# PhotoFluor™ Light Source

# Operating Manual

*This manual contains important information necessary for the safe and efficient operation of the PhotoFluor light source. Please read the manual in its entirety and heed all safety warnings before operating the light source.*

**Follow all safety precautions!**

The 89 North PhotoFluor (Model CT-3675) light source is designed and tested in accordance with ANSI/UL 61010-1 and CAN/CSA C22.2 Number 61010-1.

Prior to use, carefully unpack and inspect all components for any signs of damage which may have occurred during shipping. If shipping damage is suspected, notify 89 North or your authorized 89 North distributor immediately.

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# Contents

Special instructions are emphasized as follows:

| | |
|---|---|
| *NOTE:* | *This term contains important information regarding set-up and operation to facilitate ease of use and obtain effective results.* |

*This term contains critical information regarding safe handling and use of this system. Device malfunction or property damage could result if these instructions are not followed.*

*This symbol cautions that surfaces may be hot and could be a burn hazard.*

*This symbol indicates the location of a grounding lug.*

***WARNING:*** *This term contains critical information by identifying conditions or practices that may result in injury or loss of life if these instructions are not followed.*

# 1 Introduction and Intended Use

The 89 North PhotoFluor is a light source for fluorescence microscopy. It contains a 200 W metal halide lamp and associated optics to deliver bright illumination from 340 nm to 650 nm.

The illumination is directed to the microscope via a liquid light guide. The light guide limits heat delivery to the microscope and provides flexibility in the placement of the main body of the light source.

The metal halide lamp will operate for greater than 1500 hours of use. The light source will report the number of hours of use on the display panel.

Because of its intense brightness, the light source includes a manually changed neutral density wheel that allows the user to attenuate the light that is delivered to the microscope. The amount of light that is being transmitted through the system is reported on the display.

**Only the lamp and Light Guide supplied by the manufacturer shall be used. The use of other products may impair the safe operation and protections provided by the equipment.**

# 2 Safety

The PhotoFluor uses a powerful lamp that produces heat as well as visible and UV light. Proper care must be taken in the setup and operation to prevent injury.

If the equipment is used in a manner not specified within this manual the protection provided by the equipment may be impaired.

Never open or remove the top cover. All maintenance, including lamp replacement, must be performed by qualified personnel only.

The lamp contains trace amounts of mercury and other metals. If the lamp is damaged or broken, proper handling and disposal are required for safety.

www.lamprecycle.org

Do not operate the unit near any flammable materials including flammable gases or liquids.

The light source is designed to sustain a bulb burst within the light engine enclosure. The light source may, however, suffer internal damage as a result. Only qualified personnel shall inspect the unit for internal damage.

***WARNING:*** LAMP EXPLOSION HAZARD - The lamp contains toxic gasses under high pressure. In the event of an explosion, mercury vapor, high temperature gasses, and very fine glass may exit the unit.

All persons should leave the surrounding area at once to prevent mercury inhalation.

The area should be ventilated for 30 minutes.

The area surrounding the light source should be cleaned using an appropriate absorbent such as Mercurisorb® or Mercon™ Mercury Spill Kit II or Mercury Spill Clean-Up Kit.

***WARNING:*** Inhaling mercury vapor or small particles of mercury or its compounds can be harmful to lungs, kidneys, and the nervous system. Injuries to one's health can also arise due to penetration of the skin or resorption via the gastro-enteric tract.

***WARNING:*** To prevent risk of explosion:

- Replace lamp after 1500 hours of use with the required bulb only
- Do not bump the unit while in use
- Do not touch any portion of the bulb except the ceramic base and power wires as improper handling may shorten bulb life and may lead to catastrophic failure of the lamp.

***WARNING:*** The lamp produces significant amounts of ultraviolet radiation. Never look directly at the lamp or at light reflected from the lamp or the output from the liquid light guide.

***WARNING:*** Never operate the lamp with the light guide disconnected from the microscope as ultraviolet radiation can be harmful to the unprotected eye and skin.

