

CoolWave[®] 306 Lamphead with Unicable

Customer Product Manual
Part 1074167A03

Issued 11/10

**To order parts call 866-885-1212.
For technical support call 800-524-1322.**

This document is subject to change without notice.
Check <http://emanuals.nordson.com/uvsystems> for the latest version.



NORDSON CORPORATION • AMHERST, OHIO • USA

Address all correspondence to:

North American Sales and Service

Nordson UV Systems Inc.

300 Nordson Drive
Amherst, OH 44001
United States

Tel: (440) 985-4592
(800) 717-4228

Fax: (440) 985-4593

Email: uvcuring@nordson.com

Website: www.nordson.com/uvcuring

Nordson Corporation welcomes requests for information, comments, and inquiries about its products. General information about Nordson can be found on the Internet using the following address:
<http://www.nordson.com>.

Notice

This is a Nordson Corporation publication which is protected by copyright. Original copyright date 2004. No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of Nordson Corporation. The information contained in this publication is subject to change without notice.

Trademarks

CoolWave, Nordson, and the Nordson logo are registered trademarks of Nordson Corporation.

All other trademarks are the property of their respective owners.

Table of Contents

Safety	1-1	Maintenance and Repair	4-1
Introduction	1-1	Maintenance and Replacement Schedule	4-1
Qualified Personnel	1-2	Replacement Procedures	4-2
Intended Use	1-2	Preparation	4-2
Regulations and Approvals	1-2	Bulb Replacement	4-2
Personal Safety	1-3	Reflector Replacement	4-4
Ultraviolet Radiation	1-3	Reflector Removal	4-4
First Aid	1-4	Reflector Installation	4-4
Microwave Radiation	1-4	Internal Component Replacement	4-6
Ozone Gas	1-5	Pressure Switch	4-6
High Temperature	1-5	Light Detector Board	4-7
High Voltage	1-5	Starter Bulb	4-8
Mercury Bulbs (Lamps)	1-6	Magnetron	4-8
UV Curable Inks and Products	1-6	Troubleshooting	5-1
Fire Safety	1-6	Introduction	5-1
Action in the Event of a Malfunction	1-6	Bulb Problems	5-1
Safety Precautions While Servicing	1-7	Curing Process Problems	5-2
Control System Cleaning	1-7	Parts	6-1
High Voltage Connections	1-7	Introduction	6-1
Cabinet Cooling	1-7	Cables	6-1
Disposal	1-7	Reflector Conversion Kits	6-1
Moving and Storage	1-7	Lamphead with External/Internal Blower	6-2
Safety Symbols	1-7	Optional Lamphead Mounting Kit	6-4
Description	2-1	Specifications	7-1
Introduction	2-1	Lampheads	7-1
System Components	2-2	Bulb	7-1
Reflectors	2-4	System Drawing	7-1
Installation	3-1		
Introduction	3-1		
Inspection and Packaging	3-1		
Mounting Guidelines	3-1		
External Blowers – Cooling Air	3-1		
Lamphead	3-2		
Light Shielding	3-3		
RF Detector	3-3		
Lamphead Cooling	3-4		
Environmental Operating Conditions	3-4		
Lamphead Cable Connections	3-5		

DECLARATION of CONFORMITY

PRODUCT:

CoolWave CW-306

APPLICABLE DIRECTIVES:

73/23/EEC (Low Voltage Directive)

89/336/EEC (Electromagnetic Compatibility Directive)

STANDARDS USED TO VERIFY COMPLIANCE:

EN61010-1:2001

EN55011

EN61000-4-4

EN61000-6-4

EN61000-4-2

EN61000-4-5

EN61000-6-2

EN61000-4-3

EN61000-4-6

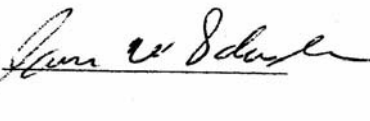
PRINCIPLES:

The product specified conforms to the directives and standards described above.

This product has been designed and manufactured to general and safety requirements:

CAN/CSA-C22.2 NO. 61010.1, 2nd Edition 7/12/04

UL61010A-1, 2nd Edition Revised 7/12/04

Signed 

Date: 23 May 2007

James W. Schmitkons
Principal Engineer, UVGroup



Section 1

Safety

Introduction

Read and follow these safety instructions. Task- and equipment-specific warnings, cautions, and instructions are included in equipment documentation where appropriate.

Make sure all equipment documentation, including these instructions, is accessible to all persons operating or servicing equipment.

All equipment is designed and manufactured to International Safety Standards to ensure that the health and safety of the operator is protected at all times.




	<p>WARNING! UV / MICROWAVE LIGHT SOURCE</p>		<p>ATTENTION ! Source de lumière UV micro-ondes</p>	
<ol style="list-style-type: none"> 1. Use only Nordson designed power supplies. 2. Only operate with properly installed undamaged screen assembly. 3. Make certain all cables and interlocks are properly connected. 4. Unsafe to operate without adequate shielding around the units to prevent UV light leakage which can be harmful to skin and eye's. 5. UV light and high voltages are present when the unit is energized. 6. Do not disconnect cables or remove the lamphead from the light shield when the unit is energized. 7. See manual for safety information and complete operating instructions. 		<ol style="list-style-type: none"> 1. Utiliser exclusivement les alimentations électriques Nordson. 2. À utiliser uniquement avec un écran monté et non endommagé. 3. Vérifier si tous les câbles et dispositifs de verrouillage mutuels sont bien branchés. 4. Il est déconseiller de faire fonctionner les appareils sans écran de protection approprié autour d'eux pour éviter les fuites de rayons UV qui peuvent être néfastes pour la peau et les yeux. 5. Présence de rayons UV et de hautes tensions lorsque l'appareil est sous tension. 6. Ne pas débrancher les câbles ni retirer la tête de lampe du paralume lorsque l'appareil est sous tension. 7. Voir les consignes de sécurité et les instructions d'utilisation complètes dans le manuel. 		

Figure 1-1 Microwave UV Warning

Qualified Personnel

Equipment owners are responsible for making sure that Nordson equipment is installed, operated, and serviced by qualified personnel. Qualified personnel are those employees or contractors who are trained to safely perform their assigned tasks. They are familiar with all relevant safety rules and regulations and are physically capable of performing their assigned tasks.

Intended Use

Nordson ultraviolet (UV) equipment is intended specifically for integration into other machines and should **NOT** be operated as a standalone system or without appropriate safety guarding, shielding, and interlocks. It is the responsibility of the integrator and end user to ensure that the final assembly fulfills all necessary legislation and is completely safe before operation.

This equipment is designed for the accelerated curing of UV inks, adhesives, and coatings. Do not use this equipment to cure alternative materials unless approved by the material supplier.

The equipment is not flame or explosion proof and is not designed for use in hazardous areas.

Use of Nordson equipment in ways other than those described in the documentation supplied with the equipment may result in injury to persons or damage to property.

Some examples of unintended use of equipment include:

- using incompatible materials
- making unauthorized modifications
- removing or bypassing safety guards, shielding, or interlocks
- using incompatible or damaged parts
- using unapproved auxiliary equipment
- operating equipment in excess of maximum ratings
- using equipment in hazardous areas

Regulations and Approvals

Make sure all equipment is rated and approved for the environment in which it is used. Any approvals obtained for Nordson equipment will be voided if instructions for installation, operation, and service are not followed.

Currently there are two organizations that set recommended guidelines for exposure to occupational microwave radiation exposure, OSHA (U.S. Department of labor, Occupational Safety and Health Administration – Directive 29cfr 1910.97) and ANSI (American National Standards Institute – Directive C95.1–1982). The ANSI directive, which is more stringent and most commonly referred to, states that individuals should not be exposed to microwave radiation levels above 5 mW/cm² at 2.45 GHz on a continuous basis.

Personal Safety

To prevent injury follow these instructions.

- Do not operate or service equipment unless you are qualified.
- Do not operate equipment unless safety guards, light shields, doors, and/or covers are intact and automatic interlocks are operating properly. Do not bypass or disarm any safety devices.
- Keep clear of moving equipment. Before adjusting or servicing any moving equipment, shut off the power supply and wait until the equipment comes to a complete stop. Lock out power and secure the equipment to prevent unexpected movement.
- Obtain and read Material Safety Data Sheets (MSDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials. Always use recommended personal protection devices.
- Make sure the UV area is adequately ventilated.
- The UV equipment runs at extremely high temperatures. Do not touch the UV lamphead face during operation or immediately after shutting off the equipment.
- To prevent injury, be aware of less-obvious dangers in the workplace that often cannot be completely eliminated, such as hot surfaces, sharp edges, energized electrical circuits, and moving parts that cannot be enclosed or otherwise guarded for practical reasons.
- Always wear safety glasses that offer UV protection.
- Never expose any part of the body to direct or indirect UV light.

Ultraviolet Radiation



WARNING: Ultraviolet light is a form of electromagnetic radiation and can be harmful if exposure exceeds recommended levels. Protect eyes and skin from direct exposure to UV light. All equipment or areas where UV light is used must be adequately guarded, shielded, and interlocked to prevent accidental exposure.

Ultraviolet light is not capable of penetrating into the body and interacting with internal tissues and organs.

The National Institute for Occupational Safety and Health (NIOSH) document *Criteria for Recommended Standard... Occupational Exposure to Ultraviolet Radiation* (PB214 268) establishes guidelines for safe use.

See Figure 1-2. Ultraviolet light is divided into wavelength bands A, B, C, and V along with vacuum UV. Although values for wavelength bands will vary depending on the source, the following ranges may be used as a guide.

