X-Cite® mini+ User Guide

Applies to X-Cite mini Series Models:

- **XMPS**
- **XMPL**
- **XTMS**
- **XTML**
- **XT120Lm (X-Cite 120LED*mini*)**

X-Cite® mini+ User Guide
035-00587R rev. 5
Made in Canada

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1 Introduction

The new X-Cite® mini+ provides LED illumination with no compromise. X-Cite® mini+ provides 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 20,000 hours and no lamps or modules to replace, X-Cite® mini+ offers sheer simplicity in its compact size 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 behavior.

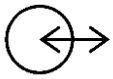
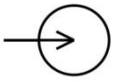
Excelitas Technologies Corp. is a global technology leader focused on delivering innovative, customized solutions to meet the lighting, detection and other high-performance technology needs of customers. X-Cite®, formerly of Lumen Dynamics (which was acquired by Excelitas Technologies Corp. in November 2013) offers the Life Science and Analytical Instrumentation market a broad range of innovative lamp and LED fluorescence illumination and measurement solutions.

Excelitas Technologies recommends reading this manual to discover all the features available in X-Cite® mini+.

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.
	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 LED head. 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 LED head is 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. To reduce the risk of fire or shock, always replace the fuses with the same type and rating.

5. Disconnecting of main supply source is done by putting the on/off button in the off “O” position and unplugging the power cord.

6. It is recommended that ONLY QUALIFIED TECHNICAL PERSONNEL perform any testing or repairs described in this manual. Disconnect the AC power cord from the unit 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.

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 Technologies, 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

The X-Cite® mini+ system contains the following components:

1. LED Head and *mini*CUBE (permanently connected via 1.5m cable)
2. SpeedDIAL Manual Controller
3. Microscope Flange
4. Accessories Box, containing:
    a. Quick Start Instruction Sheet (User Guide, Software/Driver downloads are available: https://www.excelitas.com/product/x-cite-mini-compact-led-illumination-system)
    b. Hex Tool, 3mm
    c. USB Cable
    d. Power Cord
    e. Safety Precautions Booklet

