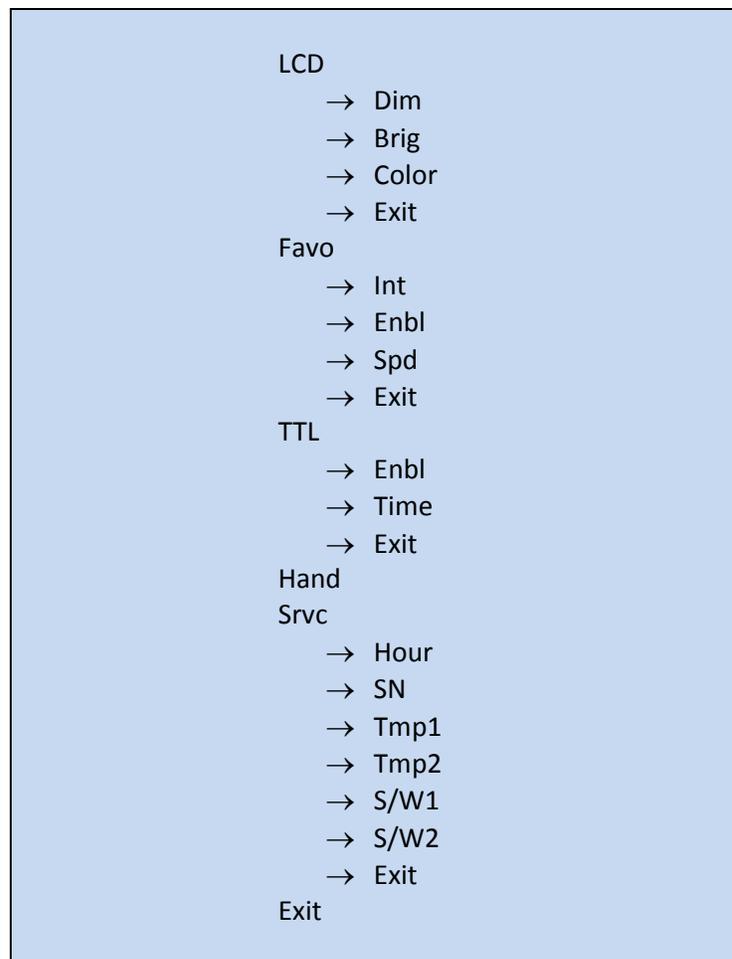
## 4.3 SpeedDIAL Menu and Settings

In addition to the intuitive intensity adjustment and illumination ON/OFF control, speedDIAL has several advanced settings and control options.

- To access the main menu, press and hold the dial for one (1) second.
- To navigate the menus, turn the dial to scroll through the options. An arrowhead will indicate the currently selected menu option; click the dial to make a selection.
- To adjust settings, turn the dial. To exit the setting adjustment, click the dial.
- To exit menu system at any time, press and hold the dial for one (1) second.

Note: Setting changes will take effect immediately after selection. However, for the first five (5) minutes, the new settings are stored in a temporary memory location. If the X-Cite unit is powered down during this time, settings will revert back to their previous values. To ensure that new settings will be remembered, wait at least five (5) minutes before powering down the unit.

### 4.3.1 SpeedDIAL Menu Structure



### 4.3.2 LCD – Display Screen Brightness and Color Settings

In the LCD sub menu, the backlight on the display screen can be turned on/off, set to a different brightness level, or set to a different color.

- a. Select the “LCD” option from main menu.
- b. To adjust LCD display backlight time out:
  - i. Select “Dim” and scroll through the time out options, which are: Off and 1 thru 999 seconds in 1 second increments. “Off” will turn off the backlight timer (i.e. backlight will always be on).
  - ii. Click dial to return to “LCD” menu.
- c. To adjust LCD brightness:
  - i. Select “Brig” and scroll through % brightness settings until the desired level is reached. To turn backlight off, set level to 0%.
  - ii. Click dial to return to “LCD” menu.
- d. To change LCD color:
  - i. Select “Color” and scroll up /down through the options until desired color is on LCD.
  - ii. Click dial to return to “LCD” menu.
- e. Select “Exit” to go back to the main menu, or press and hold dial to return to the home screen.

### 4.3.3 Favo – Favorite Intensity Setting

In the FAVO sub menu, a favorite, commonly used intensity setting can be saved. When this mode is enabled, the intensity level will instantly jump to this setting with a double-click of the dial. A second double-click will toggle back to the previous intensity level.

