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Find the *89 North Chroma PhotoFlour 2* at our website: *Click HERE*

PhotoFluor® II and PhotoFluor II NIR

Operating Manual

This manual contains important information necessary for the safe and efficient operation of the PhotoFluor II family of light sources. 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® II (10999-000-000) and PhotoFluor II NIR (10998-000-000) light sources are designed and tested in accordance with ANSI/UL 61010-1, CAN/CSA C22.2 Number 61010-1, CENELEC EN 61326-1:2006, and FCC Part 15 Subpart B, Class B.

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.

89 North®
1 Mill St. Unit 285
Burlington, VT 05401
U.S.A.
877-417-8313
+1-802-881-0302
www.89North.com

Rev D

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Special instructions are emphasized as follows:

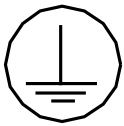
NOTE:	*This term contains important information regarding set-up and operation to facilitate ease of use and obtain effective results.*



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.*

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1 Introduction and Intended Use

The 89 North® PhotoFluor® II and PhotoFluor II NIR are light sources for fluorescence microscopy. They contains a 200 W metal halide lamp and associated optics to deliver bright illumination from 340 nm to 650 nm (PhotoFluor II) or 360 nm to 850 nm (PhotoFluor II NIR).

The illumination is directed to the microscope via a liquid light guide (LLG). The light guide limits heat delivery to the microscope and provides flexibility in the placement of the main body of the light source. The light source supports both 3mm and 5mm core diameter liquid light guides.

Both the PhotoFluor II and PhotoFluor II NIR use specific light guides to maximize the output in their intended transmission bands. Using the incorrect liquid light guide will compromise the performance of the light engine and prematurely age the light guide.

The metal halide lamp used 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 an electronic motor driven neutral density filtering device 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.

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2 Safety

The PhotoFluor II family of light sources uses a powerful lamp that produces heat as well as visible, UV light and NIR light (PhotoFluor II NIR). 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.

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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 and NIR radiation can be harmful to the unprotected eye and skin.

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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.

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3 System Overview

Front Panel Controls:



Menu / Enter / Esc (touch)
Sleep / Wake (hold 5 seconds)

◄►Filter Position (Normal Mode Main Screen)
Option Toggle (User Set Mode Screen)

▼Shutter Toggle (Normal Mode Main Screen)
▲▼Option Select (User Set Mode Screen)

Rear Panel:



Light Port

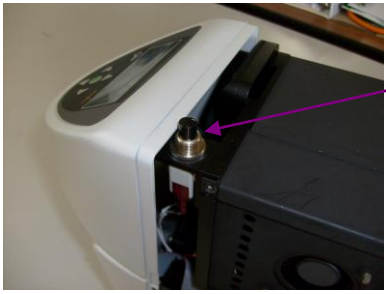
Computer Port

Power Switch

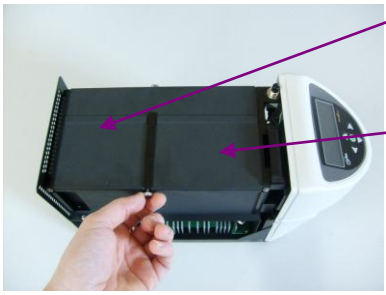
Power Plug

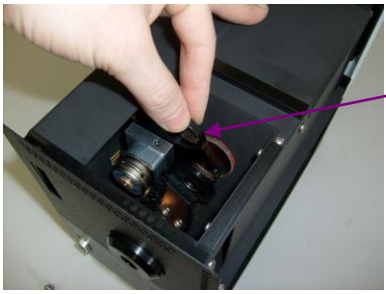
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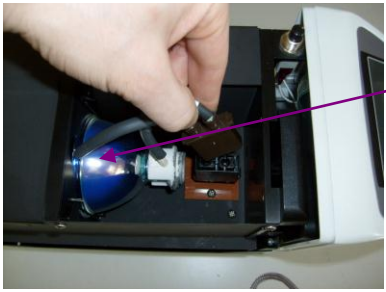
Safety Interlock:



Internal Compartments:







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4 Initial Setup

System Components

The PhotoFluor II and PhotoFluor II NIR illumination systems are comprised of:

- Light Source
- Liquid Light Guide (specific to both the PhotoFluor II and the PhotoFluor II NIR)
- Microscope Adapter (as required)
- Electrical Power Cord
- USB to Serial adapter
- Bulb

Carefully unpack all components, giving particular care to the liquid light guide. The light guide should never 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 cloth.