- Vacuum UV (100–200 nanometers) – absorbed by air and poses no danger to humans.
- UV-A (315–400 nanometers) – represents the largest portion of UV energy and is most responsible for human skin aging and increased pigmentation. UV-A is at the lower limit of sensitivity to the human eye. Referred to as far UV.
- UV-B (280–315 nanometers) – most responsible for reddening and burning of the skin and damage to the eyes.
- UV-C (200–280 nanometers) – filtered by ozone. Referred to as near UV.
- UV-V (400–450 nanometers) – visible UV

Exposure to UV radiation can result in

- reddening of skin
- headaches
- sore eyes

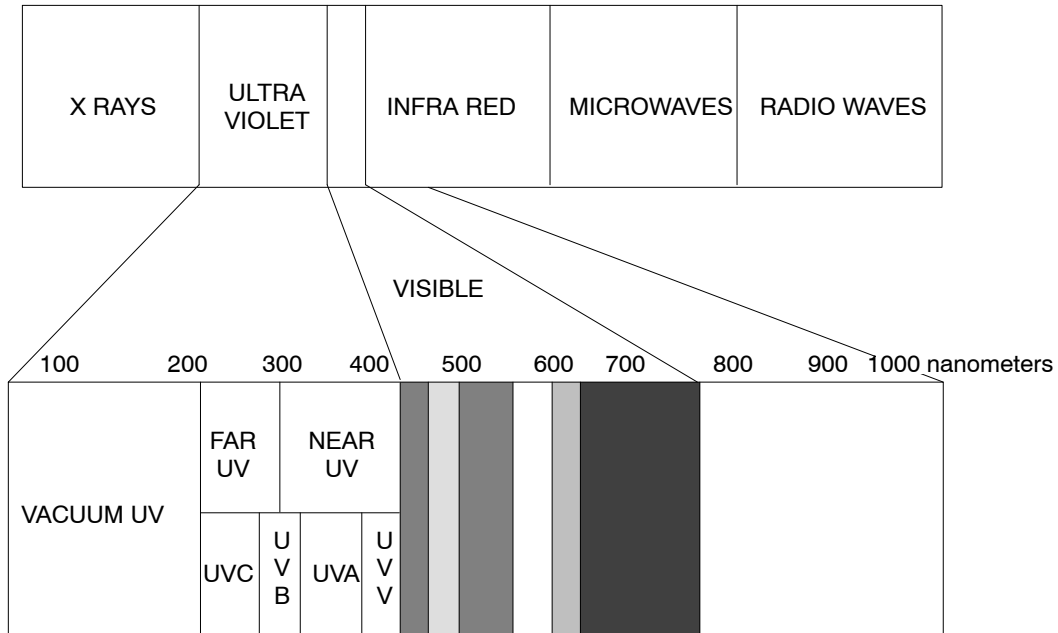


Figure 1-2 Ultraviolet Light Wavelength Bands

It is very important that all precautions are taken to prevent all UV light, whether direct or indirect, from escaping the curing area. Exposure to UV light can be harmful to both eyes and skin. Use the following table to determine the permissible exposure time to UV light on unprotected eyes or skin.

Permissible Ultra Violet Exposures as Recommended by the American Conference of Government and Industrial Hygienists	
Duration of Exposure (Per Day)	Effective Irradiance (E Micro Watts/cm sq)
8 hours	0.1
4 hours	0.2
2 hours	0.4
1 hour	0.8
30 minutes	1.7
15 minutes	3.3
10 minutes	5.0
5 minutes	10
1 minute	50
30 seconds	100
10 seconds	300
1 second	3000

First Aid

Store-bought creams, lotions, or aloe can be applied to affected areas of the skin. Seek immediate medical attention for skin burns and direct UV exposure to the eyes.

Microwave Radiation



The lamp system utilizes high powered RF microwave energy generated by a magnetron to provide power to the UV lamp. This technology is identical to that of residential microwave ovens and like these ovens can be dangerous if misused. The lamp system is safe provided that the RF screen and gasketing are intact. Any damage such as rips or holes in the screen may cause leakage of dangerous amounts of microwave radiation. The power to the lamp is interlocked to the RF detector and will shut down if microwave leakage in excess of 2 mW/cm² is detected. Any excessive leakage will cause the system to shutdown and the RF Detector fault will illuminate on the front of the power supply.

Ozone Gas

Ozone (O₃) is a colorless gas that is generated by the reaction of short-wave UV light (around 200–220 nanometers) with air, and it occurs whenever high-energy electrical discharge is present.

Ozone readily reverts to breathable oxygen when mixed with atmospheric air. Ozone should be removed from the UV source via a sealed duct and discharged to atmosphere according to local regulations. The discharge location should be away from pedestrian walkways and window openings and should be well above the average human breathing height for the area.

Regular ozone checks should be carried out every three months using an ozone meter.

Recommended levels of ozone in the atmosphere of a factory should not exceed 0.1 parts per million (PPM). This level is easily obtainable if factory recommended exhaust rates are followed.

Ozone has a very distinct, strong odor even at low levels. Immediate ozone checks should be made if an operator can smell ozone. Most people can smell ozone at about one third the maximum allowable 0.1 PPM level.

Ozone exposure will cause headaches and fatigue. It will also irritate the mouth and throat. Overexposure can lead to respiratory infections.

If ozone is detected,

1. Shut down the UV system.
2. Check exhaust ducting for leaks.
3. Check the operator working area with an ozone meter.

If a person is overcome by ozone,

- Move the individual to a warm uncontaminated atmosphere and loosen tight clothing at the neck and waist.
- Keep the individual at rest.
- If the person has difficulty breathing, oxygen may be administered provided that suitable apparatus and a trained operator are available.
- If breathing is weak or has ceased, artificial respiration should be started.
- Seek medical assistance.

High Temperature



UV curing systems generally run at extremely high temperatures. A sudden shock from touching a high temperature surface might cause an operator to jump or take his attention away from other potential hazards.

When shutting down UV equipment for maintenance, allow the equipment to cool before beginning work, or wear protective gloves and clothing to prevent burns.

High Voltage

The UV curing equipment operates at high voltages up to 5000 Vdc. The system uses high-voltage, self-discharging capacitors. **Once power to the power supply is shut off, the capacitors need 120 to 130 seconds to discharge.**

If any electrical faults develop, the operator should:

1. Switch the equipment off immediately.
2. Make no attempt to service the equipment.
3. Call a qualified electrician, trained to service this type of equipment.

Mercury Bulbs (Lamps)

The bulbs used in UV lamp systems contain mercury under medium pressure. Mercury is a toxic substance and must not be ingested or come into direct contact with the skin. Under normal UV operating conditions, mercury presents no hazard as it is completely contained in the sealed quartz tube of the bulb; however, it is strongly recommended that protective gloves and eye protection be worn when handling UV bulbs.

These precautions should be followed when disposing of UV bulbs:

- Place the bulb in a rigid protective carton.
- Dispose of used bulbs through a local mercury recycling center.
- Wash your hands if a bulb breaks: mercury could come into contact with your skin.
- Do not store or handle bulbs near food or beverages.
- Nordson Corporation will dispose of UV bulbs free of charge provided the customer covers all shipping costs associated with returning the bulbs. For bulb disposal, please clearly mark on the all bulb containers AND shipping packages BULBS FOR DISPOSAL ONLY.

Bulbs should be shipped to:

Primarc
Bulb Disposal Department
2 Danforth Drive
Easton, Pennsylvania 18045

UV Curable Inks and Products

Some materials used in UV curable inks, adhesives, and varnishes are toxic. Before handling them, read the Material Safety Data Sheets provided by the manufacturer, use the recommended personal safety equipment, and follow the recommended procedures for safe use and disposal.

Fire Safety

Under proper operating conditions, the surface temperature of the bulb is anywhere between 700–900 °C (1300–1700 °F), and the vapor gas inside the bulb is several thousand degrees Fahrenheit.

Any form of flammable material (such as paper, lint, powder, or dirt) trapped under the lamp, within the lamp housing or in the lamp's vicinity, will result in an increased risk of fire.

To avoid a fire or explosion, follow these instructions.

- Know where emergency stop buttons, shut-off valves, and fire extinguishers are located.
- Clean, maintain, test, and repair equipment according to the instructions in this manual.
- Always keep a fire extinguisher approved for electrical equipment near the unit.

Should a fire occur, the operator must:

1. Switch the equipment off immediately.
2. If possible, put out the fire with a fire extinguisher.

Action in the Event of a Malfunction

If a system or any equipment in a system malfunctions, shut off the system immediately and perform the following steps:

1. Disconnect and lock out system electrical power.
2. Identify the reason for the malfunction and correct it before restarting the system.

Safety Precautions While Servicing

A qualified competent electrician must carry out all electrical maintenance and servicing of this equipment.



WARNING: This equipment operates at high voltages up to 5000 volts dc and is therefore potentially dangerous. The electrician servicing this equipment must take all precautions.



WARNING: Isolate the equipment at the main, disconnect or lockout before removing any of the cover panels

Control System Cleaning

Keep all contactors and relays clean and free from dirt and dust. Check these regularly, particularly in extremely dusty or powder-charged working rooms.

High Voltage Connections

Check the high voltage connections within the equipment carefully to make sure that these do not become dirty or coated with powder or other possible conducting material. Clean them regularly, at least whenever the lamp is changed, possibly more often where a particularly heavily polluted atmosphere occurs.

Always make sure the unicable connectors are secure and tight before applying power.

Cabinet Cooling

Check the cabinet cooling fan at least weekly and keep clear of any material that might clog or stop its operation. The power supplies run warm and keeping them cool with proper ventilation will prolong their life.

Disposal

Dispose of equipment and materials used in operation and servicing according to local codes.

Moving and Storage

Moving or storing of the Nordson UV curing system must comply with all applicable local and state regulations. All electrical power and other services must be disconnected and the lamp head must be cool before moving or storing this equipment. Power supplies should be properly attached or fastened to an appropriate fixture such as a pallet for handling and storing. Due to the power supply's weight, it is recommended a mechanical device be used for handling and they should be kept as low to the floor as possible. It is recommended that the bulb be removed from the lamp head and stored or shipped in the original shipping tube. The lamp head and power supply should be shipped and or stored in the original container or an equivalent and kept dry and clean at all times.

Shipping of Nordson UV curing systems and their component parts must be done in accordance with all applicable shipping regulations including requirements for shipping of magnetic materials and mercury lamps.

Safety Symbols

The following safety symbols are used in this manual. The symbols are used along with warnings to help you operate and maintain your equipment safely. Pay attention to all warnings and follow directions to avoid personal injury.



WARNING: Mechanical or combined mechanical/electrical hazards.



WARNING: Electrical hazard



WARNING: Ultra violet light hazard



WARNING: Burn hazard



CAUTION: Equipment hazard

This page intentionally left blank.

Section 2

Description

Introduction

This section provides a general overview of the Nordson CoolWave 306 six-inch UV lamphead.

The system is designed to cure UV inks, adhesives, and coatings for numerous industrial applications.

The system consists of a six-inch lamphead, a corresponding fixed output power supply, and an RF detector. Additional lampheads can be lined up end-to-end to form longer curing widths.


The CoolWave 306 systems are designed to function on input line power found around the world. The CW306 power supply features an integrated motor speed controller, which ensures that an internal blower lamphead will develop the correct cooling air flow for all 50 Hz power installations. This version power supply must be used in combination with all internal blower CW306 lampheads using 50 Hz line power.

Figure 2-1 and Table 2-1 illustrate and describe the major components of a lamphead.

