Deuterium-Halogen Light Source

DH-2000 / DH-2000-BAL / DH-2000-DUV / DH-2000-S / DH-2000-S-DUV / DH-2000-FHS, DH-2000-FHS-DUV / DH-2000-S-DUV-TTL

A **Mikropack** ▶ Product

Installation and Operation Manual

Document Number 000-10000-025-02-1105

⚠ **WARNING**

Protective Eye Wear Must Be Worn When Using This Instrument - Intense Ultraviolet Radiation Present

See Important Safety Notices inside.

—A—
HALMA GROUP COMPANY

Ocean Optics offers the most comprehensive, innovative and high-quality line of modular spectroscopy tools in the world. Mikropack, a leading supplier of spectroscopy and thin film components, is an essential and valuable partner in this enterprise. We have partnered with Mikropack because they are committed to the same goals of innovation and quality that inspire us here at Ocean Optics. As always, Ocean Optics conducts its business in an open, honest and technically available fashion. We invite you to contact us at Ocean Optics, Inc. (see front cover for contact information) or Mikropack GmbH with any technical questions, comments, or applications inquiries. Mikropack GmbH can be contacted at the following location:

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Important Safety Notices

1. Do not remove or modify any installed safety device on this equipment. Doing so will void your warranty and create an unsafe operating environment.

2. Dangerous voltages are present in this device. There are NO user serviceable parts inside.

3. Only allow qualified personnel to service this unit.

4. Do not use the unit if it is damaged in any way. Contact your dealer for repair or replacement information.

5. Always screw in the fiber optic cables before starting the instrument.

WARNING

Protective eyewear must be worn when using this equipment - Intense ultraviolet radiation present.
Never look directly into the light beam, as this can cause eye damage.

Warranty

Mikropack GmbH warrants to the original user of this instrument that it shall be free of any defects resulting from faulty manufacture of this instrument for a period of 12 months from the original data of shipment.

This instrument should not be used for any Clinical or Diagnostic purposes. Data generated in these areas is not warranted in any way by Mikropack GmbH. Any defects covered by this Warranty shall be corrected either by repair or by replacement, as determined by Mikropack GmbH.

There are no warranties that extend beyond the description herein.

This Warranty is in lieu of, and excludes, any and all other warranties or representations expressed, implied, or statutory, including merchantability and fitness, as well as any and all other obligations or liabilities of Mikropack GmbH including, but not limited to, special or consequential damages. No person, firm, or corporation is authorized to assume for Mikropack GmbH. Any additional obligation or liability not expressed provided for herein except in writing duly executed by an officer of Mikropack GmbH:

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Table of Contents

About This Manual

Document Purpose and Intended Audience

This document provides you with an installation section to get your system up and running.

What's New in this Document

This version of the *Deuterium-Halogen Light Source DH-2000 / DH-2000-BAL / DH-2000-DUV / DH-2000-S / DH-2000-S-DUV / DH-2000-FHS, DH-2000-FHS-DUV / DH-2000-S-DUV-TTL Installation and Operation Manual* updates TTL shutter information.

Document Summary

Chapter	Description
Chapter 1: *Setup*	Contains a list of package contents and unpacking instructions.
Chapter 2: *DH-2000 Specifications*	Contains operating environment specifications, as well as other physical details of the product.
Chapter 3: *Operating Instructions*	Provides instructions for operating the DH-2000 Light Source.
Chapter 4: *Troubleshooting*	Contains troubleshooting information for the power supply and both the deuterium and halogen lamps.
Appendix A: *Maintenance*	Provides instructions for changing the bulb.
Appendix B: *Supplementary Information for Models DH-2000-S and DH-2000-FHS*	Contains operating instructions specific to the DH-2000-S and DH-2000-FHS models.

Product-Related Documentation

You can access documentation for Ocean Optics products by visiting our website at **http://www.oceanoptics.com**. Select *Technical → Operating Instructions*, then choose the appropriate document from the available drop-down lists. Or, use the **Search by Model Number** field at the bottom of the web page.

You can also access operating instructions for Ocean Optics products on the *Software and Technical Resources* CD included with the system.