- a. Select “Favo” option from main menu.
- b. To set/change the favorite intensity:
  - i. Select “Int” and scroll through % intensity settings until the desired level is reached.
  - ii. Click dial to save selection and return to “Favo” menu.
  - iii. TIP: Scrolling through % settings in this menu will not actually change the output in real time, even if LED is on. The favorite intensity should be determined before entering this menu.
- c. To enable/disable favorite intensity mode:
  - i. Select “Enbl” and scroll up/down to the desired setting.
    - “On” will enable (i.e. double-click speedDIAL = Favorite setting)
    - “Off” will disable (i.e. double-click speedDIAL = do nothing)
  - ii. Click dial to save selection and return to “Favo” menu.
- d. To adjust the delay between clicks in the “double-click”:
  - i. Select “Spd” and scroll up/down to the desired delay setting. “1” will provide the shortest delay, “10” will be the longest.
  - ii. Click dial to save selection and return to “Favo” menu.

- iii. TIP: If double-clicking results in the light being turned OFF instead of going to favorite intensity, increase the delay setting.
- iv. Note: Setting long delay times will result in a longer response time for regular ON/OFF control with speedDIAL (the system must wait to see if the single-click turns into a double-click). Response times for TTL or USB on/off control will not be affected.

#### 4.3.4 TTL –TTL Mode Control

In the TTL menu, TTL mode can be enabled for experiments that require rapid LED ON/OFF control. For further information on TTL mode, refer to the External Control, TTL section 5.2.

**NOTE: TTL mode MUST be enabled for the system to respond quickly to a TTL signal.**

- a. Select “TTL” option from main menu.
- b. To enable/disable TTL mode:
  - i. Select the “Enbl” menu item.
  - ii. Scroll to the desired setting, “On” to enable TTL or “Off” to disable TTL.
  - iii. Click dial to return to “TTL” menu.
- c. To define the TTL timeout setting:
  - i. Select the “Time” menu item.
  - ii. Scroll through the time out options, which are: Never and 4 to 24 hours in half hour increments. “Never” will turn off the timeout feature (i.e. the cooling system and driver will always be active when TTL mode is enabled).
  - iii. Click dial to return to “TTL” menu.

#### 4.3.5 Hand – Display Screen Orientation

In this menu, the LCD orientation can be rotated 180°. This allows operators to use speedDIAL on the left or right side of the microscope without blocking the view of the display with their hand.

- a. Select “Hand” option from main menu.
- b. Turn dial to toggle between “Right Hand” and “Left Hand” operation. Note that the screen will flip while adjusting this setting.
- c. Click dial to return to the main menu.

#### 4.3.6 Srvc – Service Data

In the Service menu, information specific to each X-Cite unit can be found. This includes total hours accumulated on the LED, unit serial number, temperatures measured at specific locations in the unit, and embedded software versions for the main unit and speedDIAL. Excelitas Tech Support personnel may request some or all of this information during a support call.

- a. Select “Srvc” option from main menu.
- b. To obtain the LED “in use” hours:
  - i. Select the “Hour” menu option.
  - ii. LED “hours of use” will be shown in one (1) hour increments from 0 to 999 hours. Due to space limitations on the LCD, when 1000 hours are logged, the

format will change to “1.0k hours”, and increments will increase in 100 hour increments (e.g. 1142 hours will display as “1.1k hours”). The precise hour-by-hour data will continue to be available via USB communication.

- iii. Click dial to return to “Srvc” menu.
- c. To obtain the unit serial number:
  - i. Select the “SN” menu option.
  - ii. Serial number of the unit will be shown.
  - iii. Click dial to return to “Srvc” menu.
- d. To obtain current system temperatures:
  - i. Select “Tmp1” or “Tmp2” as required.
  - ii. Temperature will be shown in degrees Celsius.
  - iii. Click dial to return to “Srvc” menu.
- e. To obtain the embedded software version numbers:
  - i. Select the “S/W1” (for main unit) or “S/W2” (for speedDIAL) menu items.
  - ii. The software version numbers will be shown in the format X.X.X.
  - iii. Click dial to return to “Srvc” menu.

## 5 Operation - External Control

### 5.1 USB/RS-232

The X-Cite unit is a USB device which operates at USB 2.0 speeds of 12Mb/s and does not use a USB to RS-232 adapter. However, the X-Cite will appear as a COM port in Device Manager, and is functional as a COM port for programming purposes. This is done for legacy program support and ease of integration.

A virtual COM port driver must be installed to enable Windows communication via the USB port. For computers running Windows which are connected to the internet, the driver will install automatically. For manual installation, the driver is available as a software download from the Excelitas website. Note that administrator privileges may be required to install drivers on your computer, in which case you may need to contact your IT department for assistance.