System Components

Refer to Table 2-1 and Figure 2-1.

Table 2-1 System Components

Item	Component	Description
1	Lamphead with external blower	The lamphead consists of a bulb housing, UV bulb, wave guide, reflectors, light detector, starter bulb, and the magnetron assembly. The patented wave guide couples RF energy to the bulb and provides cooling for the bulb. The reflector reflects the emitted UV light onto the substrate. 225 CFM @ 2.5 in. W.C. of cooling air from an external source is required at each lamphead.
2	Lamphead with internal blower	This lamphead is the same as the external blower lamphead but contains an internal blower to cool the UV bulb and magnetron. The internal blower is sized to provide a minimum of 225 CFM at 2.5 in. W.C.
3	Reflectors	Refer to <i>Reflectors</i> on page 2-4 for more information. Elliptical shaped focus reflectors are used to guide the UV light in a tight band across the surface of the material being cured. The reflectors are manufactured from glass, with a proprietary coating to give maximum UV reflectivity while minimizing infrared radiation. NOTE: A wider band of light can be produced by using optional flood reflectors. Contact a Nordson UV representative for details.
4	Ultraviolet Bulbs	 CAUTION: Only genuine Nordson replacement bulbs should be used with this system. Other bulbs may damage the control or overheat the reflector system. NOTE: The system warranty is void if genuine Nordson UV bulbs are not used. Contact a Nordson UV representative for ordering information. The system uses medium pressure mercury bulbs. The bulbs consist of high purity quartz and have various fills including doped spectrally enhanced metal halide bulbs to produce light at different wavelengths. Bulbs and controls are carefully matched to give optimum UV output and wavelength requirements.
5	Starter Bulb	The starter bulb acts as the ignitor for the ultraviolet bulb. The starter bulb is switched on at the same time the magnetron is energized. After the UV bulb reaches full power the starter bulb turns off automatically.
6	Magnetron	The magnetron is a 1.8 kW, 2450 MHz microwave generator that converts high voltage electrical inputs to energy. The wave guide cavity is designed to couple the microwave energy with the UV bulb, thus exciting a UV emitting plasma within the bulb.
7	External Blowers for Cooling	External blowers are used to cool the UV bulb and magnetron on the external lamphead. The lamphead requires approximately 225 CFM at 2.5 in. W.C. of cooling air per lamphead in order to function properly. The external blowers must be sized appropriately to provide adequate cooling. NOTE: The CoolWave lamphead produces heated air and ozone, which must be safely ventilated away from the work area. (Refer to page 1-5 for more on ozone gas.) The minimum ventilation requirement for each lamphead is 125% of the cooling air or 280 cfm @ 2-in. W.C. to properly evacuate the heat and ozone from the lamphead. NOTE: Lampheads with integral blower provide the appropriate cooling with an on-board blower.

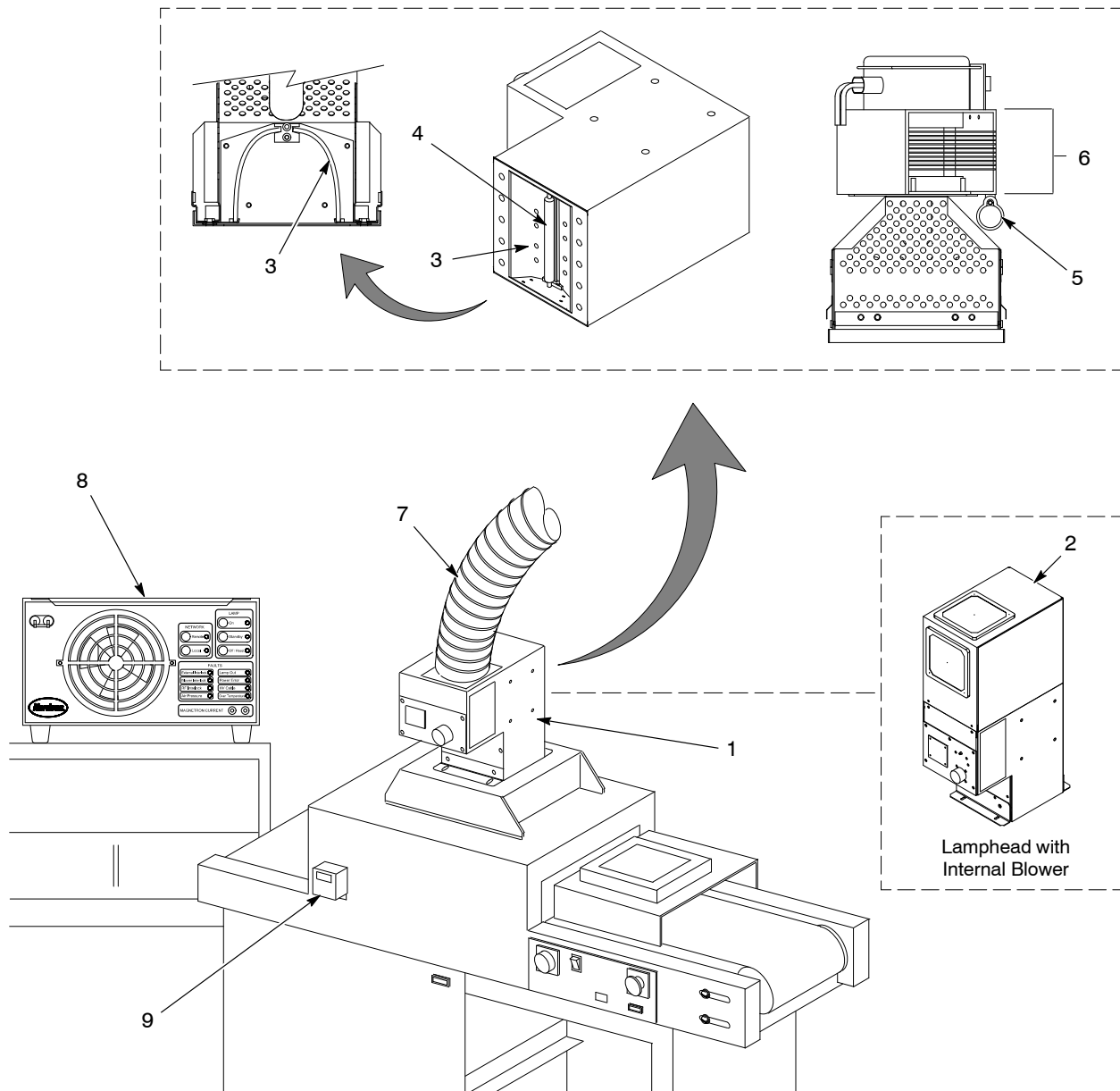


Figure 2-1 System Components (Typical UV curing system setup)

- | | | |
|---|---|-----------------|
| 1. Six-inch lamphead with external blower | 5. Starter bulb | 8. Power supply |
| 2. Six-inch lamphead with internal blower | 6. Magnetron | 9. RF detector |
| 3. Reflectors | 7. Tubing to external blowers for cooling (remote blower lamphead only) | |
| 4. Ultraviolet bulb | | |

Reflectors

Two types of reflectors are available for the lamphead: focus and flood. The flood reflectors produce a wider band of light.

The reflectors use different retaining brackets to secure them in place in the lamphead. Figures 2-2 and 2-3 illustrate the curve in each reflector and the differences in their retaining brackets.

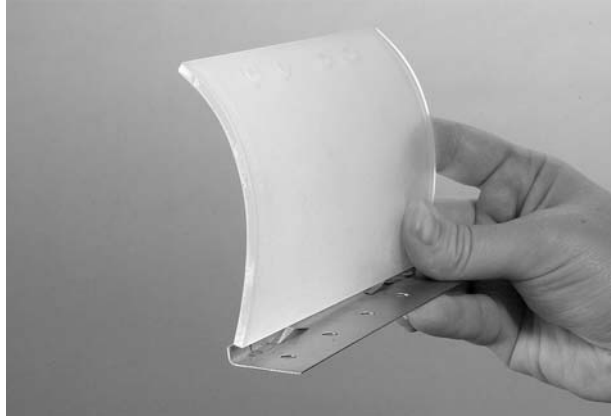


Figure 2-2 Focus Reflector and Bracket

Note: The bracket for the focus reflector is 23.3-mm (0.92-in.) wide



Figure 2-3 Flood Reflector and Bracket

Note: The bracket for the flood reflector is 33.3-mm (1.31-in.) wide

Section 3

Installation



WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

Introduction

This section contains the necessary information for installing the CoolWave six-inch lamphead. Directions for mounting and shielding are explained in general terms due to differences for each independent installation.

Inspection and Packaging

The Nordson CoolWave system has been carefully tested, inspected, and packaged prior to shipping. Upon receipt, inspect the shipping materials and components for visible damage. Report any damage immediately to the shipper and to the Nordson UV systems engineering department.

NOTE: When opening the packaging, please take care so that the packaging can be re-used to ship the unit to the next destination. Keep all packaging materials together and in a location that they will not get damaged.

Mounting Guidelines

Install the power supply so the main power disconnect and operator controls are easily accessible.

External Blowers – Cooling Air

The cooling requirements for each lamphead is 225 cfm @ 2.5-in. W.C. of static pressure. This will be measured at each lamp heads Static Pressure Measuring Port (Refer to lamphead dimensions in this section).

It is important to size the cooling blower to provide at least an additional 20% of cooling air measured at the cooling duct inlet just prior to the lamphead. Always remember to size blowers to accommodate all losses in the duct work and this will assure the specified air flow and pressure are delivered to the lamphead.

See Figure 3-1.

Many applications have multiple lampheads that get their cooling air from a common source, such as a plenum.

Air flow adjustment dampers should be added to each drop for each lamphead as close to the lamphead as possible.

Lamphead

The lamphead mounting must include provisions for shielding the UV light and venting for the cooling air. Each application contains different constraints and therefore requires custom design of enclosures and light shielding. Contact Nordson UV systems engineering department for help with design.

Figures 3-2 and 3-1 illustrate the physical dimensions of the lampheads. Install the lamphead screen (bulb end) 53.3 mm (2.1 in.) above the substrate for optimal focal positioning when using focus reflectors.

An optional lamphead mounting kit with a 2-axis bracket is available. Refer to the *Parts* section for more information.

NOTE: If flood reflectors are used there is no set focus distance. The screen to substrate distance is not as critical and can be adjusted to vary dosage.

NOTE: Detailed dimensional data is provided for each lamphead on page 7-3 in the *Specification* section.