***WARNING:*** The lamp produces significant amounts of heat. Always allow the light source components to cool to ambient temperature before attempting any adjustments or replacement of parts.

***WARNING:*** After 1500 hours of operation, the metal halide lamp must be replaced to ensure suitable performance and safety. The light source will alert the user at 1500 hours that the lamp is due for replacement. At 1600 hours, the light engine will cease operation as the bulb is no longer safe to use.

***WARNING:*** Used lamps should not be discarded in the conventional waste stream. The lamps contain metals that must be handled as potentially toxic.

Most error messages report serious problems that cannot be fixed by the user. In case of a fatal error, be prepared to turn the unit off and return it for repair. See Section 7 for specific information about Warning and Error Messages.

# 3 Initial Setup

### System Components

The PhotoFluor illumination system is comprised of a liquid light guide, an adapter to connect to the microscope body, an electrical power cord, and the light source (including a metal halide lamp), unit itself.

Carefully unpack all components, giving particular care to the liquid light guide. The light guide should not be bent severely or it will sustain irreversible damage. Also take care not to touch or contaminate the ends of light guide. If necessary the ends can be cleaned with isopropyl alcohol and a soft (non-abrasive) cloth.

### Picking a Location

Set the PhotoFluor on a flat surface in a place that allows for adequate air ventilation on all sides for the internal fans. Do not position the unit so that any of the sides or back of the PhotoFluor are up against a wall or other equipment.

| | |
|---|---|
| *NOTE:* | Assure proper space around the unit to allow for adequate ventilation. |

Allow adequate space in the back for the power cord and light guide. In addition, the main power switch is located at the back adjacent to the power cord receptacle and should be conveniently accessible to turn the unit on and off.

**Light Guide Connection**

Push the wider end of the light guide into the acceptor at the back of the unit until it snaps in place. Do not force the light guide.

Using an Allen wrench, attach the adapter to the epi-illumination port of the microscope. Insert the end of the light guide and secure in place by turning the red knob firmly to the right.

**Connecting the Power Cord**

Insert the power cord receptacle end into the AC receptacle in the back of the unit. Insert the power cord plug end into a standard AC outlet. See the technical bulletin in this manual for power requirements.

**Turning the Unit On**

Activate the main power switch in the back of the unit next to the AC receptacle. Your unit should then power up the lamp. After three to six minutes the lamp should be fully warmed up and ready for use.

To avoid damage to the lamp DO NOT turn off the lamp in the first three minutes while it is warming up.

| | |
|---|---|
| *NOTE:* | Avoid turning off and restarting the bulb during daily use unless it will not be used for an extended time. Bulb life is shortened by excessive restarts. For typical daily use it is best to let it run. |

# 4 Adapters

The PhotoFluor light source is available with adapters for Leica, Nikon, Olympus, or Zeiss microscopes. The types of microscopes for which the adapters are designed are the following:

- Leica K models including uprights and inverted microscopes (DM3000, DM4000, DM5000).
- Nikon i models, Eclipse, TE200, TE300 and TE2000.
- Olympus IX and BX models.
- Zeiss AxioImaging systems and Axiovert 200.

Other adapters may be possible as custom components. Please contact 89 North for more information.

*NOTE:* This equipment has passed testing for EMI / RFI radiation and susceptibility; however, if not installed and used in accordance with the instructions, interference to other devices in the near vicinity may occur. If this equipment does cause harmful interference to other devices, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.

- Reorient or relocate the receiving device.
- Increase the separation between the equipment.
- Connect the equipment into an outlet on a circuit different from that to which the other device(s) are connected.
- Consult the manufacturer or field service technician for help.

# 5 Neutral Density Control

The PhotoFluor light source has five levels of attenuation of the lamp output. The level of attenuation is set with the black wheel on the front of the unit under the display.

| Position | Transmission |
|---|---|
| 1 | 100% |
| 2 | 75% |
| 3 | 60% |
| 4 | 40% |
| 5 | 20% |
| 6 | closed |

Turning the wheel on the front of the unit in a clockwise manner advances the wheel to the next position. It will click in place. The level of transmission is reported on the display.