#### 5.1.1 Driver Installation (via internet)

For these instructions: internet is required, Windows 7 prompts are listed

- a. Ensure X-Cite unit is powered off.
- b. Ensure X-Cite unit is connected to the computer with the USB cable.
- c. Ensure computer is connected to internet.
- d. Power on X-Cite unit.
- e. Driver installation will begin automatically. A dialogue box will confirm installation has started.
  - i. If the dialogue box reports that **Driver installation was not successful**, click on **Get Details**.

- ii. Click on option to **Change Settings to Automatically search Windows for drivers**. Confirm **Yes, do this automatically**, and save changes.
- f. A second dialogue box will confirm successful installation and provide a COM port number. Note the COM port number for use in other software applications.

### 5.1.2 Driver Installation (via ZIP file)

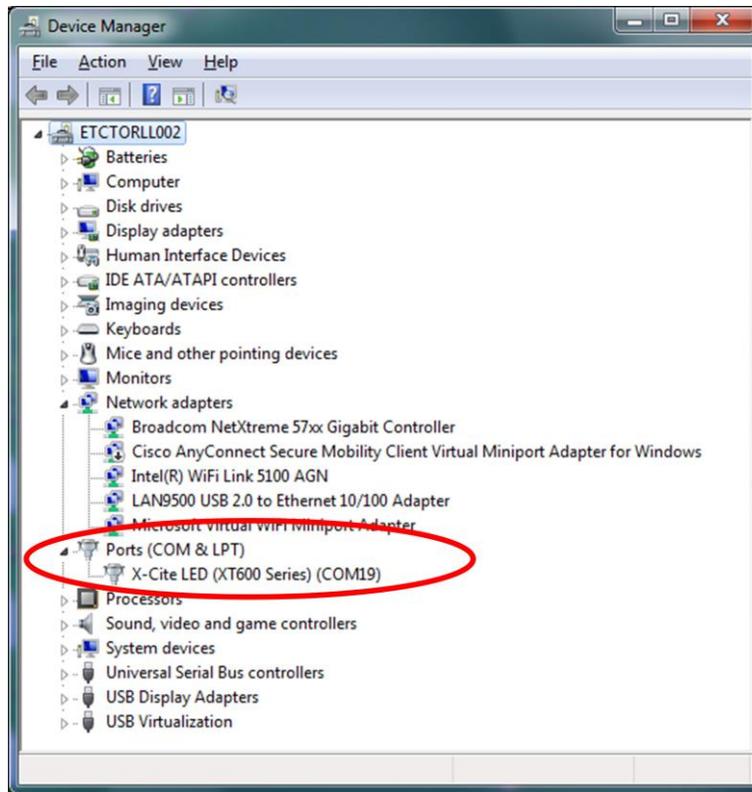
For these instructions, download the driver ZIP file from the Excelitas website:

<http://www.excelitas.com/Pages/Product/X-Cite-110LED.aspx>

- a. Ensure X-Cite unit is powered off.
- b. Ensure X-Cite unit is connected to the computer with the USB cable.
- c. Prepare the driver files by extracting and saving the files into a folder on desktop (or another easily accessible location).
- d. Power on X-Cite unit.
- e. The “new hardware found” wizard will appear. Select **No** to search Windows update for the software. Click **Next** to continue.
- f. Select **Install from a list or specific location (Advanced)** to locate the driver and click **Next**. Select **Include this location in the search:** and browse to the location on your hard drive where unzipped files were saved in step c. Click **Next**.
- g. Wait for installation to complete. Click **Finish**.

### 5.1.3 Verify Installation & Get COM Port Number

- a. Open the “Device Manager” utility on the computer.
- b. “X-Cite LED (XT600 Series)” will be listed under “Ports (COM & LPT)”.
- c. Note the COM port number for use in other software applications.



**Figure 6 Device Manager, COM Port Listing**

#### **5.1.4 X-Cite Control Panel / GUI installation (via ZIP file)**

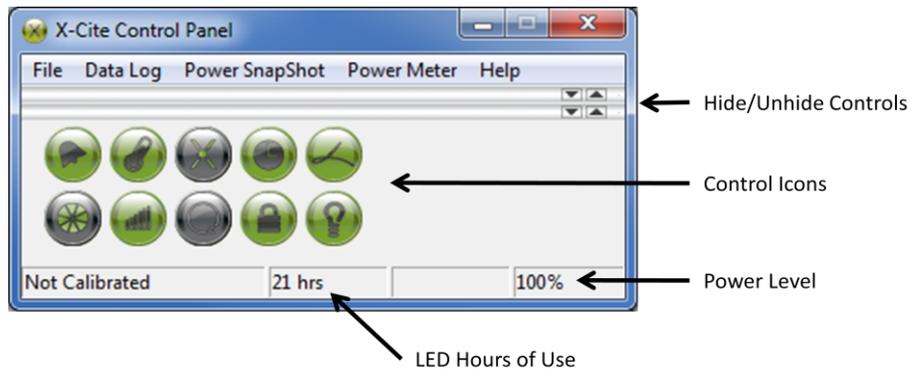
For these instructions: ZIP file is available as a software download from the Excelitas website.