Engineering-level documentation is located on our website at *Technical → Engineering Docs.*

Upgrades

Occasionally, you may find that you need Ocean Optics to make a change or an upgrade to your system. To facilitate these changes, you must first contact Customer Support and obtain a Return Merchandise Authorization (RMA) number. Please contact Ocean Optics for specific instructions when returning a product.

Setup

Overview

The following sections provide instructions on unpacking and setting up your DH-2000 Light Source.

Before using the DH-2000 for the first time check for transport damage. Be sure to adhere to all warnings on the unit and in this manual.

Unpacking the DH-2000

► *Procedure*

1. Unpack your lamp assembly and power supply carefully. Although the lamp is rigidly mounted, dropping this instrument can cause permanent damage.

2. Inspect the outside of the instrument and make sure that there is no damage. Do not use the instrument if damage is present.

3. Use this instrument in a clean laboratory environment (see *Operating Environment*).

Contents

Your DH-2000 package should contain the following:

- ❏ DH-2000 unit
- ❏ Power cord
- ❏ One IC-DB15-2 interface cable for shutter operation (DH-2000-S, DH-2000-BAL, DH-2000-FHS, DH-2000-S-DUV-TTL, and D-2000-S models only)
- ❏ UV safety goggles

Connecting the Fiber Optic Cable

Use the following procedure to connect the cable to the lamp.

► *Procedure*

To connect the fiber optic cable to the DH-2000,
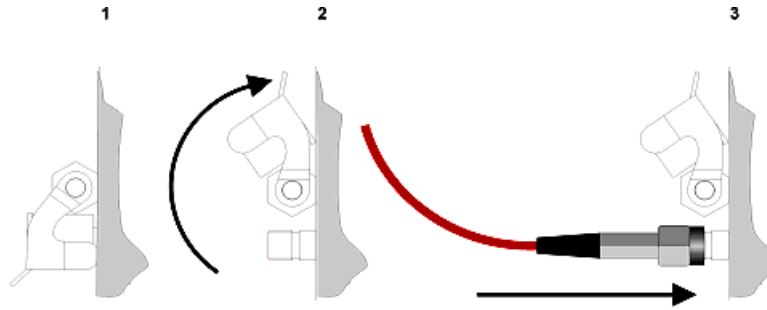
1. Locate the cap on the front of the DH-2000.

2. Lift the cap on the front of the DH-2000 to expose the SMA connector.

3. Connect the fiber optic cable to the SMA connector.

Chapter 2

DH-2000 Specifications

This section provides information on the operating environment, physical controls, and dimensions of the DH-2000.

Operating Environment

The following table provides information on optimizing the operating environment of your DH-2000 unit.