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

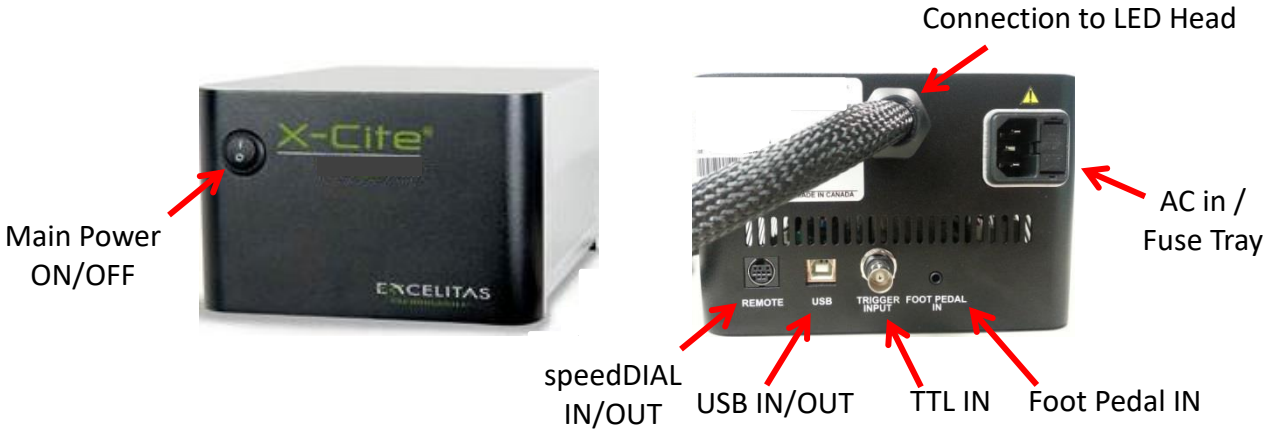


Figure 1 *mini*CUBE Front and Rear Panels

Figure 2 LED Head

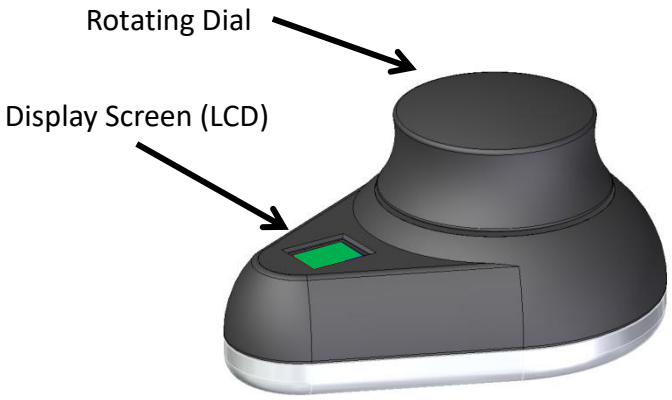


Figure 3 SpeedDIAL

3.2 Installation/Set-up

1. Unpack
    a. Carefully unpack the unit and accessories from the shipping carton.
    b. When removing the LED Head and *mini*CUBE from the carton, ensure that both components are supported and there is always some slack in the cable. Excessive strain on the cable may damage or weaken the connection.
    c. **Do not use the cable as a "handle".**

2. Install the Microscope Flange
    a. Remove protective wrap from the Microscope Flange, **being careful not to touch the lens surfaces**.
    b. Remove protective cap from LED Head. **Never power up the unit with this cap installed – it can melt very quickly at high power settings and damage the unit.**
    c. Align the mounting holes on the Microscope Flange and the LED Head. Attach the Microscope Flange using the Hex Tool and three (3) fasteners provided. The two (2) dowel pins on the LED Head will allow you to install the Flange quickly and in the proper position as required by your microscope.

Figure 4 Installing Microscope Flange on LED Head

3. Position the equipment
    a. *mini*CUBE should be positioned to avoid sharp bends and strain on the cable.
    b. The front panel of *mini*CUBE should be within reach to access the main power switch. (During operation, all other functions are controlled via speedDIAL or USB interface.)
    c. Air vents on both sides of *mini*CUBE should be clear of obstruction. Recommended clearance is 20cm (8 inches) on all sides.

4. Connect LED Head to Microscope
    a. Insert Microscope Flange portion of the LED Head 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 Microscope Flange "notch" with the pin on the microscope fitting, hold the LED head 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. **Note for IX3-RFAL use: the epi-light train aperture MUST be properly aligned before turning on X-Cite® mini+, or heat damage may result** - see procedure in Olympus manual for assistance.
    b. Verify that the LED Head is oriented with the arrow label (rear side of the LED Head) is pointing up (see Figure 5).
    c. Verify that the LED Head is securely fastened by attempting to gently rock it from side to side.