- a. Uninstall any previous versions of X-Cite Control Panel/GUI. (Previous versions released under the EXFO name will not be automatically replaced by versions 1.1.0 or later, and may cause confusion.)
- b. Prepare the driver files (if not already done in previous section) by extracting and saving the files into a folder on desktop (or another easily accessible location).
- c. To begin installation, go to unzipped files from step b, double-click on **setup.exe** or **setup**
- d. Setup Wizard will open. Follow prompts and click **Close** when Wizard is finished.
- e. To find GUI, go to: **Start, All Programs, Excelitas Technologies, X-Cite Control Panel**. Click to start/open GUI, or click-and-drag to copy a shortcut to desktop or Quick Launch toolbar.

#### **5.1.5 X-Cite Control Panel – Tips for Use**

- a. X-Cite Control Panel is available as a download from the X-Cite website. This tool provides an interface for controlling the X-Cite unit via PC and general testing of the communication port.

- b. Note that X-Cite Control Panel is designed to function with multiple X-Cite devices, and not all icons and features can be used with all devices. See the icon table below to determine which icons are relevant to control of this X-Cite unit.
- c. Icon color code:
  - i. Green icons mean status is OK and/or the function is engaged
  - ii. Yellow icons mean a warning or “getting ready”
  - iii. Red icons mean there is an alarm condition
  - iv. Grey icons mean a feature is not engaged, and/or not available
  - v. If icons are ALL grey, X-Cite unit is not connected and/or turned off



**Figure 7 X-Cite Control Panel**

| ICON | NAME        | DESCRIPTION  |
|------|-------------|--|
|      | Alarm       | Green = All OK<br>Red = Alarm on<br>Click will clear alarm, unless unsafe to ignore  |
|      | Temperature | Indicates system temperature status<br>Yellow = warning, LED temp above normal<br>Red = LED is close to (or has already exceeded) maximum safe temperature and may be turned off |
|      | Calibration | Not applicable for this X-Cite unit  |
|      | LED Hours   | Indicates hours logged on LED<br>Green = <20K hours, yellow = >20K hours, red = >40K hours   |
|      | Light Guide | Green = Light guide is inserted<br>Red = Light guide is missing or not fully inserted  |
|      | Shutter     | Click to turn LED on/off   |
|      | Intensity   | Left mouse click = increase by 1% increment.<br>Right mouse click = decrease by 1% increment.<br>Left double click = opens dialog box, type in value                             |

|   |                      |  |
|---|----------------------|--|
|  | Closed-Loop Feedback | Not applicable for this X-Cite unit  |
|  | Lock/unlock          | Lock/unlock speedDIAL control<br>Green = speedDIAL is locked<br>Grey = speedDIAL is unlocked |
|  | Lamp                 | Not applicable for this X-Cite unit  |

### 5.1.6 Commercial Software Support

- a. This X-Cite unit can be controlled through many commercially available packages. Where model-specific control may not be available, basic functionality can be achieved using X-Cite 120PC, X-Cite *exacte*, or X-Cite 120LED hardware drivers. For an updated list of software packages that support X-Cite products, see <http://www.excelitas.com/Downloads/XCite-softwareSupport.pdf>
- b. For commercial software packages, if requested specify the serial port parameters as: 19,200 baud, no parity, 8 data bits and 1 stop bit.
- c. When controlling this X-Cite unit, some commercial software packages may block manual input from speedDIAL. The lock icon will appear on the speedDIAL display in these cases.

### 5.1.7 Software Developer's Kit (SDK)

The command list for this X-Cite unit is the same as for X-Cite 120LED, and is available by request. To obtain the latest update, please contact Technical Support.

## 5.2 TTL

For high speed LED on/off control, TTL triggering can be used. The key thing to note about TTL control in this X-Cite unit is: **TTL mode MUST be enabled for the system to respond quickly to a TTL signal.**