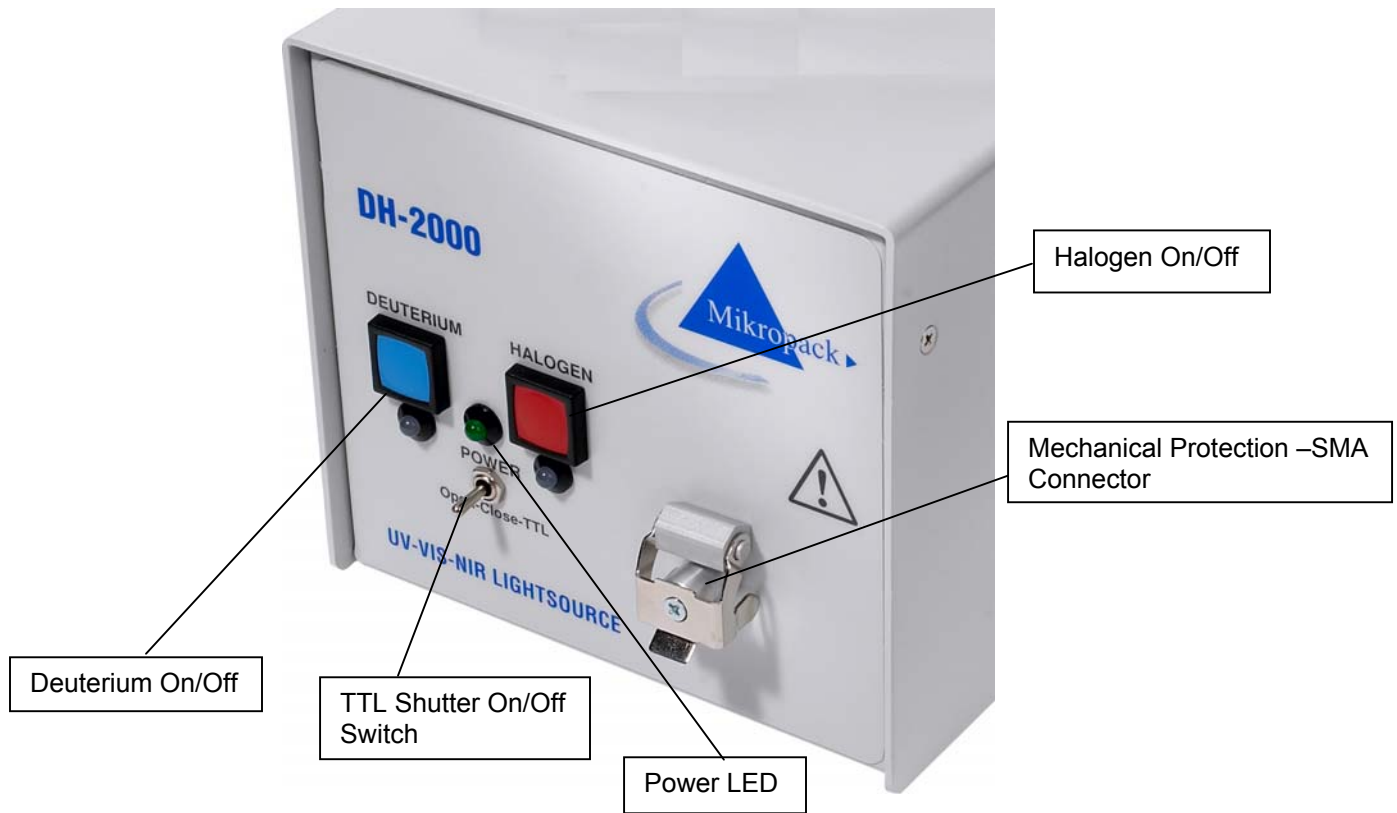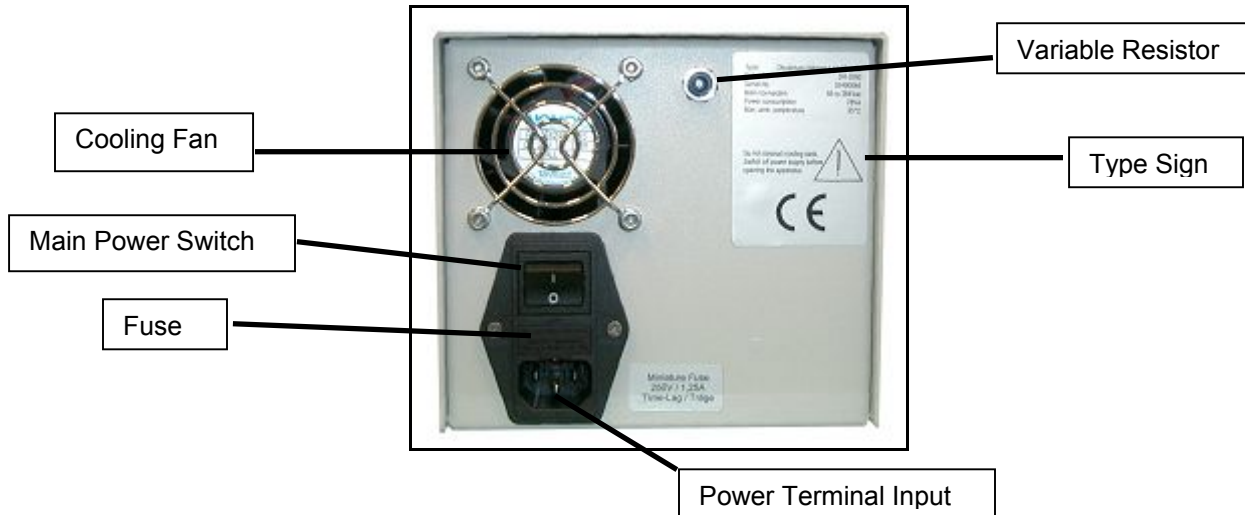| Operating Environment	The DH-2000 Unit . . .
Moisture	Is designed for operation in dry rooms only.
Ventilation	Should be situated so that its location or position does not interfere with proper ventilation.
Heat	Should be situated away from any device that emits excessive heat.
Object and Liquid Entry	Should be positioned so that objects do not fall on top of the unit. Additionally, ensure that no liquids are spilled into the enclosure through openings.
Power Sources	Should be connected to a power supply with the following specifications: • Units manufactured since April 2003 are equipped with power supplies that can handle voltage input of 90 to 240 VAC. These units have a serial number formatted as 23XXXX. • Units manufactured before April 2003 are equipped with power supplies that can handle either 110 VAC or 240 VAC. These units have serial numbers formatted as 02000XXX. The power type should be listed on a sticker on the rear of the light source.