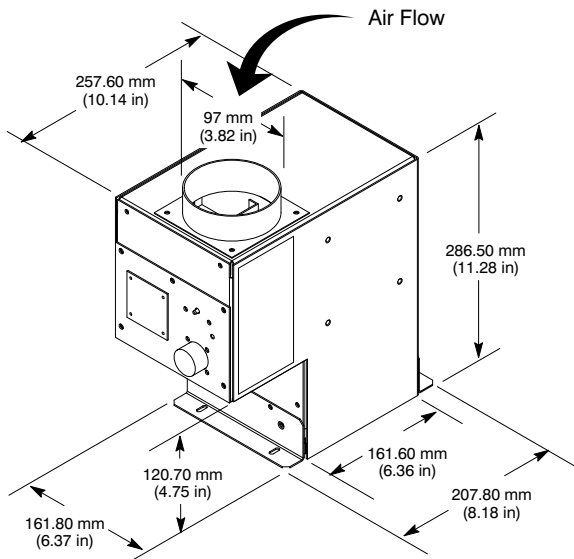


Figure 3-1 Lamphead with External Blower

Note: The mounting holes on both sides of the lamphead are the same.

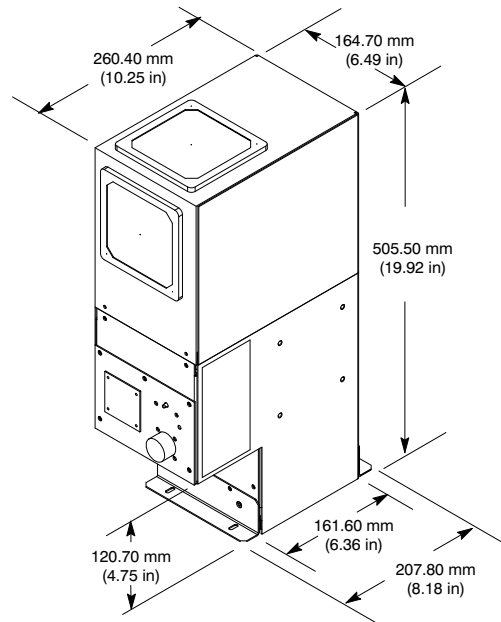


Figure 3-2 Lamphead with Internal Blower

Light Shielding

- Provide adequate shielding of UV light. The lamphead must be enclosed so that no UV light is allowed to escape.
- Any louvered material used for exhausting must be of a light shielding design.

RF Detector

See Figure 3-3.

- A minimum of one RF detector is normally required for every 16 networked units within one curing enclosure. However, some applications and systems may require an RF detector on each unit. Contact your Nordson representative for more information.
- Mount the RF detector so that the antenna faces the lamphead screen and is between the operator and the lampheads or the lampheads and any opening (the major source for RF leakage).
- The minimum distance should be eight inches to prevent excessive heat on the detector surface.
- Do not mount the RF detector directly below the lamphead.
- For RF detector connections, refer to *RF Detector* in the power supply manual.

- If UV light does escape the operator must wear approved UV-protective eyewear and long-sleeved clothing.

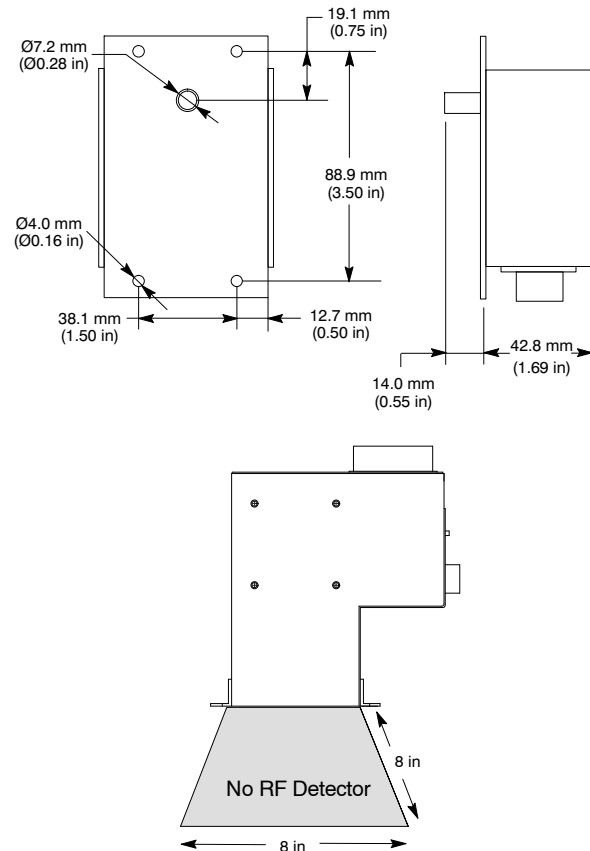


Figure 3-3 RF Detector Dimensions and Mounting Guidelines

Lamphead Cooling

Lamphead cooling is critical to the operation of the lamphead. There are two types of lampheads available:

- **Internal Blower:** requires no external cooling air.
- **Remote Blower:** requires an external source of cooling air ducted to each lamphead.

The following specifications must be maintained for all applications at all times regardless of which type of lamphead is used:

- cooling airflow through the lamphead is always maintained and not restricted at the exit end of the lamp face
- a constant static pressure of 2.5-in. water column from the inside of the lamphead to ambient or the lamp face
- 225 CFM of airflow through the lamphead
- 280 CFM of ventilation airflow

If you are using an exhaust box or any other type of lamp face attachment that can impede the airflow through the lamphead, you must monitor the pressure and CFM on the lamp face.

See Figure 3-4. To ensure proper lamphead cooling and account for the issues associated with a restricted lamphead exhaust, careful measurement at installation is required. Remove the screws at each reference location. Each location can accommodate a barbed pressure fitting. Measure the air pressure at both the inlet reference and outlet reference to ensure a minimum of 2.5-in. W.C. differential between the two reference locations.

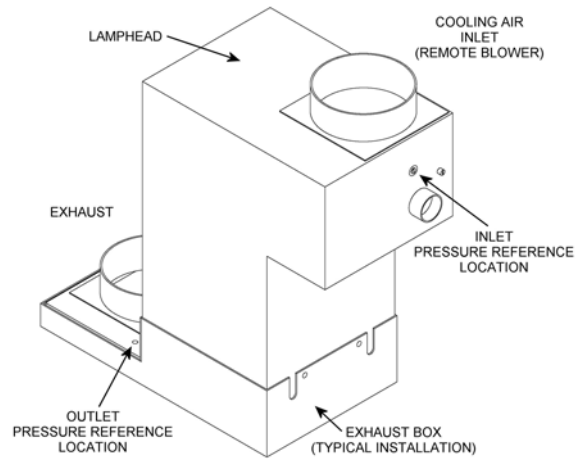


Figure 3-4 Lamphead Cooling

The same cooling air, static pressure and CFM requirements must be maintained. If not, the life lamphead will be greatly reduced with the possibility of failure.

The CoolWave lamphead produces heated air and ozone, which must be safely ventilated away from the work area. (Refer to page 1-5 for more on ozone gas.) The minimum ventilation requirement for each lamphead is 125% of the cooling air or 280 cfm @ 2-in. W.C. to properly evacuate the heat and ozone from the lamphead.

For more information on lamphead cooling, contact your Nordson UV representative.

Environmental Operating Conditions

Condition	Specification
Altitude	Up to 2000 meters
Temperature	5–40 °C (4–104 °F)
Rh	80%

Lamphead Cable Connections



CAUTION: The unicable conducts high and low voltage between the power supply and the lamphead. It is important that the unicable connectors be completely engaged and tightened before turning on the lamp system. Failure to properly engage these connectors can result in damage to the UV system.

Before inserting the unicable plugs into receptacles check both the plug and receptacle and ensure that the rubber inserts are in good condition and not torn. Make sure also that there is no evidence of arcing on the pins and sockets.

NOTE: The plugs are keyed and can only be inserted into the receptacles when correctly oriented. Do not force the plugs into the receptacles. Do not use the screw ring to pull the plugs into the receptacles. In most cases, it might help to wiggle the plug slightly while pushing it into the receptacle to ensure that all the pins mate securely with the sockets.

Push the plug into the receptacle as far as it will go, then start threading the screw ring onto the threaded portion of the receptacle. Continue to push on and wiggle the plug while tightening the screw ring until the plug is firmly seated into the receptacle.

NOTE: When tightening the screw ring, it is recommended to use a 30–32 DIN1810B hook wrench (spanner wrench) to insure that the connection is secure. There are four holes in the screw ring for the wrench pin.

When fully mated, the red indicator on the plug should not be visible and there should be no movement between the plug and the receptacle.



Figure 3-5 Unicable connector partially installed

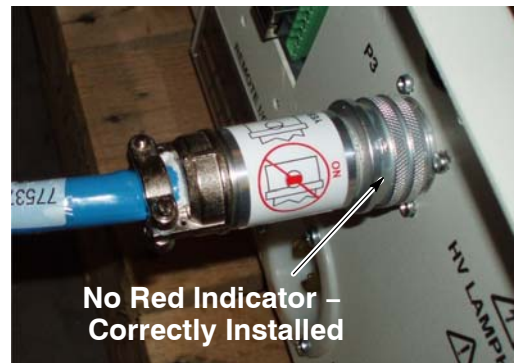


Figure 3-6 Unicable connector fully installed



30–32 DIN1810B Spanner Wrench (Customer-Supplied)

Figure 3-7 Using spanner wrench on screw ring

Table 3-1 Unicable Part Numbers

Cable	From	To	Length (ft)	Part
Unicable	Power supply unit connector	Lamphead	12	775374
			25	775023
			50	775375
			75	775377

Section 4

Maintenance and Repair



WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

Maintenance and Replacement Schedule

Table 4-1 lists typical maintenance guidelines and replacement schedules for the components of the CW306 lamp head.


Recommended maintenance to the lamp head consists of changing bulbs and reflectors; and cleaning or replacing filter material. Reflectors and screen should be cleaned periodically.

Establish acceptable curing levels for your process and then develop a maintenance schedule that fits your needs. Radiometers can be used to measure relative readings for spectral output as a means of monitoring spectral intensity.