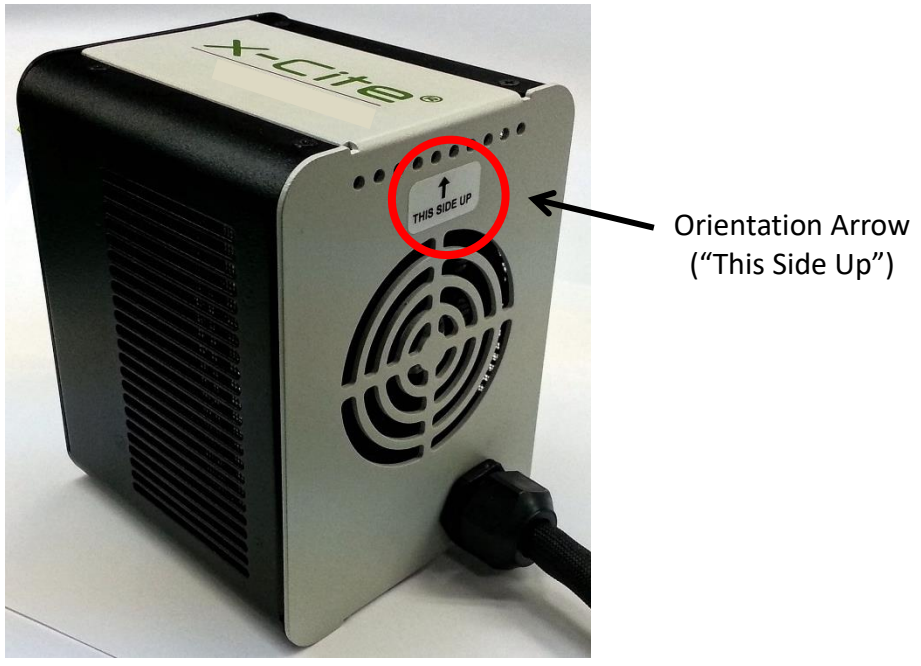


Figure 5 LED Head and Arrow in Correct Position

5. Connect speedDIAL to *mini*CUBE
    a. Insert the mini DIN plug into the "Remote" port on the rear of the *mini*CUBE. Ensure the arrow mark on the connector is on top and centered. Note: Never force the connector – this can damage the pins. If connector does not insert smoothly, stop and check for bent pins.
    b. 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 *mini*CUBE.
    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 female end to AC port on rear of the *mini*CUBE.
    b. 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 the front of *mini*CUBE to turn X-Cite® mini+ on.
    b. The system will have a brief initialization period (approximately 10 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.

NOTE: Power cycling of the main unit (off and then on) requires a minimum of 10 seconds of off time. Failure to wait at least 10 seconds before restarting the unit after powering down may cause memory and USB communication errors.

