

# **Coolwave<sup>®</sup> 610 Lamphead with Unicable**

Customer Product Manual

Part 1074165A02

Issued 11/10

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

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# Table of Contents

<b>Safety</b> .....	<b>1-1</b>	<b>Maintenance and Repair</b> .....	<b>4-1</b>
Introduction .....	1-1	Maintenance and Replacement Schedule .....	4-1
Qualified Personnel .....	1-2	Replacement Procedures .....	4-3
Intended Use .....	1-2	Preparation .....	4-3
Regulations and Approvals .....	1-2	Bulb Replacement .....	4-3
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 .....	4-7
High Temperature .....	1-5	Light Detector Board .....	4-8
High Voltage .....	1-5	Starter Bulb .....	4-8
Mercury Bulbs (Lamps) .....	1-6	Magnetron .....	4-9
UV Curable Inks and Products .....	1-6	<b>Troubleshooting</b> .....	<b>5-1</b>
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 .....	5-1
Control System Cleaning .....	1-7	<b>Parts</b> .....	<b>6-1</b>
High Voltage Connections .....	1-7	Introduction .....	6-1
Cabinet Cooling .....	1-7	Using the Illustrated Parts List .....	6-1
Disposal .....	1-7	Coolwave 610 Lamphead with Unicable .....	6-2
Moving and Storage .....	1-7	Coolwave 610 Cables .....	6-4
Safety Symbols .....	1-7	Reflector Conversion Kits .....	6-4
<b>Description</b> .....	<b>2-1</b>	Recommended Spare Parts .....	6-5
Introduction .....	2-1	<b>Specifications</b> .....	<b>7-1</b>
System Components .....	2-2	Lamphead .....	7-1
Reflectors .....	2-4	Bulb .....	7-1
<b>Installation</b> .....	<b>3-1</b>	System Drawing .....	7-2
Introduction .....	3-1		
Inspection and Packaging .....	3-1		
Mounting Guidelines .....	3-1		
External Blowers – Cooling Air .....	3-1		
External Blowers – Ventilation Air .....	3-1		
Lamphead .....	3-2		
Light Shielding .....	3-3		
RF Detector .....	3-3		
Lamphead Cooling .....	3-4		
Lamphead Cable Connections .....	3-5		



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

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/cm<sup>2</sup> 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

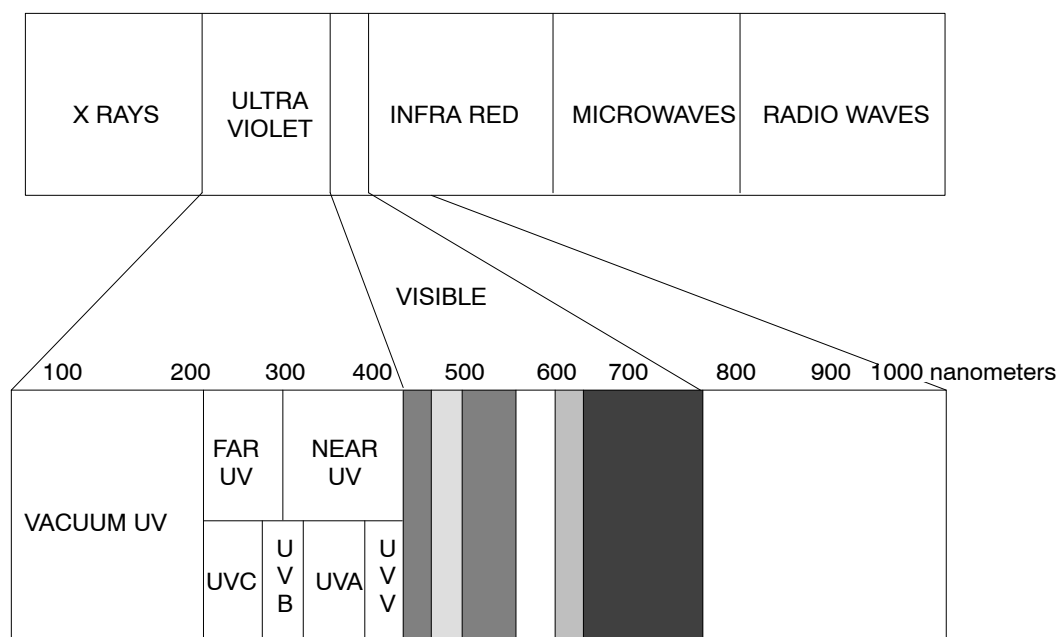


Figure 1-2 Ultraviolet Light Wavelength Bands

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/cm<sup>2</sup> 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 (O<sub>3</sub>) 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



## *Section 2*

# Description

### Introduction

This section provides a general overview of the Coolwave 610 ten-inch lamphead with uncable for the Nordson CoolWave ultraviolet microwave applied curing system.