The maintenance and replacement schedule for the system will depend upon your:

- application process
- plant environment
- quality of cooling air passing through the system
- coating formulation

Table 4-1 Typical Maintenance and Replacement Schedule

Component	Maintenance Guidelines	Replace component...
UV Bulb	<p>Bulbs are warranted for a specific number of hours when operating under manufacturer's operation specifications (hours vary with differing bulbs). Depending on your application, some installations may provide acceptable curing well beyond the warranty.</p> <p>NOTE: Do not touch or handle the bulb with bare hands. Be sure to clean them with a lint-free cloth or tissue to remove any fingerprints that might be present.</p>	as needed
Magnetron	<p>The magnetron is warranted for a specific number of hours when operating under the manufacturer's operation specifications. Each application will be different and, in many cases, the magnetron life will last well beyond the warranty.</p>	after 3000 hours of operation or as needed
Screen	<p>The screen should be free of all debris such as cured material, lint, dust, or anything that might impede cooling or UV transmittance. Soaking in a compatible solvent to remove any such items may clean the screen.</p> <p style="text-align: center;">  Do not use damaged screens. This can result in RF leakage. </p>	as needed

Continued...

Component	Maintenance Guidelines	Replace component...
Reflector	<p>Reflector surfaces should be cleaned every 500 working hours (more frequently in dirty environments) and at every bulb change. Clean the reflector surface and cavity with a small amount of isopropyl alcohol on a lint-free soft cotton cloth, clean room wipes, or an optical lens cleaning cloth. Do not use paper towels or other non-optical compatible supplies. Use gentle cleaning pressure. Use care to protect the edges and corners of the reflectors.</p> <p>Be careful when replacing reflectors. They are made of glass and may break if dropped or forced.</p> <p> Never use metal polish or any abrasive media to clean the reflectors.</p>	as needed
Pressure Switch	<p>Pressure switches are rated for operation between -40 °C and 120 °C. If your system experiences repeated loss of cooling air, the pressure switch may overheat and fail. Make sure that the lamp head cooling fan cools the system sufficiently to avoid pressure switch and other internal lamp head component failures. Refer to the <i>Operation</i> section for recommended cooling fan timer settings.</p>	when failure occurs
<p>Filters</p> <p>Remote blower cooling fan electrical enclosure/ lamp head</p>	<p>Filter material is designed to capture dust and contaminants from the plant before entering the UV equipment. These filters are located on the lamp heads, remote blowers, and some power supplies (customer-supplied filters). Eventually, the filters will become loaded with matter and will start to impede the flow of air. A dirty filter also will release matter into the air stream that may deposit on the part being cured as well as the bulb and reflector.</p> <p>Use soap and water to wash all filter material that provides cooling to any part of your UV system.</p>	Weekly or as needed

Replacement Procedures

Preparation

1. Turn off the UV system from the process equipment controller or at the UV panel.
2. Allow the lamp head fan to complete its cooling cycle. If this has been prevented by premature isolation of the control cabinet, always allow sufficient time for the bulb to cool before proceeding.
3. Turn off the main electrical disconnect. Follow all relevant OSHA established lockout procedures.
4. Disconnect all cables to the lamp head.
5. If necessary, loosen the lamp head mounting fasteners and remove the assembly from the brackets.

Bulb Replacement

1. Perform the *Preparation* procedure.
2. See Figure 4-1. Turn or place the lamp head assembly so that the entire bulb area is exposed and accessible.
3. Using a 2.5-mm hex wrench or a #2 Phillips head screwdriver, remove the six screws from the lamp head base and remove the RF screen.

NOTE: The locations of the screws are circled for reference.

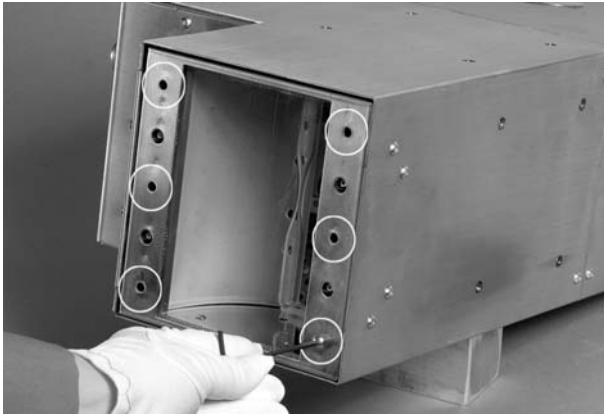


Figure 4-1 Removing the Screen Screws

NOTE: Do not touch the quartz portion of the bulb with bare hands. Use protective gloves.

4. See Figure 4-2. The bulb is supported by spring contacts on the bulb end. Grasp the ends of the bulb and carefully push it toward one end of the bulb to release bulb from spring contact. Once opposing end has cleared the retaining hole, carefully tilt bulb and slowly remove bulb, taking care not to damage the bulb end tips.
5. Place one end of the new bulb into the retaining hole, push to one side and lower the bulb into place. Install the remaining end of the bulb into the other retaining hole.
6. Place the old bulb in the new bulb packaging and dispose of according to your company's disposal policies. Refer to page 1-6 in the *Safety* section for the bulb return policy.
7. Install the RF screen to the lamp head base with the six screws and tighten screws to 1.1 N•m (10-in. lb).



Figure 4-2 Bulb Replacement

Reflector Replacement

Two types of reflectors may be used in the lamp head: **Flood** and **Focus**. The reflectors use different retaining brackets within the lamp head.

Reflector Removal

1. Perform the *Preparation* procedures on page 4-2.
2. Remove the bulb. Refer to *Bulb Replacement* beginning on page 4-2.
3. See Figure 4-3. Using a 2.5-mm hex wrench or Phillips screw driver, remove the four screws and the two retaining brackets from the lamp head base.

NOTE: The locations of the screws are circled for reference.

4. See Figure 4-4. Carefully slide the two reflectors from the lamp head base.

NOTE: Be careful when replacing reflectors. They are made of glass and may break if dropped or forced.

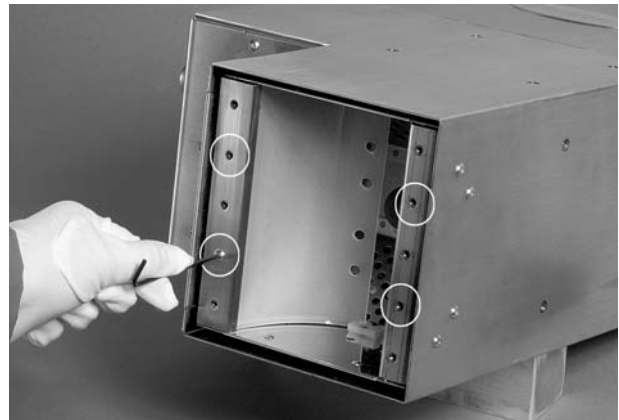


Figure 4-3 Removing the Screws

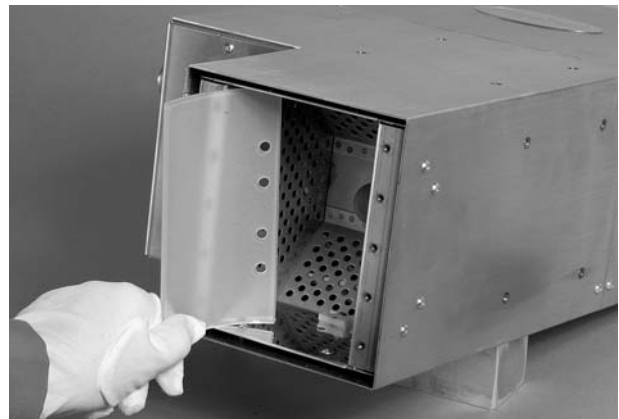


Figure 4-4 Slide the Reflectors from the Lamp head

Reflector Installation

1. See Figure 4-5. Slide the focus or flood reflectors into the lamp head with the holes to the inside.

NOTE: The inside edge of the reflector should slide into the upper and lower notches of the white retainers.

2. Set the retaining brackets in place. The placement of the retaining brackets differs between focus and flood reflectors.

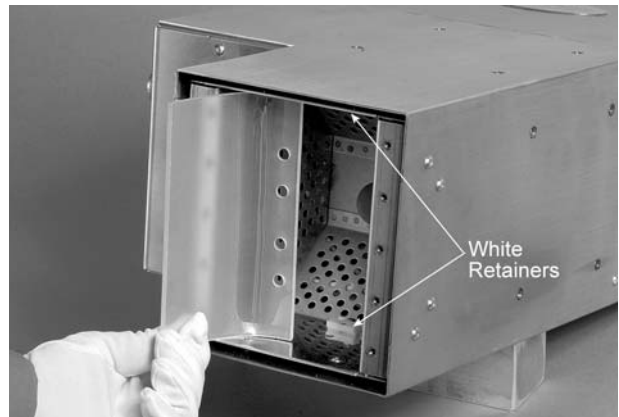


Figure 4-5 Slide the Reflectors Into the Lamp head

Focus Reflectors: See Figures 4-6 and 4-7. The bracket for the focus reflector is 23.3-mm (0.92-in.) wide. The edge of the reflector will sit on the retainer springs on the inside edge of the bracket.

The lip on the focus bracket will go to the inside of the lamp head and wrap around the reflector. Line up the retaining bracket mounting holes with the mounting holes in the lamp head base.

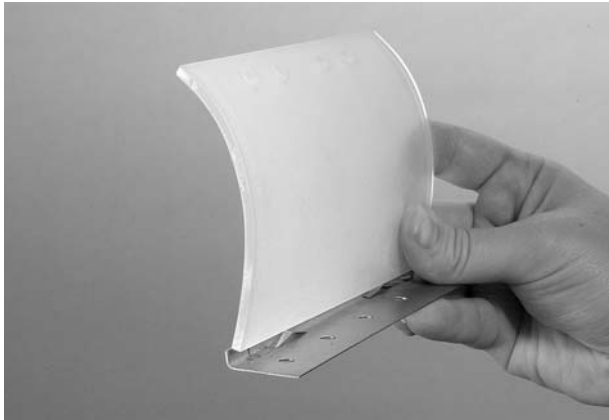


Figure 4-6 Focus Reflector Curve and Retaining Bracket

Flood Reflectors: See Figures 4-8 and 4-9. The bracket for the flood reflector is 33.3-mm (1.31-in.) wide. The edge of the reflector will sit on the retainer springs on the inside edge of the bracket.



Figure 4-7 Placing the Focus Retaining Bracket

The lip on the flood bracket will go to the inside of the lamp head and wrap around the edge of the reflector. The curve of the reflector causes the reflector to sit farther away from the side of the cavity wall. Line up the retaining bracket mounting holes with the mounting holes in the lamp head base.



Figure 4-8 Flood Reflector Curve and Retaining Bracket



Figure 4-9 Placing the Flood Retaining Bracket

3. Using a 2.5-mm hex wrench or Phillips screw driver, secure the the two retaining brackets to the lamp head base with the four screws and tighten screws to 1.1 N•m (10-in. lb).
4. Install the bulb.
5. Install the RF screen to the lamp head base with the six screws and tighten screws to 1.1 N•m (10-in. lb).