DH-2000 Components

The following sections describe the components located on the front and rear of the DH-2000 unit. Also see *Supplementary Information for Models DH-2000-S and DH-2000-FHS* if you have one of these models.

Front Panel

Component	Description
Deuterium On/Off	Press to turn the Deuterium lamp on or off. The bulb requires a warm-up time of 20 seconds before the Deuterium lamp is illuminated. You must allow the bulb to warm up to receive accurate data from the lamp. LED lights green upon successful illumination, or red to indicate lamp malfunction.
Power LED	Indicates the power state of the DH-2000.
Mechanical Protection – SMA Connector	Covered to protect users from unintentionally looking directly at the beam of light. Connect the fiber cable to the DH-2000 **BEFORE** turning the lamp on to avoid unnecessary exposure to UV radiation. Always wear proper eye protection when using the DH-2000 lamp.
Halogen On/Off	Press to turn the Halogen lamp on or off. Requires a warm-up time of 20 seconds before the Halogen lamp is illuminated. LED lights green upon successful illumination, or red to indicate lamp malfunction.
For DH-2000-S and -BAL models: Shutter Mode Switch	Sets the operational mode of the shutter. Open indicates that the shutter is constantly open; Closed indicates that the shutter is constantly closed; TTL indicates that the shutter is operated via 5V TTL signal (see *Rear Panel*).

Rear Panel

Component	Description
Variable Resistor	Use a screwdriver to adjust the intensity of the halogen lamp to optimize the intensity between deuterium and halogen light in UV-VIS applications. <table><tr><td>**DH-2000-(S)-(FHS)-(DUV)-(BAL)**</td><td>**Voltage**</td><td>**Optical Power**</td></tr><tr><td>Halogen Adjustment</td><td>5V - 12 V</td><td>10% - 100%</td></tr></table>
Power Terminal Input	Connect power cable to provide voltage to DH-2000: **Note**: Only connect the power cable to the lamp when the Main Power Switch is in the OFF position.
Main Power Switch	Turn on to supply power to the DH-2000. The Power LED illuminates when this switch is in the On position.
Fuse	Contains the fuse to protect the unit against overload: European Fuse Type: Miniature fuse 5 x 20 mm, 1 Amp slow blow USA Fuse Type: Miniature fuse 5 x 20 mm, 2.5 Amp slow blow
Cooling Fan	Cools the interior of the DH-2000. Do not obstruct.
Type Sign	Information about: – Type — Version – Order No. — Serial No. – Main connection — Max. Ambient. Temperature – Warnings — CE-Marking
15-pin TTL Connector (not shown)	On TTL Connector-equipped DH-2000 Series lamps, this connector allows for external TTL control of lamp shuttering (-S and _BAL models only) and individual lamp operation (TTL model only). See Pinout information.