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


The system consists of an individual 10-in. lamphead, a corresponding variable output power supply, and an RF detector. Additional lampheads can be lined up end-to-end to form longer curing widths.

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

## System Components

Refer to Table 2-1 and see Figure 2-1 for a description of the system components.

Table 2-1 System Components

Item	Component	Description
1	Lamphead	The lamphead consists of a bulb housing, UV bulb, wave guide, reflectors, light detector, starter bulb, and the magnetron assembly. The patented wave guide also couples RF energy to the bulb and provides cooling for the bulb. The lamphead reflects the emitted UV light onto the substrate.
2	Ultraviolet Bulbs	 Use genuine Nordson replacement bulbs with this system. Alternative bulbs may damage the control or overheat the reflector system. <b>NOTE:</b> 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) to produce light at different wavelengths. Bulbs and controls are carefully matched to give optimum UV output and wavelength requirements.
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 borosilicate glass, with a dichroic coating to give maximum UV reflectivity while minimizing infrared radiation. <b>NOTE:</b> A wider band of light can be produced by using optional flood reflectors. Contact a Nordson UV representative for details.
4	Starter Bulb	The starter bulb acts as the ignitor for the ultraviolet bulb. The starter bulb is powered with 220 Vac at the same time the magnetron is energized. After the UV bulb reaches full power the starter bulb turns off automatically.
5	Pressure Switch	Sets the minimum lamphead pressure for cooling the magnetrons and bulbs for each lamphead.
6	Magnetrons	The magnetrons are 3 kW, 2450 MHz frequency generators that convert high voltage electrical inputs to RF energy. The wave guide cavity is designed to couple the RF 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. The lamphead requires approximately 350 cfm at 7 in. W.C. of cooling air per lamphead in order to function properly. The external blowers must be sized appropriately to provide adequate cooling. <b>NOTE:</b> Installation of a device that monitors the airflow and pressure is recommended. In the event of cooling air loss the device will shut the system down.