Picking a Location

Set the light source on a flat surface in a place that allows for adequate air ventilation on all sides. Do not position the unit so that any of the sides (including the back or the top) are up against a wall or other equipment.

NOTE:	Maintain **at least 6" of clearance** around all sides of the light source for adequate ventilation.

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 (as required) 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.

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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" Using Rear Panel Switch

Activate the main power switch in the back of the unit next to the AC receptacle. Your unit should then power on 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 the lamp off 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.

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.

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5 Adapters and Liquid Light Guides

The PhotoFluor II and PhotoFluor II NIR light sources have adapters available for a wide arrange lf microscope and imaging systems. Contact 89 North or an authorized 89 North reseller for more information.

Two different diameter liquid light guides are available. The PhotoFluor II and PhotoFluor II NIR each use different LLGs to maximize their specified transmission range. Use of the wrong LLG will both comprise the output power of the system and result in premature light guide aging. Only use the LLG specified for your version of PhotoFluor II.

	PhotoFluor II	PhotoFluor II NIR
3 mm x 2M Liquid light guide	20001-000-000	20023-000-000
5 mm x 2M Liquid light guide	20003-000-000	20024-000-000

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Neutral Density Control

The PhotoFluor II and PhotoFluor II NIR, as shipped, have five levels of internal attenuation for the lamp output. The level of attenuation is adjusted by either the front panel controls or through optional external software. An internal electronic drive system moves the filters into position as well as actuates the light shutter feature.

Position	Transmission
1	100%
2	75%
3	60%
4	40%
5	20%
6	Closed

The ◄ and ► arrows on the keypad step the filters in the Main Screen (Normal Mode). The ▼ arrow controls the shutter toggle.

NOTE:	Neutral density filters may be replaced with specific high temperature tolerance excitation filters. Replacing a neutral density filter with an unapproved glass filter may result in damage to the unit. Call 89 North for details and assistance regarding acceptable filters and filter replacement.

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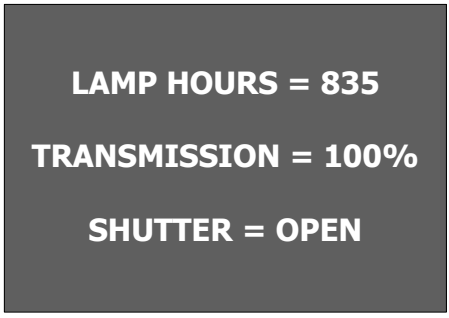
6 Monitoring Operation

Display Modes: *Normal Mode*, *Sleep 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 after the 3 minute warm-up screen.

"Normal Mode" layout for the display is shown below:



6.2 Sleep Mode

Sleep Mode can be activated while the unit is in *Normal Mode* by holding the green button for 5 seconds until the unit powers off. Repeat the sequence to awaken the unit. Re-initialization will happen as the bulb starts up again so the standard 3 minute warm-up will still apply.

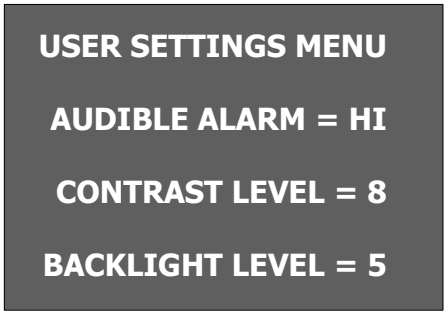
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6.3 User Set Mode

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

The green enter button toggles *Normal Mode* and *User Set Mode* with a single momentary press. The ▲ and ▼ buttons move the cursor up and down while the ◄and ► buttons toggle the settings and increase or decrease values. The green enter button will save the settings and exit the menu.