Specifications

| Specifications	Deuterium Lamp Criteria	Tungsten-Halogen Lamp Criteria
Wavelength Range	210–400 nm	300–1500 nm
Current – Voltage – Stability	≤0,01 % / h	0.4% of voltage
Current – Voltage – Drift	≤0,01 % / h	
Warm-Up Time	20 minutes	40 minutes
Lamp Voltage Lamp Current	Ignition 580V / 20° Operating 85 V / 0.3A	12V DC / 1.67A
Lamp Lifetime	1000 hours	
Radiation Characteristics	Aperture 0.5mm NA26° (13°)	Focused
PIN Position at SUB-D 15 Pin Connector (Only -S / -FHS / -BAL models) (Only -TTL model)	Shutter PIN 13: TTL / PIN 10: Ground PIN 2 Deuterium / PIN3 Halogen / PIN 4 Ground	
Possible Filter Dimensions (only -FHS model)	Up to diameter or square 25mm x 4mm, or 20mm x 6mm	
Performance Guaranteed Temperature	5°C – 35°C	
Humidity	5 - 95% without condensation at 40°	
Internal Power Consumption	25 W	20 W
Total Power Max. Power Consumption	100 Watt/190 Watt (Heating D-Lamp for 20 seconds)	

Power Requirements:
 	
  European Version (prior to 4/2003)
 	
  USA Version (prior to 4/2003)
 	
  All units manufactured after 4/2003
	230-240V 50/60 Hz
	
	110-115V 50/60 Hz
	
	90-240V 50/60 Hz
	
	See *Operating Environment* for specific information.	

Markings / Directives	CE; VDI/VDE 0160; EN 61010	
Weight	Approximately 6 kg	
Size	150 x 135 x 319 mm	

Pinout Information

The following table contains pinout information for the DH-2000 Series of Lamps. Consult the appropriate column for pinout information on your lamp.

If your lamp is not listed, pinout information in this chart is not applicable for your particular model.

Pin	Description	DH-2000	DH-2000-S	DH-2000-FHS	DH-2000-TTL	DH-2000-BAL
1	na					
2	Deuterium Lamp – Turns the Deuterium Lamp on when 5V is applied to the pin				X	
3	Halogen Lamp - Turns the Halogen Lamp on when 5V is applied to the pin				X	
4	Ground (TTL versions only)				X	
5	na					
6	na					
7	na					
8	na					
9	na					
10	Ground	X	X	X	X	X
11	na					
12	na					
13	TTL Signal – Shutter control	X	X	X	X	X
14	na					
15	na					
na = not applicable						

15-pin Connector Pinout Diagram
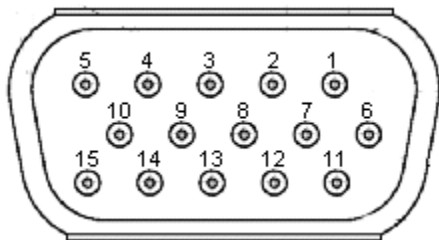
Note

Modification of specifications and design to improve device performance are possible without notice.

Chapter 3

Operating Instructions

Operating the Lamp

The following sections provide instructions on operating the Deuterium and Halogen lamps in the DH-2000. The Halogen lamp is only available in the DH-2000, DH-2000-DUV, and DH-2000-BAL models.

Caution

The unit must operate in a horizontal position.

Starting the Lamp

Press the Deuterium or Halogen On/Off switch down to preheat the desired lamp. The LED blinks green until the lamp illuminates (approximately 20 seconds). The bulb requires a 20-second preheating period. You must allow this warm up period in order to receive accurate data. After the warm up period, the lamp will light.

After successful illumination, the two-color LED beneath the lamp's On/Off switch lights up green to indicate that the lamp is on. Should the lamp fail to light, the two-color LED lights up red. This indicates a malfunction of the lamp. Press the On/Off switch again to reset the lamp. See *Troubleshooting* for more information.

WARNING

Protective eyewear must be worn when using this equipment - Intense ultraviolet radiation present.

Never look directly into the light beam, as this can cause eye damage.

Turning the Lamp Off

Turn the lamp off by pressing the appropriate On/Off switch.

Warming Up the Lamp

The Deuterium lamp requires 10–15 minutes, while the Tungsten-Halogen lamp requires 5–10 minutes of operation to reach a state of thermal equilibrium. During this warm-up period, the intensity of the UV output power can vary substantially.

If applications require extreme intensity stability, the Halogen lamp should be warmed up for an additional 15 minutes. Once warmed up for this amount of time, the lamp will reach specified drift values.