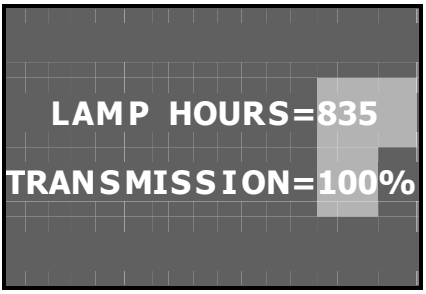
# 6 Monitoring operation

Display Modes: Normal Mode and User Set Mode

## 6.1 Normal Mode

The Normal Mode displays the operational status of the light source. This is the default display when the unit is powered ON.

“Normal Mode” layout for the display is shown below:




Start Up Display Message:


The “lamp warning” message will be displayed for the three minutes while the lamp is warming up.

## 6.2 User Set Mode

User Set Mode allows the user to tailor the factory pre-set default settings to their personal preferences.

In order to move from mode to mode, the user presses the ***Green Enter*** button. To change values in the **User Set** mode press the up and down ***Arrow*** buttons. The ***Arrow*** buttons are used to scroll, select, increment, decrement or set operating parameters in the **User Set** mode. Once the user has entered the desired parameters the ***Green Enter*** button is pressed to save the new values and to return to the Normal Mode display.

The figure below shows the layout for the User Set display.


The value text will be highlighted when the "▲" and "▼" ***Arrow*** buttons are used to scroll and select the feature to be changed. The alarm value is highlighted when this screen is first entered. The "◄" and "►" buttons are used to increase or decrease the values.

The ***Green Enter*** button will save the values and return to the Normal Mode display.

# 7 Warning and Error Messages

Warning Messages

A warning message is displayed when there is a condition that the user should be aware of. Some warning messages may be aborted by the user while others may go away if the warning condition resolves itself (for example, if the temperature goes down below a warning level). Except where noted, the "warning" sequence of the audible alarm will be sounded for a warning condition.

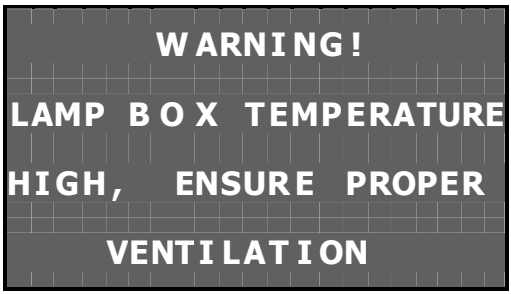
Error Messages

An error message is displayed when there is an error condition. **There are no errors that can be corrected by the user: the unit must be shipped back for repair.** Error display messages will flash 4 seconds on, ½ second off, except where noted. The "error" sequence of the audible alarm will also be sounded for all error conditions, except where noted.

**Error – Power Supply Failure**

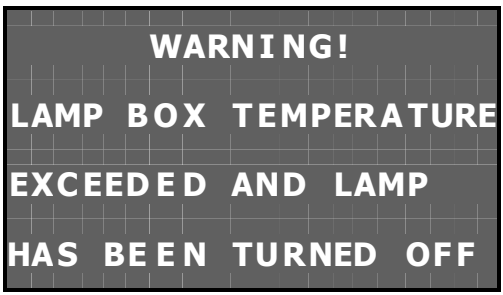

If a power supply failure occurs this error message is displayed. The lamp will then be powered down and will remain off until the unit is powered up again or repaired.

**Warning – Lamp Temperature**



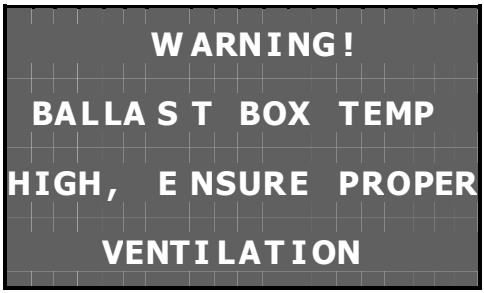

This warning is displayed if the lamp chamber temperature exceeds the warning limit. The display will return to normal if the temperature returns below the warning temperature.