### 5.2.1 TTL Mode

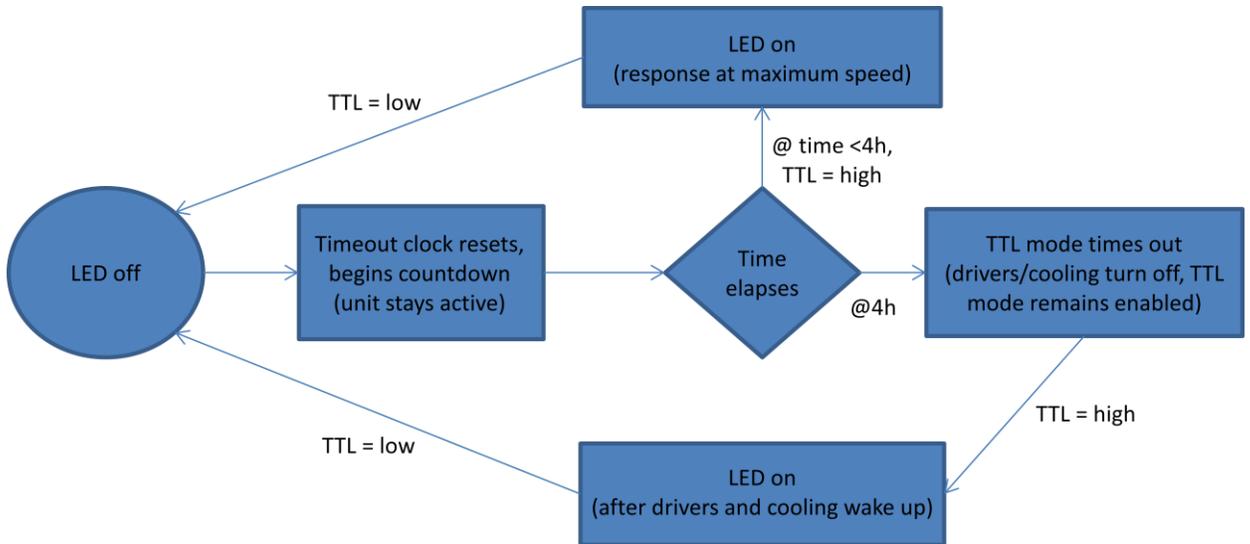
TTL mode ensures that X-Cite's cooling system and LED drivers are active between exposures, ensuring the fastest possible response to a TTL signal.

- Enabling/disabling TTL mode can be accomplished manually via speedDIAL (refer to section 4.3.4) or via computer commands (refer to SDK).
- ON/OFF status of the system will be updated on speedDIAL when it is controlled via TTL. However, due to the communication lag time between the main unit and speedDIAL, if LED "on time" is less than 30ms, the change may not be displayed.

### 5.2.2 TTL Mode Timeout

There is a potential disadvantage of TTL mode - in this "always active" state, the system continues to consume energy and mechanical components accumulate wear. To help minimize unnecessary consumption at the end of an imaging session (or if equipment is accidentally left

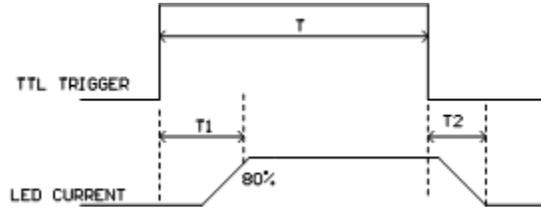
on), this unit is equipped with a TTL timeout setting. The factory default for the TTL timeout setting is “Never”, but defining a timeout is recommended for any imaging session that will end without an operator present to shut down equipment (e.g. middle of the night).



**Figure 8 Sequence of Events for TTL Mode Timeout (set to 4 hours)**

### 5.2.3 TTL Timing Diagram

This plot shows typical TTL timing values when the unit is operated in TTL mode. These values should be used as a guide only. Actual values will be dependent on the LED intensity setting and the specific configuration/control hardware being used.



| Interval | Description                            | Time ( $\mu$ s) |
|----------|--|-----------------|
| T1       | Delay time, TTL trigger on to LED on   | <100 @ 100%     |
| T2       | Delay time, TTL trigger off to LED off | <30             |

### 5.2.4 TTL Signal and LED Status

| TTL  | LED Status |
|------|------------|
| High | ON         |
| Low  | OFF        |

### 5.2.5 TTL Input Specifications

- Connector type: BNC (female port)
- Maximum low level : +0.8V
- Minimum high level : +2.2V
- Maximum high level: + 5.5V
- Typical input current: 800 $\mu$ A

## 6 Troubleshooting

Organized by symptom, this section provides basic troubleshooting information for installation and set-up parameters. X-Cite 110LED may be serviced by authorized technical personnel only.