4.2 SpeedDIAL Home Screen

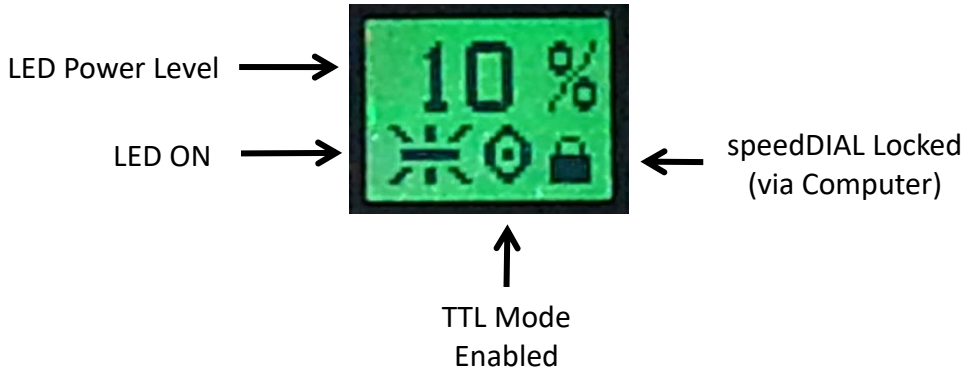


Figure 6 SpeedDIAL Home Screen Icons

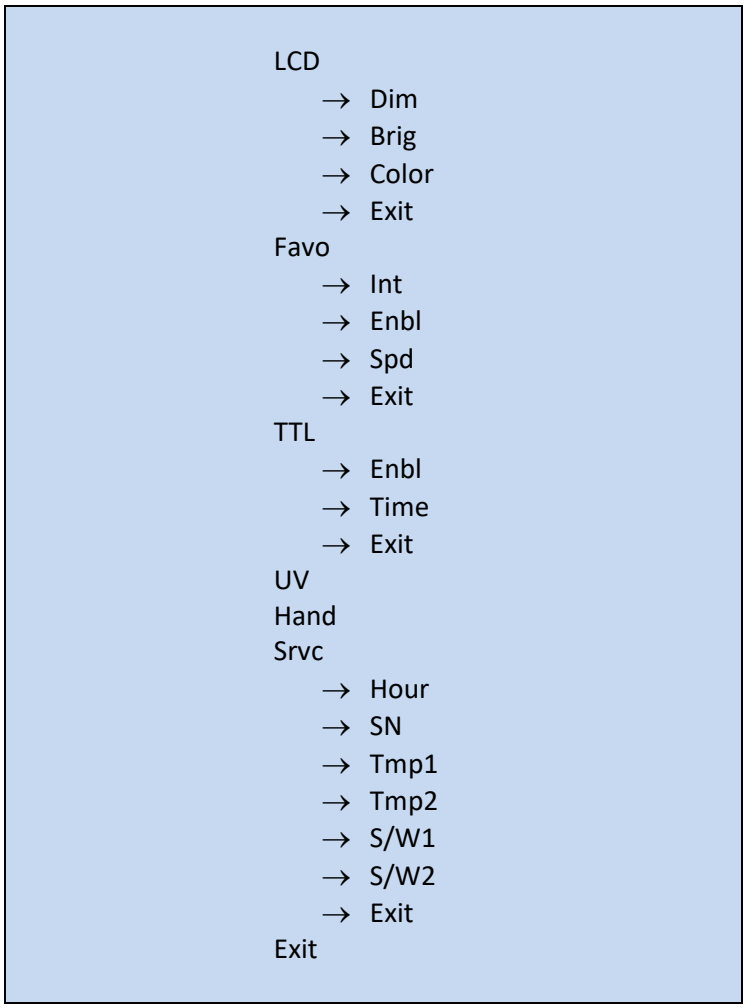
4.3 SpeedDIAL Menu and Settings

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 X-Cite® mini+ 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 save selection and 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 save selection and 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 save selection and 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, USB or foot pedal 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 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 save selection and 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 save selection and return to “TTL” menu.

4.3.5 UV – UV Mode Control

Models XMPS/XMPL and XTMS/XTML only.

In this menu, the UV LED can be disabled to remove the UV content from the unit’s total output spectrum. The unit is designed to remain in UV “on” or “off” mode for the duration of an experiment, i.e. it is not intended to be a fast-switching system.

To disable/enable UV:

a. With LEDs turned off (recommended*), select “UV” option from main menu.
b. Turn dial to toggle between “ON” and “OFF”.
c. Click dial to return to the main menu.

*Note that while the UV setting can be changed while the LEDs are turned ON, the change to the UV LED will not take effect until the next time the LEDs are turned on. To avoid confusion, it recommended to change settings with the LEDs turned off.

4.3.6 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.

d. Select “Hand” option from main menu.
e. Turn dial to toggle between “Right Hand” and “Left Hand” operation. Note that the screen will flip while adjusting this setting.
f. Click dial to save selection and return to the main menu.

4.3.7 Srvc – Service Data

In the Service menu, information specific to each X-Cite® mini+ 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 *mini*CUBE 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 to 100 hours

(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” or “S/W2” 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

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® mini+ is powered off.
b. Ensure X-Cite® mini+ is connected to the computer with the USB cable.
c. Ensure computer is connected to internet.
d. Power on X-Cite® mini+.
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:
https://www.excelitas.com/product/x-cite-mini-compact-led-illumination-system

a. Ensure X-Cite® mini+ is powered off.
b. Ensure X-Cite® mini+ is connected to the computer with the USB cable.
c. Prepare the driver files by extracting and saving the files into a folder on the desktop (or another easily accessible location).
d. Power on X-Cite® mini+.
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 120LED USB Communications" will be listed under "Ports (COM & LPT)".
c. Note the COM port number for use in other software applications.