**Error – Lamp Temperature Exceeded**



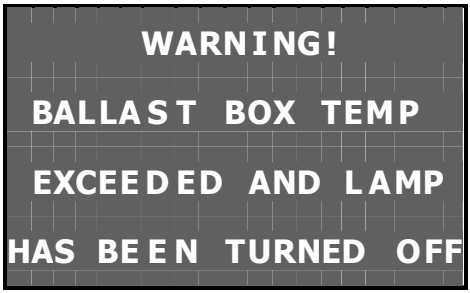

This error is displayed if the lamp chamber temperature exceeds the error limit. The lamp will be powered down and will remain off until the unit is powered up again or repaired. The message remains on the display until the user powers the unit down.

**Warning – Ballast Temperature**



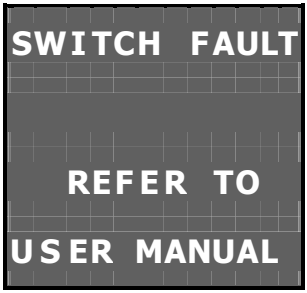

This warning is displayed if the ballast chamber temperature exceeds the warning limit. The display will return to normal if the temperature returns below the warning temperature.

**Error – Ballast Temperature Exceeded**




This error is displayed if the ballast chamber temperature exceeds the error limit. The lamp will be powered down and will remain off until the unit is powered up again or repaired. The message remains on the display until the user powers the down.

**Error – Switch Failure**




This error is displayed if the unit's switch becomes stuck in the "on" position. Retry switches and buttons to see if the faulty connection is freed. If this fails, unplug the unit and return for repair.

**Warning – Cover Open**


If the case is open, this warning message is displayed, and the ballast will be shut down / disabled so the lamp will not be powered. The message remains on the display until the unit is powered down and the fault is corrected.

**Error – Thermostat Over-Temperature**


If the thermostat monitoring crucial temperature points in the unit fails, the unit will shut down and must be returned for repair.

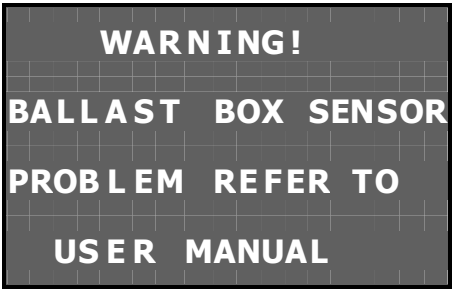
**Error – Encoder Not Responding / ND Filter Failure**


A problem with the filter wheel may be remedied by moving the wheel. If this does not alleviate the problem, the unit must be inspected and repaired.

**Warning – Ballast Interface Not Connected / Responding**

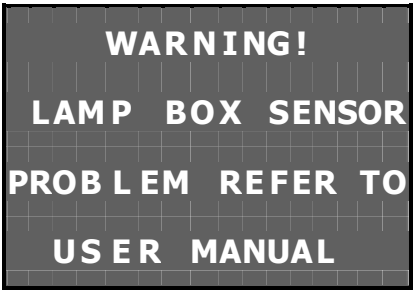

Lamp did not start or the lamp is not plugged in or the lamp has failed. Shut down and restart. If error persists, have qualified personnel check installation if the lamp. If the lamp is intact and is properly installed and the error persists, return the unit for repair.

**Error – Ballast thermistor outside of normal range**




Shut down and restart.
If error persists, return for repair.

**Error – Lamp thermistor outside of normal range**




Shut down and restart. If error persists, return for repair.

**Warning – Lamp hours approaching replacement time**


This error indicates that the lamp use has exceeded 1500 hours. A replacement lamp will be required shortly. The warning can be cleared by depressing the green enter button.

**Error - Lamp hours exceed safety limit**


At 1600 hours, the lamp will shut down to prevent any possible danger of envelope failure. To reset the message and restart the light engine, the bulb must be replaced per the Lamp Replacement Guide by qualified personnel.