### 6.1 Error Messages

If X-Cite 110LED detects a problem, an error message with one of the following codes will appear on the speedDIAL display.

| Error Code | Description                                    | Action   |
|------------|--|--|
| 1          | LED has exceeded maximum operating temperature | Turn off the system and wait for the LED to cool down. Verify that the system has been installed with adequate clearance for ventilation, especially around vents on the side panel of the unit. If fan is not running or the problem persists contact technical support for assistance. |
| 3 or 5     | Internal Error                                 | Power cycle the X-Cite 110LED unit. If the error message reappears contact technical support for assistance.   |
| 6          | LED is below minimum operating temperature     | Ensure the room temperature is within the recommended operating limits. If unit has been stored / transported in a cold environment, allow it to warm up to room temperature and restart. If the problem persists contact technical support for assistance.                              |

### 6.2 Failure to Power Up

If X-Cite 110LED fails to power up or function properly, use the following checklist to eliminate the most common causes of problems. Check for the following:

1. Power Connection Check:
  - a. The power supply cord is securely connected to a grounded (earthed mains socket) functional outlet.
  - b. The power supply cord is securely connected into the 3-pin outlet on the power supply brick
  - c. The DC cord from the power supply is securely connected to the "Power" port on the rear of the X-Cite unit.
  - d. The main power switch is in the ON position.
  
2. SpeedDIAL Check:
  - a. Verify that the pins on speedDIAL connector are straight.
  - b. Verify that speedDIAL is plugged securely into main unit.

## 6.3 Low Illumination Intensity

1. SpeedDIAL Setting Check:
  - a. Verify that the LED intensity is set to a sufficient level.
  - b. Verify that the LEDs are turning on.
  
2. Light Guide Check:
  - a. Verify that the ends of the light guide are free of debris.
  - b. Verify that there are no bubbles in the light guide. (For detailed steps see: <http://www.excelitas.com/Downloads/XCite-120-TroubleShooting.pdf> section 2.2.)
  - c. Verify that the light guide is fully inserted in the main unit and the microscope.
  
3. Microscope Check:
  - a. Verify that the Microscope Adaptor is appropriate for the microscope configuration.  
Note: Some adaptors have the same mechanical fitting but different optics.
  - b. Verify that everything in the microscope beam path is properly aligned and open, e.g. shutters, apertures, diaphragms, filters, filter cubes, etc.
  - c. Verify that microscope filter sets are for the appropriate wavelengths.
  - d. Verify that air objectives are clean / immersion objectives have enough of the appropriate fluid.

## 6.4 Other Potential Symptoms & Questions

| Category                | Symptom   | Action   |
|-------------------------|---|--|
| <b>speedDIAL</b>        | Favorite intensity setting: double-click turns off LED instead of going to the stored setting | Increase delay in the speed (Spd) setting. Ensure Favorite mode is enabled.  |
|                         | New settings are forgotten when unit is shut down and powered up                              | After changing settings, wait at least five (5) minutes before shutting unit down.   |
|                         | Turning dial does not scroll through the menu options   | Turn dial in the opposite direction.   |
|                         | “Lock” icon is on display, speedDIAL not responding to manual control                         | Send “unlock” command via computer OR power down unit and restart.   |
| <b>TTL Triggering</b>   | TTL response time is longer than usual  | Verify that timeout settings are appropriately set. Enable TTL mode.   |
| <b>Audible Noise</b>    | Fan never turns off, even when LED is not on  | Fan continues to run for five (5) minutes after LED is turned off. If it runs longer, disable TTL mode or adjust the TTL timeout (it is likely enabled). |
| <b>Output Linearity</b> | Plotting output power vs. intensity setting is not a straight line                            | No action. “x%” shown on speedDIAL refers to LED input current, which is not necessarily linear with optical output.                                     |

## 7 Routine Care and Maintenance

### 7.1 General

X-Cite 110LED is a very low maintenance system with only one consumable component – the liquid light guide. By maintaining the following conditions, performance will be maximized and risk of future problems will be reduced.

1. Maintain a clean work area, keeping the X-Cite 110LED air vents unobstructed.
2. Ensure that the light guide has some slack in it and is never cut, stretched, kinked, or forced into a sharp bend.
3. Never touch optical surfaces with fingers, tools or any other abrasive/sticky/sharp materials or fluids.
4. If cleaning is required, follow the directions in the next section.

### 7.2 Cleaning - Exterior Surfaces

If necessary, exterior surfaces of X-Cite 110LED and speedDIAL can be cleaned with a mild soap and water solution and lint-free cloth.

1. Turn unit off and disconnect AC power prior to cleaning.
2. Use a damp cloth only - do not allow cleaning solution to get into I/O ports, air vents or seams.
3. Avoid optical surfaces.
4. Allow the unit to dry before turning it on.

### 7.3 Cleaning - Optical Surfaces

Cleaning of optical surfaces is not generally required. However, if any visible contamination or fingerprints appear on the lens surface, cleaning may be necessary.