Internal Component Replacement

Remove the lamp head cover to replace the following internal components:

- Pressure switch
- Light detector board
- Starter bulb
- Magnetron

NOTE: Step 2 is optional and is only to prevent damage to the RF screen and UV bulb.

1. Perform the *Preparation* procedures on page 4-2.
2. Remove the bulb. Refer to *Bulb Replacement* beginning on page 4-2.
3. Remove all the screws that are circled in white in Figure 4-10 to remove the lamp head cover and cavity assembly.

NOTE: The lamp head cover and cavity are removed as an assembly.

NOTE: Remove the two inside screws (not pictured) on the back of the lamp head as well.

4. Loosen the screws circled in black in Figure 4-10 to provide a secure point to help remove the cavity assembly.
5. Pull the cover off the lamp head base.

Pressure Switch

NOTE: Due to product style variations, the installed pressure switch may vary physically from the replacement pressure switch.

1. Follow steps 1–5 under *Internal Component Replacement* on page 4-6 to remove the lamp head cover and cavity assembly.
2. Note the orientation of the pressure switch with regard to the airflow direction.
3. See Figure 4-11. Using a wrench remove the two nuts and energizer washers from the pressure switch.



Figure 4-10 lamp head Cover Removal

4. Pull the pressure switch from the front cover and turn it so you can easily grasp and remove the wires from the switch.
5. See Figure 4-12. Install the wires on the new pressure switch.
6. Using a wrench or a Phillips screwdriver, secure the pressure switch on the front panel with the two nuts and energizer washers.
7. Install the cover and cavity assembly on the lamp head base.
8. Install the bulb and RF screen per bulb replacement procedure on page 4-2, if necessary.

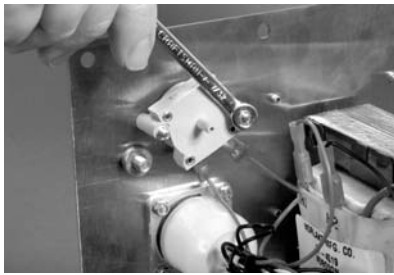


Figure 4-11 Pressure Switch Removal

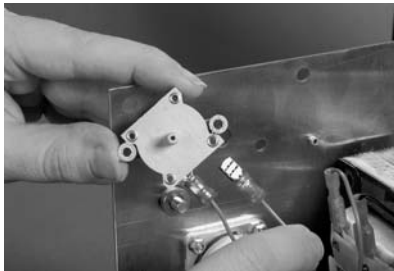


Figure 4-12 Pressure Switch Wires

Light Detector Board

NOTE: Due to product improvements and changes, the replacement board may vary physically from the installed board.

1. Follow steps 1–6 under *Internal Component Replacement* on page 4-6 to remove the lamp head cover.

2. See Figure 4-13. Disconnect the light detector board.
3. Remove the two screws that are circled in the figure.
4. Replace and connect the new board and install it with the screws.

NOTE: See Figure 4-14. For installation on a CW-306 system with an analog light detector, the jumper on J1 must be spanning the top two pins of the three pin terminal.

5. Install the cover on the lamp head base.
6. Install the bulb and RF screen, if necessary.

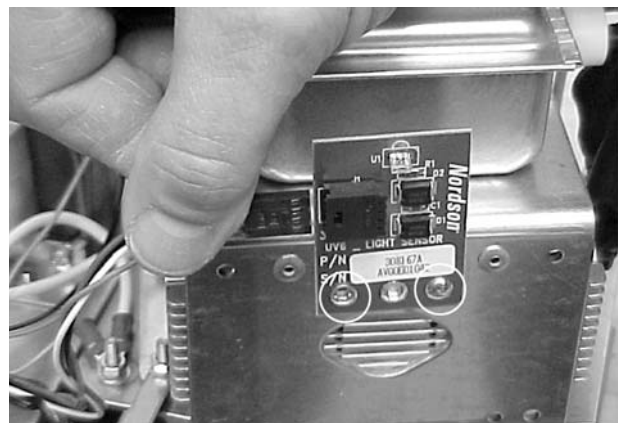
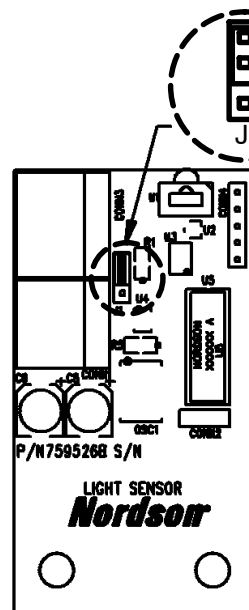


Figure 4-13 Light Detector Board Replacement



NOTE: Install electrical connector to 4 pin receptacle.

Figure 4-14 Jumper position for a CW-306 system

Starter Bulb

1. Follow steps 1–5 under *Internal Component Replacement* on page 4-6 to remove the lamp head cover and cavity assembly.
2. See Figure 4-15. Cut or remove the threadlocking material from the base of the bulb to remove the bulb.
3. Apply a small dot of threadlocking material to the base of the new bulb and install it.
4. Install the cover on the lamp head base.
5. Install the bulb and RF screen per bulb replacement procedure on page 4-2, if necessary.

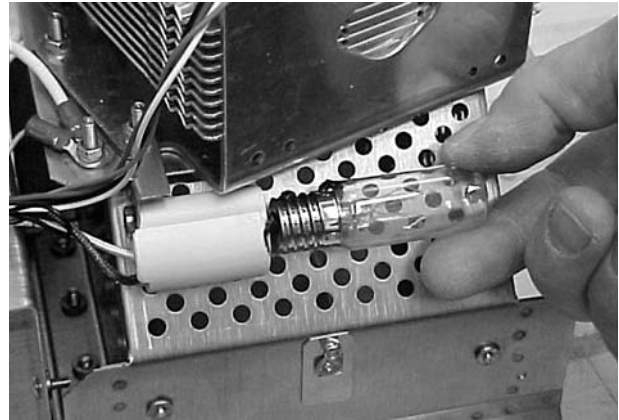


Figure 4-15 Starter Bulb Replacement

Magnetron

Magnetron Removal

1. Follow steps 1–5 under *Internal Component Replacement* on page 4-6 to remove the lamp head cover and cavity assembly.

NOTE: Be careful not to cut or damage the black sleeving.

2. See Figure 4-16. Cut the four ties securing the black sleeving over the high-voltage ring terminals.
3. See Figure 4-17. Slide the sleeving down to expose the two ring terminals. Remove the two screws.

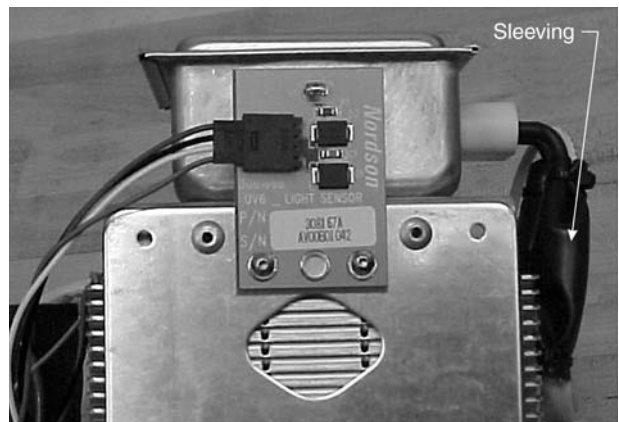


Figure 4-16 Removing Black Sleeving



Figure 4-17 Disconnecting Ring Terminals

4. Disconnect and remove the light detector board as described on page 4-7.
5. See Figure 4-18. Using a wrench, remove the four nuts that secure the magnetron to the lamp head base. Remove the magnetron.

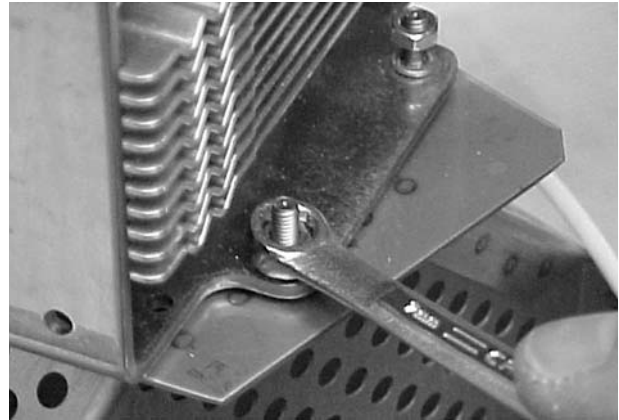


Figure 4-18 Removing the Magnetron

Magnetron Installation

1. See Figure 4-19. Inspect the gasket around the antenna of the new magnetron making sure it is smooth and free of debris.
Check for signs of arcing or burning around the flange. If arcing or burn marks are present, contact your Nordson representative.
2. Carefully insert the antenna through the hole in the lamp head base.
3. Make sure the magnetron gasket is sealed evenly on the flange and secure the magnetron to the lamp head with the four nuts. Tighten the nuts to 1.9 N•m (17-in. lb).
4. Connect and install the light detector board.
5. Install wires to magnetron ring terminals removed during step 3 of removal procedure. Secure the two high-voltage ring terminal with the two screws.
6. Pull the black sleeving up over the high-voltage terminal and secure it in place with tie wraps.
7. Install the cover and cavity assembly on the lamp head base.
8. Install the bulb and RF screen per bulb replacement procedure on page 4-2, if necessary.

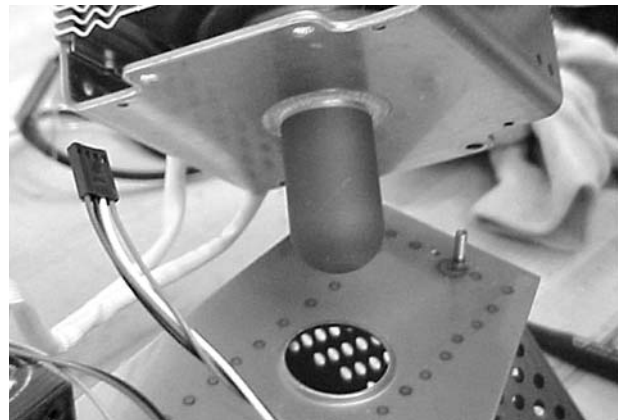


Figure 4-19 Installing the Magnetron

Section 5

Troubleshooting



WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

Introduction

These procedures cover only the most common problems that you may encounter. If you cannot solve the problem with the information given here, contact your local Nordson representative for help.