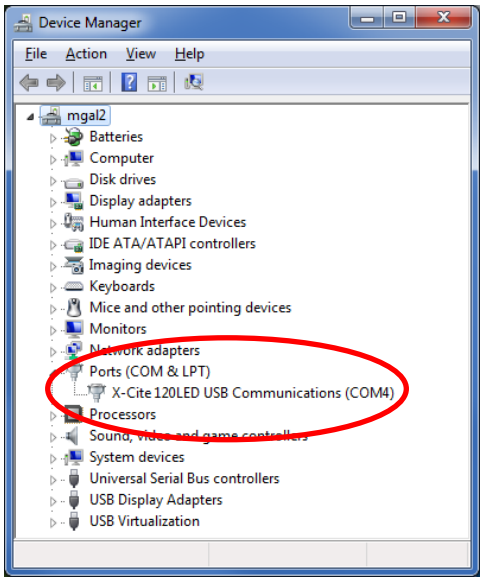


Figure 7 Device Manager, COM Port Listing

5.1.4 X-Cite® Control Panel / GUI installation

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, Lumen Dynamics, 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 Excelitas website. This tool provides an interface for controlling the X-Cite® mini+ 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 X-Cite® mini+.
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® mini+ is not connected and/or turned off

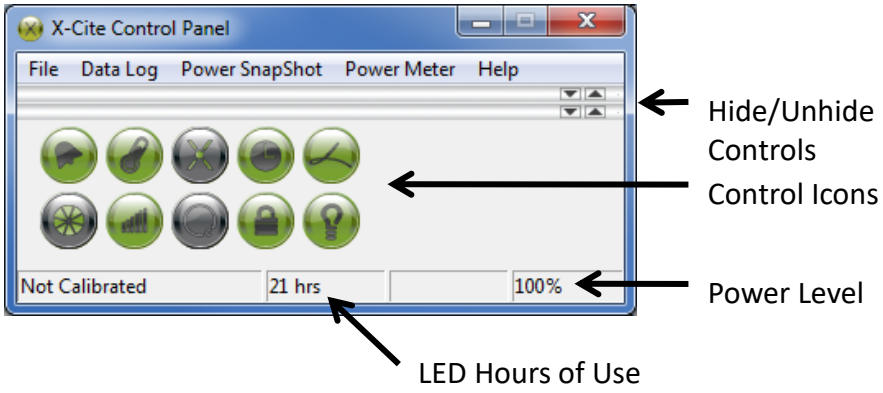


Figure 8 X-Cite Control Panel

ICON	NAME	DESCRIPTION
	Alarm	Green = All OK Red = Alarm on

		Click will clear alarm, unless unsafe to ignore
	Temperature	Indicates system temperature status Yellow = warning, LED temp above normal Red = LED off, temp is too high
	Calibration	Not applicable for X-Cite® mini+
	LED Hours	Indicates hours logged on LED Green = <20K hours, yellow = >20K hours, red = >40K hours
	Light Guide	Not applicable for X-Cite® mini+
	Shutter	Click to turn LED on/off
	Intensity	Left mouse click = increase by 1% increment. Right mouse click = decrease by 1% increment. Left double click = opens dialog box type in value
	Closed-Loop Feedback	Not applicable for X-Cite® mini+
	Lock/unlock	Lock/unlock speedDIAL control Green = speedDIAL is locked Grey = speedDIAL is unlocked
	Lamp	Not applicable for X-Cite® mini+

5.1.6 Commercial Software Support

a. X-Cite® mini+ can be controlled through many commercially available packages. Where X-Cite® mini+ specific control may not be available, basic functionality can be achieved using X-Cite® 120PC or X-Cite® *exacte* hardware drivers. For an updated list of software packages that support X-Cite® products, see https://www.excelitas.com/product/x-cite-mini-compact-led-illumination-system

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 X-Cite® mini+, 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 X-Cite® mini+ is available by request. To obtain the latest update, please contact Excelitas Technologies.

5.2 TTL

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

5.2.1 TTL Mode

TTL mode ensures that X-Cite® mini+*'s* cooling system and LED driver 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.

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), X-Cite® mini+ 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).