Troubleshooting

Deuterium Lamp

If the power supply or Deuterium lamp does not seem to functioning properly, check the following:

Issue	Probable Cause	Resolution
Power switches on, but no LEDs light.	Line power not present	Check line voltage
	Fuse defective	Check fuse
Deuterium lamp does not light. The two-color LED under the Deuterium On/Off switch lights up red, indicating an error.	Deuterium lamp too hot	Allow the Deuterium lamp to cool down (20 minutes). Press On/Off switch again to reset the Deuterium Tungsten-Halogen lamp, then press again to restart.
	Deuterium lamp life exhausted	Replace Deuterium lamp
	Deuterium lamp's internal connection plug is not closed correctly.	Open unit (see the *Maintenance*) and close connector plug.
Deuterium lamp turns off during operation.	Deuterium lamp too hot	Turn off the unit. Allow the unit to cool down for at least 20 minutes. Once the unit has cooled down, turn the Deuterium lamp back on.

Halogen Lamp

If the Halogen lamp does not seem to functioning properly, check the following:

Issue	Probable Cause	Resolution
Halogen lamp does not work after pressing On/Off switch	Deuterium lamp is warming up	Wait until the Deuterium lamp has lit and try again
	Halogen lamp is defective	Replace the Halogen lamp
LED does not light after switching on the Halogen lamp	Internal power supply is defective	Disconnect the unit from the main power source and contact your dealer for repair or replacement

Appendix A

Maintenance

Overview

Maintenance of your DH-2000 unit involves periodic replacing the light source bulbs, when necessary.

Bulb Replacement

You can manually change the Deuterium and Halogen bulbs in the DH-2000. To order replacement bulbs for the DH-2000, order the following item number(s):

- Deuterium Spare Bulb (210 – 400 nm): D-2000-B

- Deuterium Spare Bulb Deep UV (190 – 400 nm): D-2000-B-DUV

- Halogen Spare Bulb (300 – 1500 nm): DH-2000-B

WARNING

Before replacing the bulb in the DH-2000, disconnect the lamp from your power source and allow the unit to cool for at least twenty minutes, if necessary.

Do not touch the lamp glass directly, as contact with bare fingers will reduce the lifetime of the bulb.

Replacing the Deuterium Bulb for All Models Except DH-2000-BAL

► *Procedure*

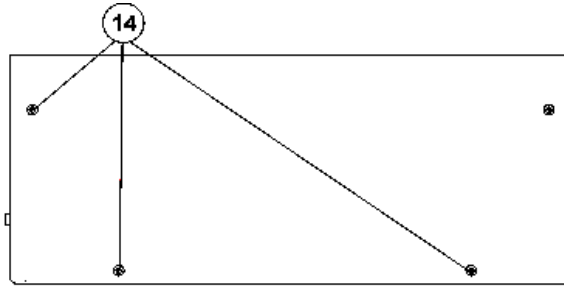1. Open the six slotted screws (14) and open the casing cover.
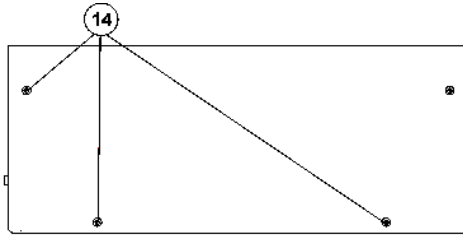
2. Open the screws (15) with the tool (18) that is delivered with the spare bulb (16).

3. Disconnect the old bulb and connect the new Deuterium Tungsten-Halogen lamp only with the originally supplied connection plugs (17).
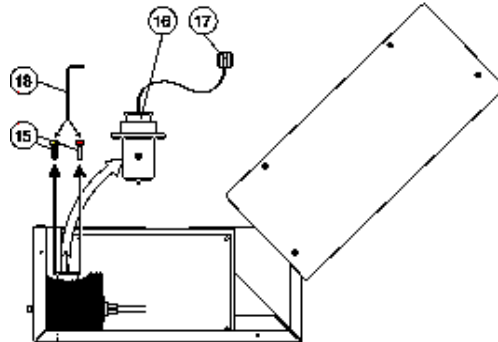