1. Recommended Cleaning Materials
  - a. Rubber bulb dust blower
  - b. Lint-free lens tissue, lint-free cotton swabs
  - c. Powder-free gloves or finger cots
  - d. Lens cleaning solution, reagent-grade isopropyl alcohol, or another appropriate solvent
2. Cleaning Procedure
  - a. Use rubber dust blower to blow off any loose lint, dust or other contaminant.
  - b. If the contaminant is a fluid (e.g. water, immersion oil), first use a dry lens tissue (or cotton swab) to wick away as much as possible – do not wipe.
  - c. Saturate a corner of the lens tissue (or the cotton swab) with cleaning solvent, and gently wipe the optical surface in one pass. Note: Take care not to “flood” the area with solvent, particularly near unsealed joints (e.g. lens-retaining ring interface).
  - d. Repeat the previous step with a fresh portion of lens tissue (or new cotton swab) – this will help avoid recontamination of the optical surface and minimize the amount of cleaning required.

- e. Let solvent evaporate and verify that the optical surface is clean. Repeat cleaning steps as necessary.
- f. Before reinstalling and/or using the optics, allow them to dry completely.

**CAUTION: Before using any solvent, consult the manufacturer’s Material Safety Data Sheet (MSDS) and your internal Health and Safety Advisor for proper handling, storage, and disposal instructions.**

## 8 Technical Specifications

### 8.1 General

|        | Main Unit                 | speedDIAL      |
|--------|---------------------------|----------------|
| Height | 230mm (9.1")              | 59mm (2.3")    |
| Width  | 95mm (3.7") <sup>a</sup>  | 80mm (3.1")    |
| Depth  | 212mm (8.4") <sup>b</sup> | 112mm (4.4")   |
| Weight | 3kg (6.6lbs)              | 0.3kg (0.7lbs) |

Notes:

- a. Does not include clearance required for adequate ventilation.
- b. Does not include clearance required for cables or light guide.

### 8.2 Electrical

AC input information for external power supply:

|               |   |
|---------------|---|
| Power Supply  | Power Factor Corrected, Universal Input |
| Input Voltage | 100-240VAC, 50/60Hz                     |
| Current       | 1.85A max /115V, 1.0A max/230V          |
| Input Surge   | With cold start, 120A max/230V          |
| Protection    | Over load and over temperature          |

DC input information for X-Cite unit:

| Model #                 | Input Voltage | Input Current |
|-------------------------|---------------|---------------|
| XT640-W (X-Cite 110LED) | 24VDC         | 3.0A          |
| Other variations:       |               |               |
| XT600                   | 24VDC         | 5.5A          |
| XT601                   | 24VDC         | 8A            |
| XT641-W                 | 24VDC         | 5.5A          |
| XT651-V                 | 24VDC         | 4.5A          |

### 8.3 Environmental – Operating Conditions

|                       |                               |
|-----------------------|-------------------------------|
| Ambient Temperature   | 10° to 35° C                  |
| Altitude              | 2000m max                     |
| Atmospheric Pressure  | 700 to 1060 hPa               |
| Relative Humidity     | 15 to 90% RH (non-condensing) |
| Installation Category | II                            |
| Pollution Degree      | 2                             |

### 8.4 Environmental – Transport and Storage Conditions

|                      |                               |
|----------------------|-------------------------------|
| Temperature          | -35° to 60° C                 |
| Relative Humidity    | 10 to 95% RH (non-condensing) |
| Atmospheric Pressure | 500 to 1060 hPa               |

### 8.5 Input/Output (I/O) Connections

| Connection         | Connection Style    | Purpose   |
|--------------------|---------------------|---|
| speedDIAL - IN/OUT | Mini DIN plug, 9pos | Communication between speedDIAL and X-Cite unit to control LED and report status (on/off, intensity adjustment, system error, etc.) |
| USB - IN/OUT       | B                   | Communication between computer and X-Cite unit to control LED and report status.  |
| TTL - IN           | BNC                 | External trigger to turn LED on/off   |

### 8.6 Output Stability

High power LEDs tend to lose their output stability when operated at low drive currents (i.e. set to low intensity levels). To prevent power fluctuations, X-Cite 110LED has a built-in 5% lower limit on the intensity setting. To further maximize output stability if an application requires lower power levels, strategies to avoid fluctuations include:

- Increase power level, and reduce exposure time to compensate for brighter signal.
- Increase power level, and use a neutral density filter or iris in the microscope light train to reduce intensity to an appropriate level for the specimen.

## 9 Regulatory Compliance

### 9.1 Product Safety and Electromagnetic Compatibility

The X-Cite 110LED has been tested and found to comply with product safety and electromagnetic compatibility requirements. For a complete list of tests and for certification details, please contact your X-Cite representative or visit <http://www.excelitas.com/Pages/Product/X-Cite-110LED.aspx>.