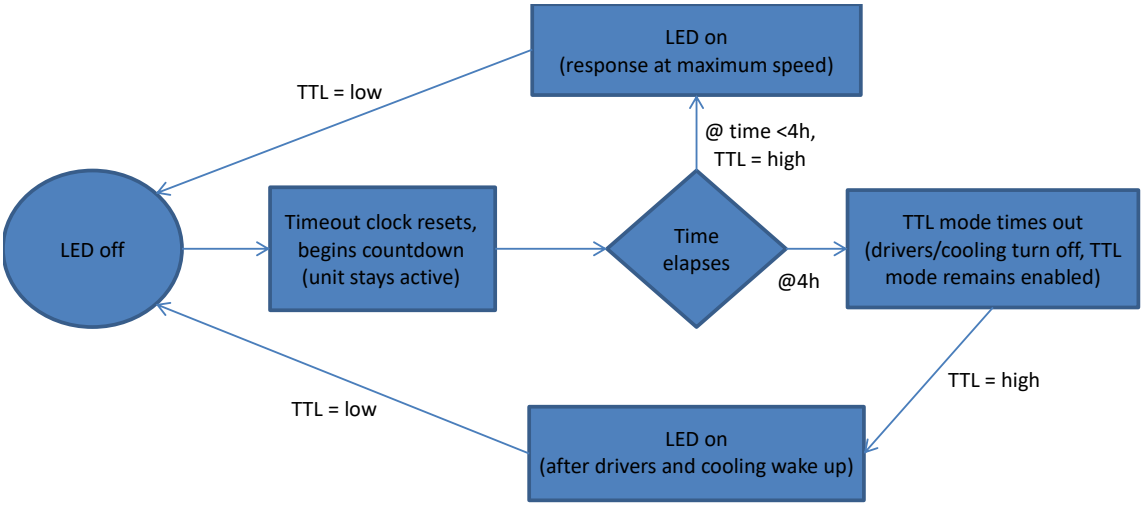
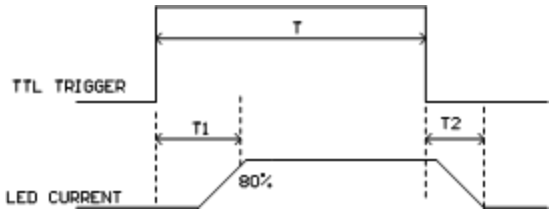


Figure 9 Sequence of Events for TTL Mode Timeout (set to 4 hours)

5.2.3 TTL Timing Diagram

This plot shows typical TTL timing values. These values should be used as a guide only. Actual values will be dependent on the specific configuration/control hardware being used.



Interval	Description	Time (µs)
T1	Delay time, TTL trigger on to LED on	100 @ 100% power
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

a. Connector type: BNC (female port)
b. Maximum low level : +0.8V
c. Minimum high level : +2.2V
d. Maximum high level: + 5.5V
e. Typical input current: 800µA

5.3 Foot Pedal Control (Optional)

For hands-free operation, a foot pedal can be used to manually turn the LED on and off. The foot pedal is an optional accessory and can be purchased separately from Excelitas Technologies.

1. Installing the foot pedal
    a. Locate the “FOOT PEDAL IN” / “FP IN” input port on the rear panel of X-Cite® mini+.
    b. Insert foot pedal plug.
    c. Place foot pedal on floor.
2. Operating the foot pedal
    a. Press and release pedal with your foot to toggle LED on and off.
    b. On/off status of LED will be shown on speedDIAL display.
    c. If desired, the foot pedal can be used in combination with speedDIAL (e.g. turn on with speedDIAL, turn off with foot pedal.) The ON/OFF status of the system will be reflected on speedDIAL’s home screen whether it is changed via the foot pedal or by any other means.

6 Troubleshooting

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

6.1 Error Messages

If X-Cite® mini+ 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 *mini*CUBE and LED Head. If fan is not running or the problem persists contact technical support for assistance.
3 or 5	Internal Error	Power cycle the X-Cite® mini+ 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® mini+ 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 rear of the controller unit.
    c. The main AC power switch is in the ON position.
2. Fuse Check:
    a. Check both main power fuses. First disconnect the power cord, then carefully remove the fuse tray assembly next to the AC receptacle on the rear of the unit. Note: depending on the orientation of the AC receptacle, the fuse tray may be below or beside it. The red arrow in figure 10 (A) shows where a flat screwdriver can be inserted to gently lever out the fuse tray.