Bulb Problems

NOTE: Any bulb that has been touched or contaminated should be cleaned with alcohol prior to use. Failure to do so can and possibly will result in premature failure of the bulb.

Problem	Possible Cause	Corrective Action
1. Bulbs have white fingerprints on quartz	Quartz was touched when bulb was installed: finger dirt and oils were deposited on the quartz and burned into the quartz when the bulb was running	Replace the bulb. The spectral output has diminished. In the future, do not touch the quartz portion of the bulb under any circumstances.
2. New bulb does not start	Pressure seal has been broken	Replace the bulb.
3. Quartz portion of bulb is rippled	Bulb is overheating	Check the ventilation. Clean the filter material. Check the pressure switch, it may have failed.
4. Quartz has a white or gray cloudy appearance	Bulb is overheating	Replace the bulb. If UV output is below acceptable levels.

Curing Process Problems

Problem	Possible Cause	Corrective Action
1. System running ok but material not curing	Reflectors are installed in the wrong orientation Reflectors are badly damaged or dirty RF screen dirty Lamp out of focus	Check to make sure reflectors are installed and are installed correctly. Replace the reflectors. Remove and clean the RF screen. Focus the lamphead.

Section 6

Parts

Introduction

To order parts, call the Nordson Industrial Coating Systems Service Center at (800) 433-9319 or your local Nordson representative. Use the parts lists and accompanying illustrations to locate and describe parts correctly.

Cables

See Figure 6-1. Order the correct cable length for your particular system.

Item	Part	Description	Quantity	Note
20	775374	12-ft UNICABLE	1	
20	775023	25-ft UNICABLE	1	
20	775375	50-ft UNICABLE	1	
20	775377	75-ft UNICABLE	1	
21	1061134	12-ft CABLE, RF detector 6/10		
21	775029	25-ft CABLE, RF detector, 6/10	1	
21	775050	50-ft CABLE, RF detector, 6/10	1	
21	775051	75-ft CABLE, RF detector, 6/10	1	
21	775052	100-ft CABLE, RF detector, 6/10	1	
NS: Not Shown				

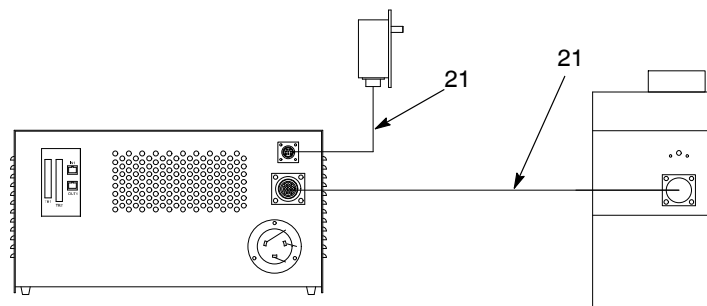


Figure 6-1 CoolWave Cables

Reflector Conversion Kits

Part	Description
1103602	KIT, reflector conversion, 2.1 focus, CW6
1103603	KIT, reflector, conversion, 3.1 focus, CW6
1103604	KIT, reflector conversion, flood, CW6

Lamphead with External/Internal Blower

See Figure 6-2.

Item	Part	Description	Quantity	Note
1a	775204	FOCUS LAMPHEAD, 2.1, external blower	1	
1a	775207	FLOOD LAMPHEAD, external blower	1	
1a	775205	FOCUS LAMPHEAD, 3.1, external blower	1	
1b	775203	FOCUS LAMPHEAD, 2.1, internal blower	1	
1b	775206	FLOOD LAMPHEAD, internal blower	1	
1b	775202	FOCUS LAMPHEAD, 3.1, internal blower	1	
NS	775219	FLOOD LAMPHEAD, external blower, front air inlet	1	
2	775242	MERCURY BULB, CoolWave, H	1	A, B
2	775243	IRON BULB, CoolWave, D	1	A, B
2	775244	GALLUM BULB, CoolWave, V	1	A, B
2	775245	INDIUM BULB, CoolWave, Q	1	A, B
2	775246	MERCURY PLUS BULB, CoolWave, H+	1	A, B
3	775260	BRACKET, retaining, reflector, focus CoolWave 6, 2.1, 3.1	2	B, C
3	775261	BRACKET, retaining, reflector, flood, CoolWave 6	2	B, C
4	1078076	SWITCH, pressure, CoolWave, 306	1	B
5	775385	FILAMENT TRANSFORMER, CoolWave	1	B
6	775040	BULB, starter	1	
7	1103119	FOCUSED REFLECTOR, CoolWave, standard, 2.1	2	B, C
7	1103131	FLOOD REFLECTOR, CoolWave, standard	2	B, C
7	1103130	FOCUSED REFLECTOR, CoolWave, 3.1	2	B, C
8	775335	MAGNETRON, 1.8 kw, CoolWave 6	1	
9	775320	SCREEN, lamphead, CoolWave 6	1	
10	775139	SENSOR, light, CoolWave, 6	1	B
11	-----	BUTTON HEAD SCREW, M4 x 10, zinc plated, steel	32-external 38-internal	
12	-----	BUTTON HEAD SCREW, M3 x 6, zinc plated, steel	10	
13	-----	BUTTON HEAD SCREW, M4 x 10, zinc plated, steel	2	
14	-----	HEX NUT, M4	2	
15	775389	BRACKET, mounting, L, CW6	2	
16	1053790	RETAINER, 2.1, focus, kit		
16	1053791	RETAINER, 3.1, focus, kit	1	
16	1053792	RETAINER, flood, kit	1	
17	-----	SCREW, M5 mounting	8	
18	775022	RF DETECTOR, CoolWave 6/10	1	
19	775221	50/60 POWER SUPPLY, MPS306F	1	
19	1061956	50 Hz POWER SUPPLY, MPS306F	1	
NS	775305	KIT, end, reflector, CW6, pair	1	
NS	775310	QUARTZ PLATE, kit, CoolWave 6	1	
NS	759526	LIGHT DETECTOR BOARD, digital	1	
NS	775162	60 Hz BLOWER, external, 60 Hz	1	
NS	775165	50 Hz BLOWER, external, 50 Hz	1	
<p>NOTE A: Order the correct bulb for your particular system. B: Recommended spare part. Keep this part in inventory to avoid unplanned downtime. C: Order the correct bracket and reflector for your particular system. NS: Not Shown</p>				

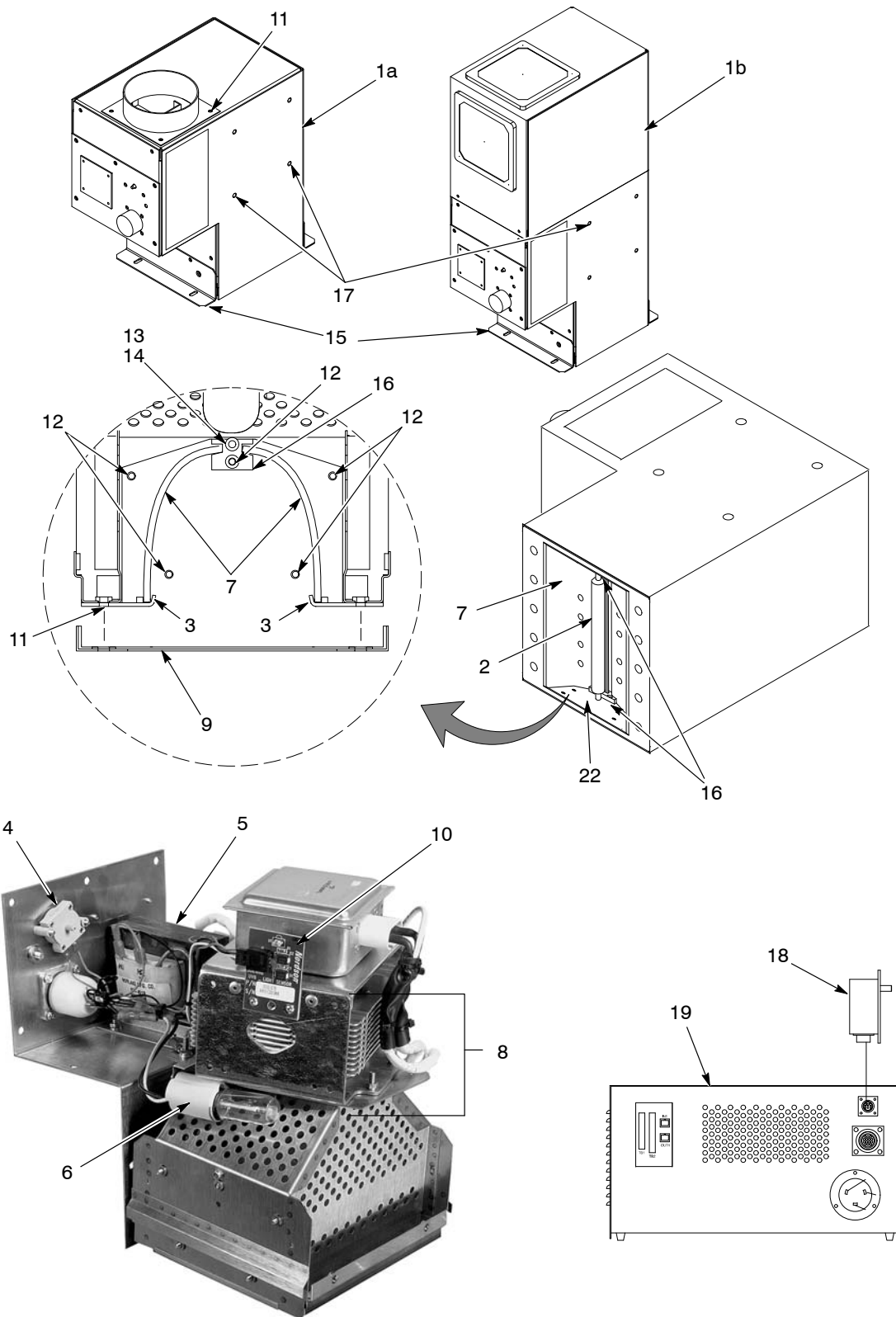


Figure 6-2 CoolWave Lamphead

Optional Lamphhead Mounting Kit

An optional 2-axis bracket, mounting plate, and screws are available as a kit for flexible mounting of lamphheads. Refer to Parts for the kit part number.