### 9.2 CE Marking

|                               |                       |   |
|-------------------------------|-----------------------|---|
| Council Directive 2006/95/EC  | Low Voltage Directive |  |
| Council Directive 2004/108/EC | EMC Directive         |   |
| Council Directive 2012/19/EU  | WEEE Directive        |   |
| Council Directive 2011/65/EU  | RoHS                  |   |

### 9.3 FCC

#### FCC Class A Digital Device or Peripheral - Information to User

##### NOTE

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

##### WARNING

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

### 9.4 WEEE Directive



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

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

- In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way.
- The crossed-out wheeled bin symbol indicated above invites you to use those systems.
- If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administration.

## 9.5 China RoHS

|  | Pb | Hg | Cd | Cr6+ | PBB | PBDE |
|--|----|----|----|------|-----|------|
| X-Cite 110LED (main unit)  | o  | o  | o  | o    | o   | o    |
| speedDIAL  | o  | o  | o  | o    | o   | o    |
| <p>o : Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006</p> <p>x: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006 (Enterprises may further provide in this box technical explanation for marking "X" based on their actual conditions.)</p> |    |    |    |      |     |      |

## 10 Warranty & Repairs

### 10.1 Warranty Terms

Excelitas warrants the original purchaser for a period of one (1) full year, calculated from the date of purchase, that the equipment sold is free from defects in material and workmanship. All repairs are warranted for 90 days. The LED assemblies within the unit have a warranty period of 25,000 hours of use or 3 years, whichever comes first.

In the event of a claim under this guarantee, the equipment is to be sent postage and carriage paid, including a description of the fault, to an appropriate Excelitas Authorized Service Center. Returned equipment will not be received without a Return Material Authorization (RMA) Number, issued by the Service Center.

In the case of damage caused by wear and tear, careless handling, neglect, by the use of force or in the case of interventions and repairs not carried out by an Excelitas Service Center, the guarantee ceases to be valid. This guarantee may not form the basis for any claims for damages, in particular not for compensation of consequential damages.

The warranty is not transferable. No warranty is extended to perishable items, such as light guides, fuses and air filters.

Any claims for units received with defects in material or workmanship must be reported to an authorized Excelitas Service Center within 30 days from the original date of receipt.

| SYSTEM COMPONENT        | WARRANTY   | WARRANTY VOID IF...  |
|-------------------------|--|--|
| X-Cite 110LED main unit | 1 year   | <ul style="list-style-type: none"><li>• Unit has been subjected to misuse or mishandling.</li><li>• Unit has been opened or tampered with.</li></ul>   |
| X-Cite 110LED speedDIAL | 1 year   | <ul style="list-style-type: none"><li>• Unit or cabling has been subjected to misuse or mishandling.</li><li>• Unit has been opened or tampered with.</li><li>• LCD display damage (physical).</li></ul> |
| LED assembly            | <ul style="list-style-type: none"><li>• 25,000 hrs</li><li>• 3 years</li></ul> whichever Comes first | <ul style="list-style-type: none"><li>• LED assembly has been opened or tampered with.</li></ul>   |

### 10.2 Returning equipment to Excelitas

1. Please make a note of the problem encountered, the steps followed to isolate the problem and the result of any trouble shooting steps taken.

2. Contact the nearest Excelitas Service Center to obtain a Return Material Authorization (RMA) number. For your convenience, RMA numbers can also be requested on-line at:  
[www.excelitas.com/Support-UVM](http://www.excelitas.com/Support-UVM)
3. Follow shipping instructions provided by the service technician. The unit should be returned in its original packaging if possible.

## **11 Contact Information**

### **11.1 General**

Excelitas Canada Inc.

Tel: (905) 821-2600

Fax: (905) 821-2055

Toll Free: 1-800-668-8752 (*USA and Canada*)

[x-cite@excelitas.com](mailto:x-cite@excelitas.com)

<http://www.excelitas.com/x-cite>

### **11.2 Technical Support and Service**

For Technical Support and Service specific to Excelitas UV & Microscopy products:

(905) 821-2600, option 3

1-800-668-8752, option 3 (*USA and Canada*)

[www.excelitas.com/Support-UVM](http://www.excelitas.com/Support-UVM)

### **11.3 Accessories and Replacement Parts**

Replacement parts and accessories can be purchased directly from Excelitas. For ordering and pricing information contact the inside sales department at:

(905) 821-2600

1-800-668-8752 (*USA and Canada*)

[x-cite@excelitas.com](mailto:x-cite@excelitas.com)

[http://www.excelitas.com/Pages/Contact/Contact\\_OX.aspx](http://www.excelitas.com/Pages/Contact/Contact_OX.aspx)