A B C

Figure 10 Location and Removal of Fuse Tray in AC Receptacle

b. If either or both of the fuses are open, replace with the same type (4A, 250V).
c. Note: To determine if a fuse is intact (i.e. OK) or open (i.e. blown), remove the fuse from the tray and check with a multi-meter set to resistance (Ω). An intact fuse will read "0Ω" (or another very low value), an open fuse will have an extremely high Ω reading.
d. Note: Fuses that chronically need replacing are usually a signal that something is wrong and Technical Support should be contacted.

3. SpeedDIAL Check:
   a. Verify that the pins on speedDIAL connector are straight.
   b. Verify that speedDIAL is plugged securely into *mini*CUBE.

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 LED Head is turning on.
2. Microscope Check:
    a. Verify that the Microscope Flange is appropriate for the microscope configuration. Note: Some flanges 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
speedDIAL	Favorite intensity setting: double-click turns off LED instead of going to the stored setting	Increase delay in the speed (Spd) setting.
	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.
TTL Triggering	TTL signal does not trigger unit	Enable TTL mode.
	TTL response time is longer than usual	Verify that timeout settings are appropriately set.
Audible Noise	*mini*CUBE 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 (it is likely enabled).
UV Excitation	No DAPI signal is visible, all other fluorophores are fine.	Unit is in "UV Off" mode. Use speedDIAL to enable "UV On" mode.
USB Communication	Computer does not detect X-Cite unit via USB connection	Power down X-Cite unit. Wait at least 10 seconds. Restart.

Note: The LED head has an additional feature of a temperature-controlled fan which only turns on when required by the unit, thereby preventing additional vibration or acoustic noise which may interfere with sensitive applications. The fan in the LED head will automatically turn on when the LED temperature reaches 55°C and turn off when the LED temperature is below 45°C. Timing will vary depending on the ambient temperature of the LED head's location and duty cycle.

7 Routine Care and Maintenance

7.1 General

X-Cite® mini+ is a very low maintenance system with no consumable components. 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® mini+ air vents unobstructed.
2. Ensure that the cable connecting the *mini*CUBE and LED Head has some slack in it and is never cut, stretched, kinked, or forced into a sharp bend.
3. If X-Cite® mini+ must be moved, ensure that both the *mini*CUBE and the LED Head are supported. Never use the cable as a handle.
4. Never leave the internal optics of the LED Head exposed. When not connected to a microscope, ensure the output port is always covered by a Microscope Flange or the supplied protective plastic cover.
5. Never touch optical surfaces with fingers, tools or any other abrasive/sticky/sharp materials or fluids.
6. If cleaning is required, follow the directions in the next section.

7.2 Cleaning - Exterior Surfaces

If necessary, exterior surfaces of X-Cite® mini+*'s* LED Head, *mini*CUBE 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.

7.4 Thermal Management System

X-Cite® mini+*'s* unique thermal management system incorporates air cooling technologies. If the general care and maintenance guidelines described above are followed, no further maintenance is required to ensure continued superior performance.

If, through accident or negligence, the cable between *mini*CUBE and the LED Head is damaged:

1. Power off and discontinue using the system.
2. Contact Technical Support (techsupport@excelitas.com).

8 Technical Specifications

8.1 General

	***mini*CUBE**	**LED Head**	**speedDIAL**
Height	110mm (4.4")	135mm (5.3")	59mm (2.3")
Width	180mm (7.1")	100mm (3.9")	80mm (3.1")
Depth	230mm (9.1")[a]	110mm (4.4")[a,b]	112mm (4.4")
Weight	3.4kg (7.5lbs) *mini*CUBE and LED Head are permanently connected		0.3kg (0.7lbs)

Notes:

a. Does not include clearance required for cable, minimum 200mm (8").
b. Does not include microscope flange, varies by type, approximately 10-15mm (0.4-0.6").