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



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7 Warning Messages

Warning messages display important information about the unit. The following section describes the protocol for each message. Some warnings automatically reset, while others require user intervention. Visual warnings will always be accompanied with audio beeping.

Warning – Power Supply Failure



This warning indicates a power supply failure. The lamp will be powered down and remain off. Cycle the AC power. If the problem persists, call for technical help.

Warning – Lamp Temperature



This warning signals a ventilation problem which could be a warm ambient environment, obstructed vents, or a fan failure. Assure proper ventilation (clean vents and clearance). The warning will clear if the internal temperature of the unit decreases below the warning temperature. If the message persists, call for technical help.

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Warning – Lamp Temperature Exceeded



This latching warning shuts down the bulb because of a ventilation problem which could be a warm ambient environment, obstructed vents, or a fan failure. Assure proper ventilation (clean vents and clearance). Re-power the unit to clear the message. Call for technical help if the problem persists.

Warning – Ballast Temperature



This signals a ventilation problem which could be a warm ambient environment, obstructed vents, or a fan failure. Assure proper ventilation (clean vents and clearance). If the message does not clear, call for technical help.

Warning – Ballast Temperature Exceeded



This latching warning shuts down the bulb because of a ventilation problem which could be a warm ambient environment, obstructed vents, or a fan failure. Assure proper ventilation (clean vents and clearance). Re-power the unit to clear the message. Call for technical help if the problem persists.

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Warning – Switch Failure



This warning is displayed if a control button becomes stuck in the “on” position. Retry switches and buttons to see if the faulty connection is freed. Call for technical help if the problem persists.

Warning – Cover Open



This warning is displayed when the cover is not secured. The ballast and lamp will be disabled. Secure the cover with 4 screws and re-power the unit to clear the message. Call for technical help if the message persists

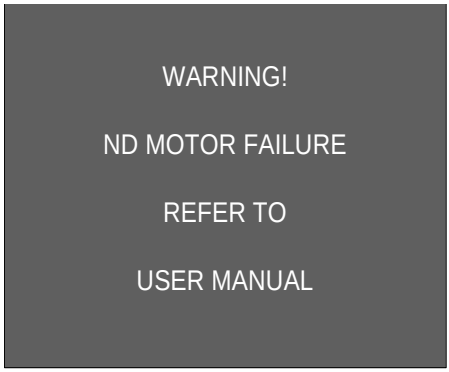
Warning – Thermostat Over-Temperature



This warning indicates either the unit has overheated or has a sensor failure. Assure proper ventilation and clean unrestricted vents. Call for technical help if the problem persists.

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Warning – ND Filter Failure



This warning indicates the filter wheel has failed to calibrate. Remove the top cover and check for obstructions around the filter wheel. Call for technical help if the problem persists.

Warning – Ballast Interface Not Connected / Responding



Lamp or ballast did not start or the lamp is not plugged in or the lamp has failed. Shut down and restart. If the error persists, have qualified personnel check the installation of the lamp. If the lamp is intact and is properly installed and the error persists, call for technical help.

Warning – Ballast Thermistor Outside of Normal Range



Shut down and restart. Call for technical help if the problem persists.

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Warning – Lamp Thermistor Outside of Normal Range



Shut down and restart. Call for technical help if the problem persists.

Warning – Lamp Hours Approaching Replacement Time



Indicates the lamp has exceeded its life (1500 hours). Replacement is required. The warning can be delayed for a short time by depressing the green enter button.

Warning - Lamp Hours Exceed Safety Limit



At 1600 hours, the lamp will shut down to prevent any possible danger of envelope failure. Have qualified personnel replace the bulb per the *Lamp Replacement Guide*.