Replacing the Deuterium Bulb for DH-2000-BAL Model

► *Procedure*

1. Open the six slotted screws (14) and open the casing cover and rotate or remove the cover to expose the bulb housing.

2. Open the screws (15) with the tool (18) that is delivered with the spare bulb (16).

3. Disconnect the old bulb and connect the new Deuterium lamp only with the originally supplied connection plugs (17).
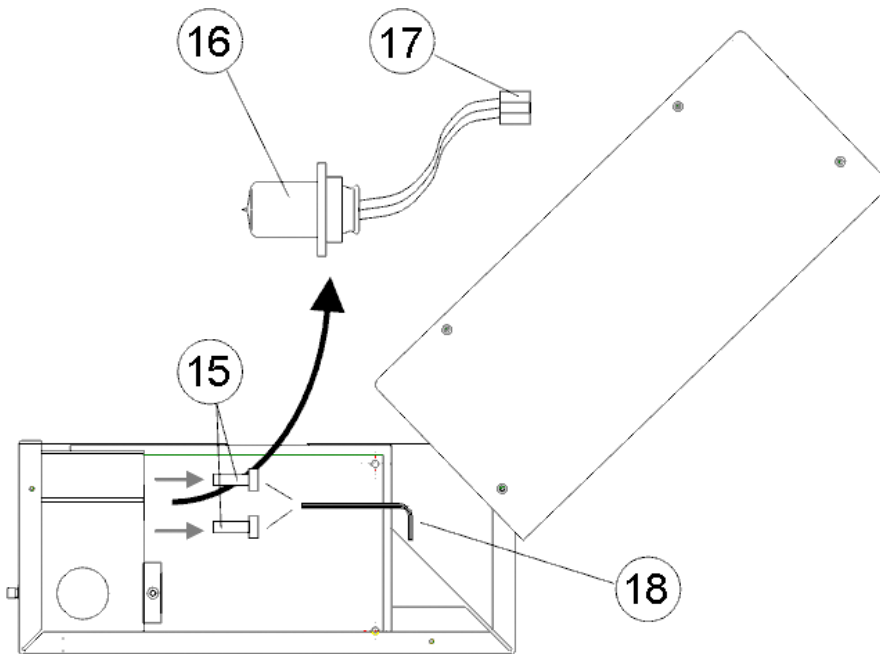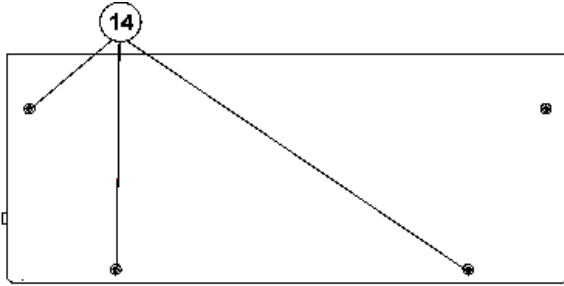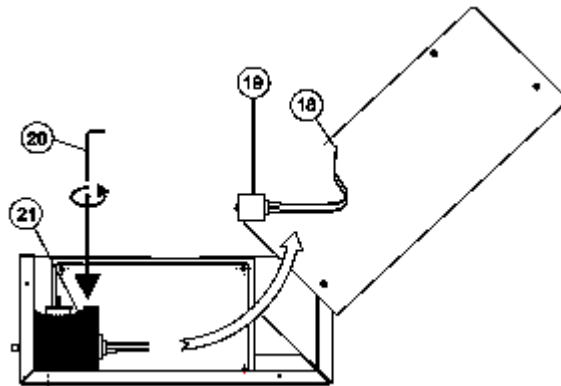

4. Reassemble the lamp housing by reversing Steps 1-3.

Replacing the Halogen Bulb for All Models Except DH-2000-BAL

► *Procedure*

1. Open the six slotted screws (14) and open the casing cover.

2. Remove the screw (21) with the tool (20) provided with the spare bulb (19).

3. Disconnect the old Halogen bulb from the connection plugs (18)

4. Open the screws of the cable-clamp on the lamp-side and remove the defective Halogen lamp module.

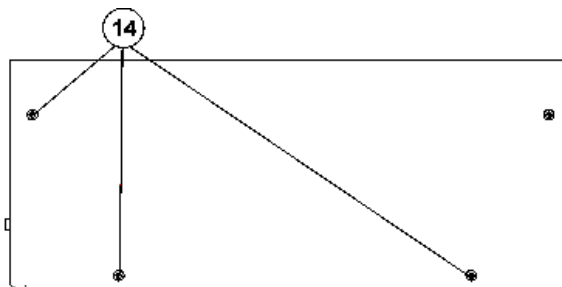5. Insert the new Halogen lamp module and Replace the screw (21).