8.2 Electrical

Power Supply	Power Factor Corrected, Universal Input
Input Voltage	100-240VAC, 50/60Hz
Current	XMPS/XMPL: 2.4A max /100V, 1.2A max/240V XTMS/XTML: 2.4A max /100V, 1.2A max/240V

	XT120Lm: 2.0A max /100V, 1.0A max/240V
Input Surge	With cold start 40A/115V, 80A/240V
Protection	Over load and over temperature
Fuse Rating	Dual fuse system: each fuse rated at F 4.0A 250V 5x20mm type located in AC receptacle

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
Enclosure Rating	1

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 *mini*CUBE to control LED and report status (on/off, intensity adjustment, system error, etc.)
USB - IN/OUT	B	Communication between computer and *mini*CUBE to control LED and report status.
TTL - IN	BNC	External trigger to turn LED on/off
Foot Pedal - IN	3mm stereo plug	External trigger to turn LED on/off

8.6 Output Stability

For maximum output stability, X-Cite® mini+ should be set to a power level of 5% or greater. At lower power levels (<3%), some intensity fluctuation may be observed.

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

9.1 Product Safety and Electromagnetic Compatibility

The X-Cite mini+ 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 https://www.excelitas.com/product/x-cite-mini-compact-led-illumination-system.

9.1.1 Optical Safety

The X-Cite mini+ is classified as Risk Group 3 according to IEC 62471: Photobiological Safety of Lamps and Lamp Systems.

Resulting Classification and Labelling:

Hazard	All models
Actinic UV	Risk Group 3
Near UV	Risk Group 3
Blue Light	Risk Group 2
Retinal Thermal Weak Visual	Exempt Group

9.2 CE Marking

Council Directive 2014/35/EU	**Low Voltage Directive**	CE
Council Directive 2014/30/EU	**EMC Directive**	
Council Directive 2012/19/EU	**WEEE Directive**	
Council Directive 2011/65/EU as amended by (EU) 2015/863	**RoHS**	

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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/her own expense.

WARNING

Changes or modifications not expressly approved by Excelitas Technologies 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

The symbol above indicates that this product is in compliance with China RoHS requirements.

9.6 Australia - RCM

The symbol above indicates that this product is in compliance with the Electromagnetic Compatibility and Labelling requirements of the Australian Communications and Media Authority (ACMA).

10 Warranty & Repairs

10.1 Warranty Terms

Excelitas Technologies 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 assembly within the LED Head has a warranty period of 20,000 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 the Excelitas Technologies Service Center. Returned equipment will not be received without a Return Material Authorization (RMA) Number, issued by the appropriate 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 Technologies 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 fuses and air filters.

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

SYSTEM COMPONENT	WARRANTY	WARRANTY VOID IF…
X-Cite® mini+ *mini*CUBE X-Cite® mini+ Head	1 year	• Unit has been subjected to misuse or mishandling. • Unit has been opened or tampered with.
X-Cite® mini+ speedDIAL	1 year	• Unit or cabling has been subjected to misuse or mishandling. • Unit has been opened or tampered with. • LCD display damage (physical).
LED assembly (in X-Cite® mini+ Head)	• 20,000 hrs • 3 years whichever Comes first	• Cable damage due to misuse or mishandling. • LED Head has been opened or tampered with. • For all other LED Head components, 1 year warranty applies.

10.2 Returning equipment to Excelitas Technologies

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 Technologies Service Center to obtain a Return Material Authorization (RMA) number. For your convenience, RMA numbers can also be requested on-line at: techsupport@excelitas.com
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 1-800-668-8752 (*USA and Canada)*
Fax: (905) 821-2055
1-800-668-8752 (*USA and Canada)*
x-cite@excelitas.com
https://www.excelitas.com/product-category/x-cite-illuminators

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)
techsupport@excelitas.com
https://www.excelitas.com/ox_service_request_form

11.3 Accessories and Replacement Parts

Replacement parts and accessories can be purchased directly from Excelitas Technologies. 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