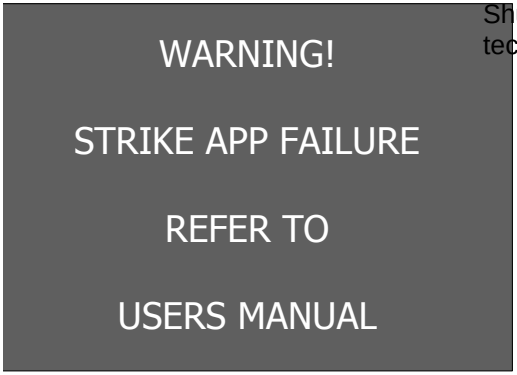
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Warning – Program Failure



Shut down and call for technical assistance

Warning – Strike Program Failure



Shut down and call for technical assistance

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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.

Keep the vents and internal heat sinks dust free. If the unit should malfunction, and the troubleshooting matrix does not correct the problem, please contact 89 North or your authorized 89 North distributor.

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7.1 Troubleshooting

Fault	Causes and remedies
Console won't power up	**Check** AC power and that cord is plugged in. **Check** PhotoFluor II AC main fuses in back panel switch assembly. **Check** Is the unit in "Sleep Mode"? **Contact** If problem persists, contact 89 North customer service for further instructions.
Unit Displays Warning Message	**Note** Error message and Warning Messages section of this manual. **Contact** 89 North customer service with errors that may require servicing. Be sure to write down the exact error messages seen.

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Fault	Causes and remedies
Lamp does not start	**Check** Top cover is secured. If top cover is not secured, lamp will not start. **Check** Lamp life. If 1600 hours have been exceeded, lamp must be replaced. **Check** 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. **Contact** If problem persists, contact 89 North customer service for further instructions.
Temperature High or Exceeded	**Check** Ambient air temp too high, improve air circulation. **Check** Air vents blocked or restricted. **Contact** If problem persists, contact 89 North customer service for further instructions.

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7.2 Replacing the Fuses

Use only rated fuses 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.

7.3 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.

7.4 Limited Guarantee / Warranty

The PhotoFluor II and PhotoFluor II light engines are 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 II or PhotoFluor II NIR unit.

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7.5 Technical Specification

PhotoFluor II (10999-000-000)

- 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.)
- Power supply: 100-240 V, 50/60 Hz, 3.15 A;
- Fuse: T3.15A 250V
- Keypad: Five button control

Liquid Light Guide

- Length: 2 M (6.5 feet)
- Core: 5 mm or 3 mm (diameter)

Lamp

- Type: 200 W metal halide

Filter Wheel

- Mode: Motorized operation
- Contents: Attenuation screens, can accept heat tolerant excitation filters
- Motorized shutter Approx 250 ms response time

Display and Safety features

- Clear display of lamp time, filter wheel position
- Automatic system diagnostics
- Resettable lamp counter with warnings
- Four line by 20 character display (dimmable)
- Safety interlocks, output light blocked in absence of light guide
- Over temperature protection with software warnings and hardware shutdown

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Serial Connection

- Full computer control via ASCII or binary command set
- user controlled filter positions
- Computer-controlled lamp shut off conserves power and lamp hours during long experiments

Ambient conditions for operation

- Temperature: 10° to 25°C (50° to 77°F)
- Rel. humidity: 30% to 75%

PhotoFluor II NIR (10998-000-000)

- 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.)
- Power supply: 100-240 V, 50/60 Hz, 3.15 A;
- Fuse: T3.15A 250V
- Keypad: Five button control

Liquid Light Guide

- Length: 2 M (6.5 feet)
- Core: 5 mm or 3 mm (diameter)

Lamp

- Type: 200 W metal halide

Filter Wheel

- Mode: Motorized operation
- Contents: Attenuation screens, can accept heat tolerant excitation filters
- Motorized shutter Approx 250 ms response time

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Contact Information:

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