6. Reattach the two cables of the Halogen lamp module to the cable-clamp. To do this, attach the Halogen lamp's blue cable to Port 1 and the black cable to Port 2 of the connector.

Replacing the Halogen Bulb for DH-2000-BAL Model

► *Procedure*

1. Open the six slotted screws (14) and open the casing cover.

2. Remove the screw (21) with the tool (20) provided with the spare bulb (19).

3. Disconnect the old Halogen bulb from the connection plugs (18)

4. Open the screws of the cable-clamp on the lamp-side and remove the defective Halogen lamp module.

5. Insert the new Halogen lamp module and Replace the screw (21).

6. Reattach the two cables of the Halogen lamp module to the cable-clamp.
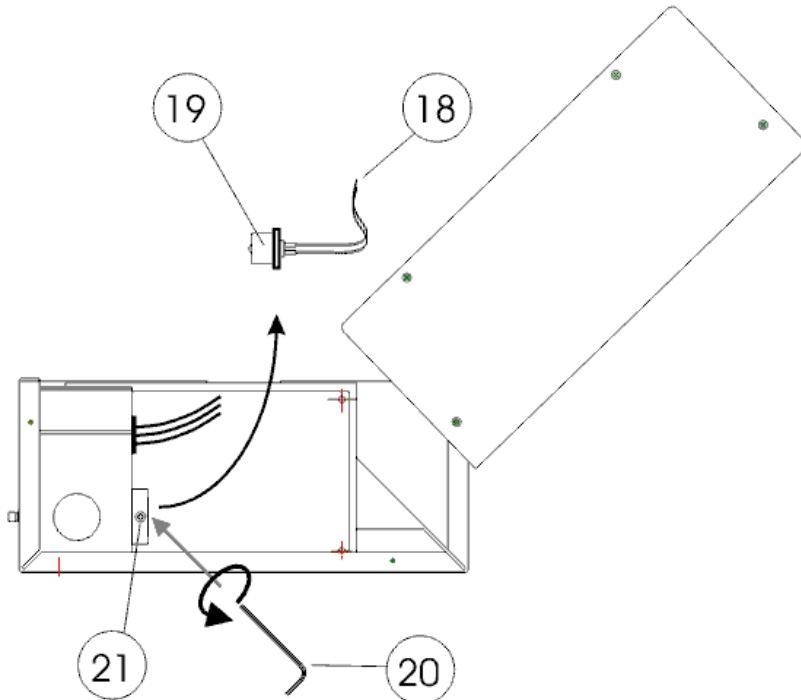
7. Reassemble the unit by reversing the disassembly steps.

Supplementary Information for Models DH-2000-S and DH-2000-FHS

Overview

The following information applies to specific models of the DH-2000. Read the instructions and refer to the figures on page 23.

DH-2000-S (With TTL Shutter Control)

Automatic Operation

Plug SUB-D 15-pin TTL connector into socket on rear of DH-2000-S.

Manual Operation

Manually set operating mode using the toggle switch on the front of the DH-2000-S:

- Open - Shutter open
- Close - Shutter closed
- TTL - Controls shutter with external TTL signal (High = Open, Low = Close)

DH-2000-FHS (With Filter Holder and TTL Shutter Control) and DH-2000-BAL

TTL Function Operating Instructions

Automatic Operation

Plug the SUB-D 15-pin TTL connector into the socket on the rear of the DH-2000-FHS.

Manual Operation

Manually set operating mode using the toggle switch on the front of the DH-2000-FHS:

- Open - Shutter open

- Close - Shutter closed

- TTL - Controls shutter with external TTL signal (High = Open, Low = Close)

Operating Instructions – Filter (DH-2000-FHS Only)

► *Procedure*

1. Open the filter slit by rotating the light beam protection cap.

2. Insert a filter with a maximum size of 1" (round or square) into the filter slit.

3. Close the filter slit by rotating the light beam protection cap until the slit is closed.

| Switch | Light Beam Protection | Filter Slit | SUB-D 15 Pin TTL Connector |

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