- Install the mounting plate (2) on the bracket (1) with four 5/16–18 socket-head screws (3).
- Install the mounting plate on the lamphhead with four M5 x 16 pan-head screws (4) and the M5 threaded holes on the sides of the lamphhead.
- Install the bracket on a suitable mounting surface or rack with four 5/16–18 socket-head screws.

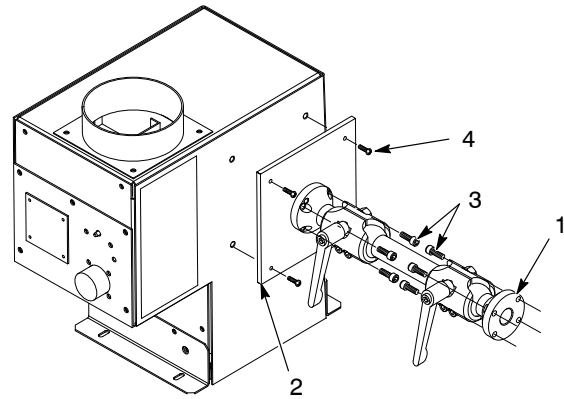


Figure 6-3 Optional Lamphhead Mounting Kit

Item	Part	Description	Quantity	Note
–	1106332	KIT, bracket, adjustable, 6 in. lamphhead		
1	-----	• BRACKET, adjustable, lamphhead, UV	1	
2	-----	• PLATE, interface, 6 in. lamphhead	1	
3	981340	• SCREW, socket, 5/16–18 x 0.750 in., black	8	
4	982432	• SCREW, pan, recessed, M5 x 16, zinc	4	

Section 7

Specifications

Lampheads

Table 7-1 Lamphead Specifications

Item	Internal Blower Lamphead	External Blower Lamphead
Dimensions		
length	260.40 mm (10.25 in.)	257.60 mm (10.14 in.)
width	161.60 mm (6.36 in.)	161.80 mm (6.36 in.)
height	505.50 (19.92 in.)	286.50 mm (11.28 in.)
Weight	17.2 kg (38 lb)	8.6 kg (19 lb)
Cooling Air	225 CFM @ 2.0 in. H ₂ O; measured at lamphead	225 CFM @ 2.5 in. H ₂ O; measured at lamphead
Ventilation Air	280 CFM @ 2-in. W.C. (minimum)	280 CFM @ 2-in. W.C. (minimum)
Reflector	Borosilicate glass with dichroic coating: focus, flood profiles	
Ambient Temperature	5–40 °C (41–104 °F)	
Relative Humidity	Up to 80%	
Focal Length	Variable	
Interlocks	Photo resistor assembly (light detector) Air pressure switch High-voltage cable connection	

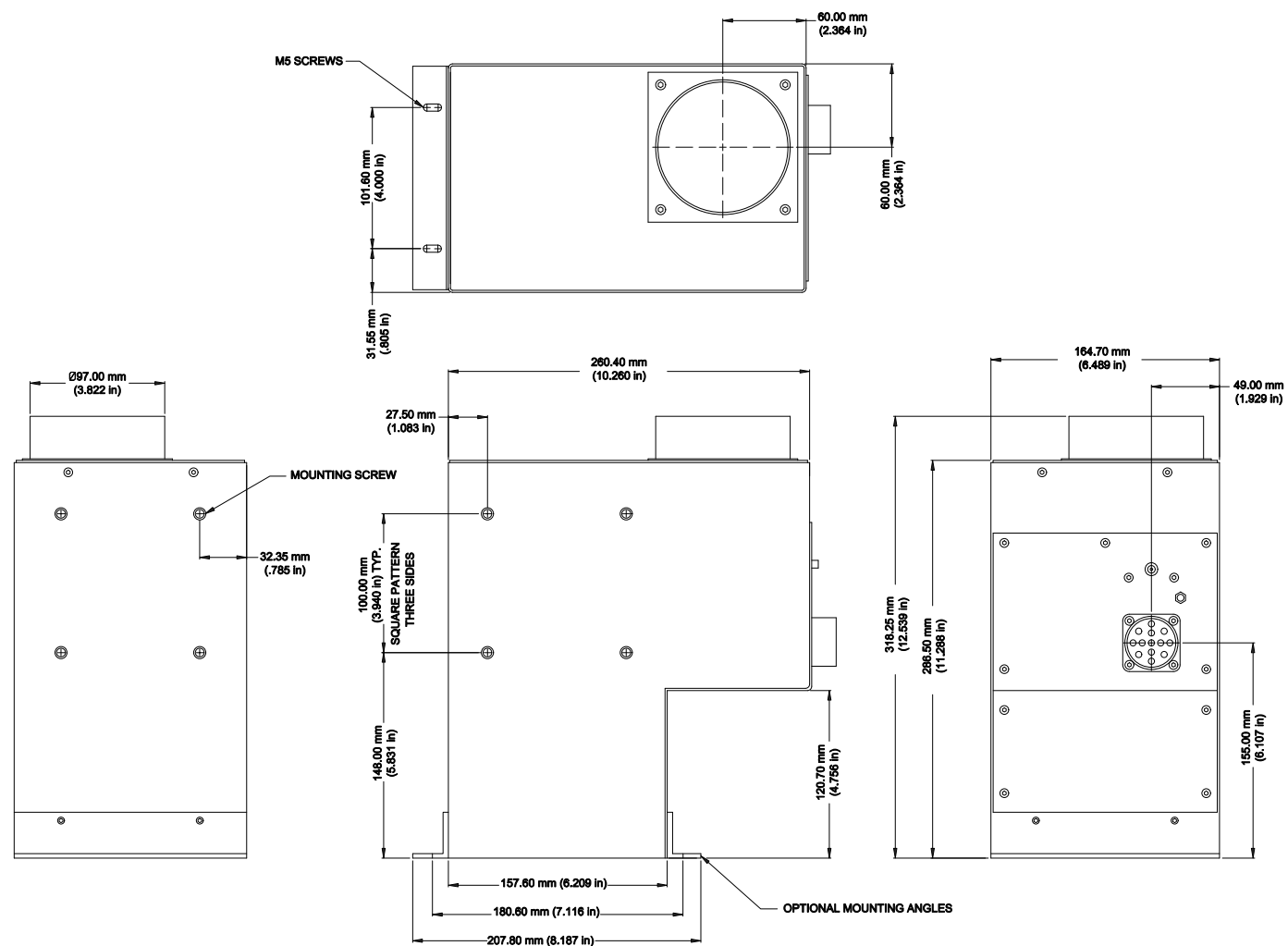
Bulb

Table 7-2 Bulb Specifications

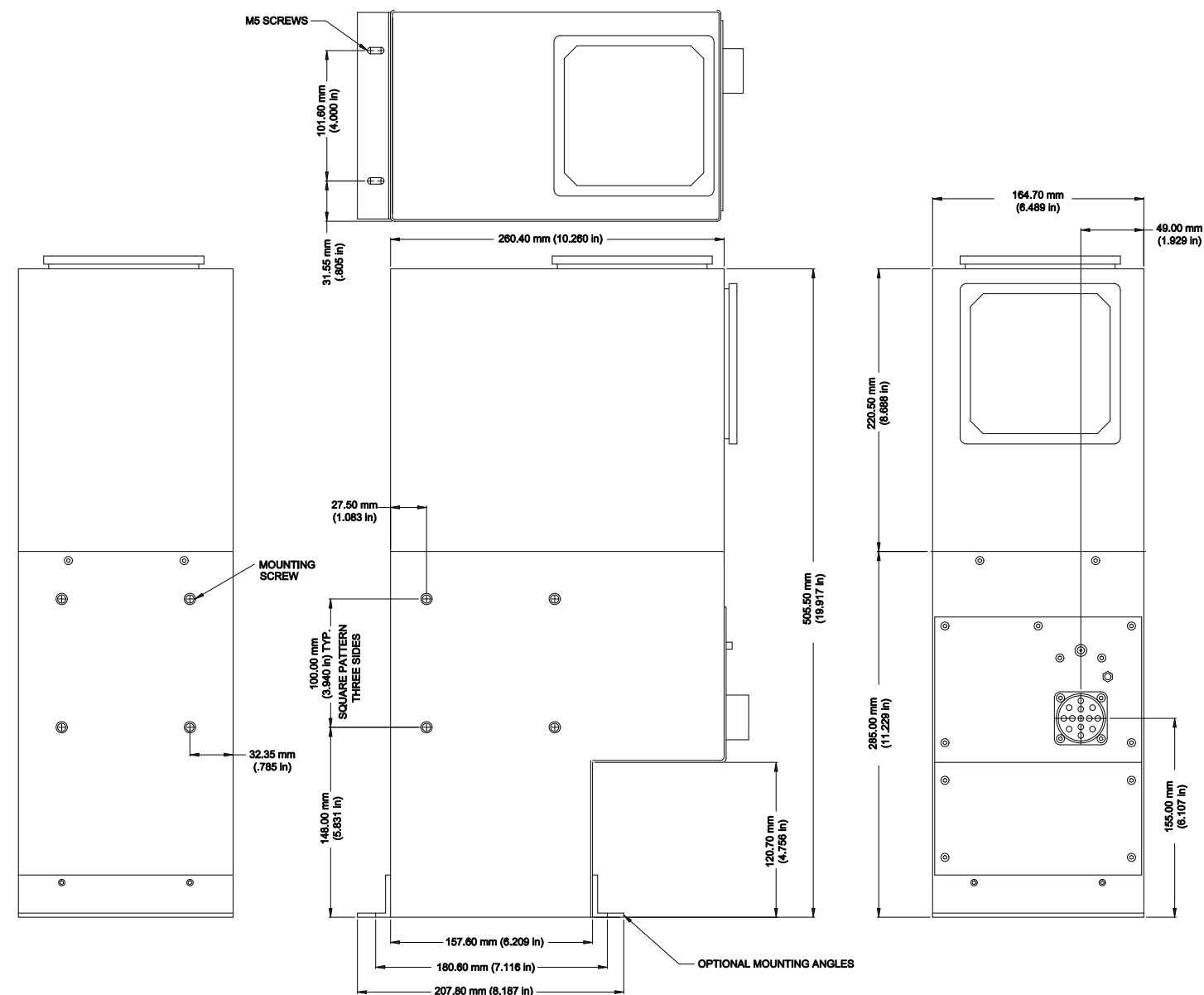
Item	Specification
Length	153 mm (6 in.)
Power	300 watts/in. maximum
Types	Mercury, Mercury +, Iron, Gallium, Indium

System Drawing

Figure 7-1: Lamphead Dimensions



External Blower Lamphead



Internal Blower Lamphead

Figure 7-1 Lamphead Dimensions