# 8 Maintenance

**All maintenance including lamp replacement to be performed by qualified personnel only.** Under no circumstances should the top cover be removed as electrical hazards and hot surfaces exist.

No special or scheduled maintenance is required. If the unit should malfunction, and the troubleshooting matrix does not correct the problem, please contact 89 North or your authorized 89 North distributor.

## 8.1 Troubleshooting

89 North customer service should be informed immediately in the event of any damage or malfunction in the equipment.

| Fault | Causes and remedies |
|---|---|
| **Console won't power up** | **Check**<br>AC power and that cord is plugged in.<br><br>**Check**<br>PhotoFluor AC main fuses in back panel switch assembly.<br><br>**Contact**<br>If problem persists, contact 89 North customer service for further instructions. |
| **Console fails Self Diagnostic Test** | **Note**<br>Error message.<br><br>**Contact**<br>89 North customer service for further instructions. |
| **Cover Open** | **Check**<br>All four cover screws must be installed or the interlock may not allow normal use.<br><br>**Contact**<br>If problem persists, contact 89 North customer service for further instructions. |

| Fault | Causes and remedies |
|---|---|
| **Lamp does not start** | **Check**<br>Top cover is secured. If top cover is not secured, lamp will not start.<br><br>**Check**<br>Lamp life. If 1600 hours have been exceeded, lamp must be replaced.<br><br>**Check**<br>Lamp is intact and properly installed. If lamp is not intact or properly installed, it will not start. Only qualified personnel can inspect lamp installation.<br><br>**Contact**<br>If problem persists, contact 89 North customer service for further instructions. |
| **Temperature High or Exceeded** | **Check**<br>Ambient air temp too high, improve air circulation.<br><br>**Check**<br>Air vents blocked or restricted.<br><br>**Contact**<br>If problem persists, contact 89 North customer service for further instructions. |

## 8.2 Replacing the fuses

When changing the fuses, always ensure that fuses with ratings as marked on the rear panel are used.

Replace the main fuses as follows:

1. Disconnect the device from the main power supply.
2. Apply a flat screwdriver to the slot at the top of the fuse tray and gently pry it open.
3. Slide the fuse tray out as far as possible; the fuses will now be accessible.
4. Remove and replace the fuses.
5. Slide the fuse tray back in the plug housing.

## 8.3 Disposal of the lamp

The lamp contains heavy metals and must be disposed of properly. Please consult the following web address for current information: www.lamprecycle.org.

## 8.4 Limited Guarantee / Warranty

The PhotoFluor light engine is under warranty for one year from the date of delivery as long as it is operated as described in this manual. The lamps have an expected life span of at least 1500 hours and will be replaced if they fail or provide poor performance during that time, provided they are handled as described herein. The liquid light guide is under warranty for one year from delivery.

89 North's liability to the customer is limited to the replacement cost of the PhotoFluor unit.

# 8.5 Technical Data

**PhotoFluor (CT-3675)**

- Width: 14.0 cm (5.5 inches)
- Height: 21.6 cm (8.5 inches)
- Depth: 36.8 cm (14.5 inches)
- Weight: 5.45 kg (12lbs.)
- Operating mode: continuous
- Water protection: IPX0
- Main cable: 10 A/250 V
- Jack: IEC 320/C13
- Power supply: 100-240 V, 50/60 Hz, 3.15A
- Fuse: T3.15A 250V
- Cleaning: Surface cleaning with mild detergent

**Liquid Light Guide**

- Weight: 0.23 kg (0.5 lbs.)
- Length: 1.5 M (4.9 feet)
- Cleaning: Surface cleaning with mild detergent; Optical components with Isopropyl alcohol

**Ambient conditions for operation**

- Temperature: 10° to 25°C (50° to 77°F)
- Rel. humidity: 30% to 75%
- Air pressure: 700 hPa to 1060 hPa

**Ambient conditions for storage (in shipping packaging)**

- Temperature: 0° to +50°C (32° to 122°F)
- Rel. humidity: 0% to 100%, non-condensing

**Contact Information:**
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