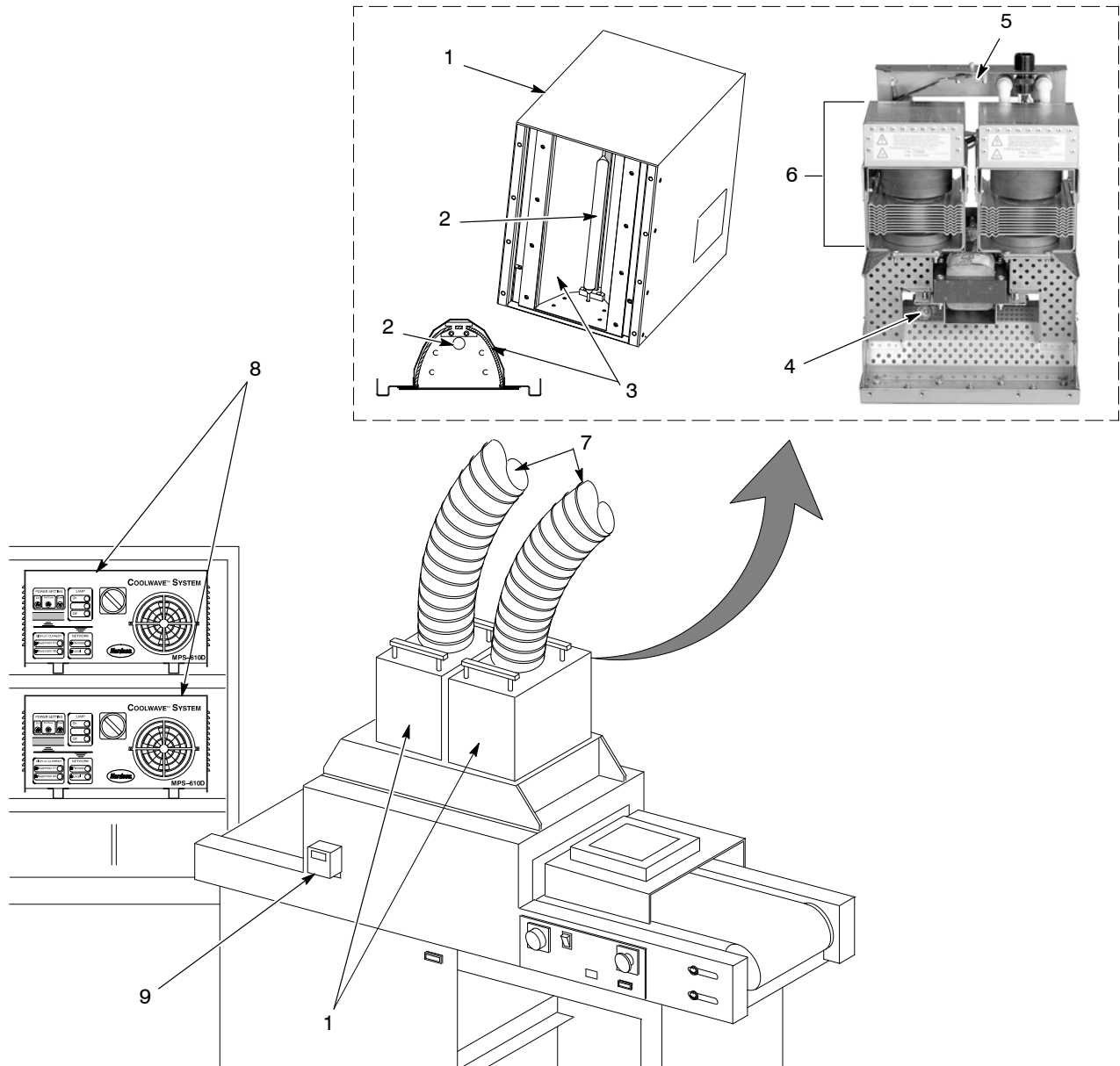


Figure 2-1 System Components (Typical UV Curing System Setup)

- |                     |   |                   |
|---------------------|---|-------------------|
| 1. Lampheads        | 4. Starter bulb                           | 8. Power supplies |
| 2. Ultraviolet bulb | 5. Pressure switch                        | 9. RF detector    |
| 3. Reflectors       | 6. Magnetrons                             |                   |
|                     | 7. Tubing to external blowers for cooling |                   |

## 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.

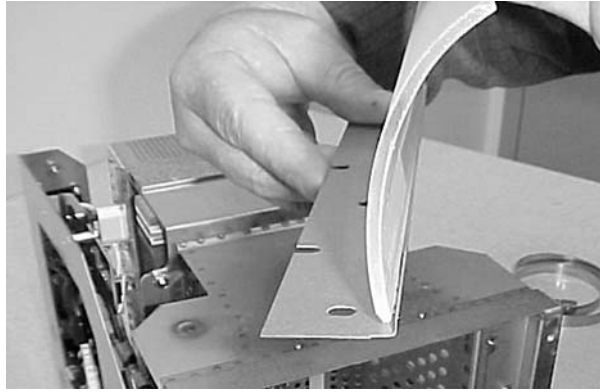


Figure 2-2 Focus Reflector and Bracket

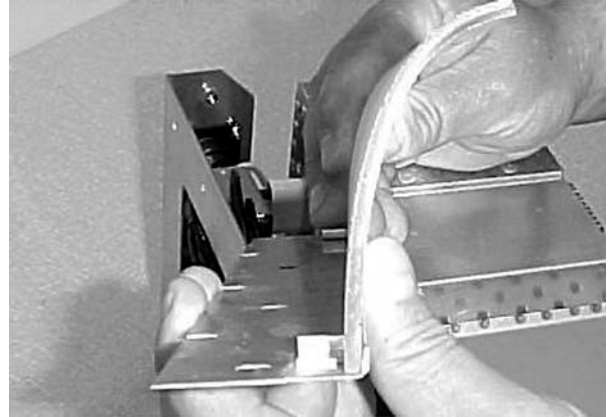


Figure 2-3 Flood Reflector and Bracket



## 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 10-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

### *External Blowers – Cooling Air*

The cooling requirements for each lamphead is 350 cfm @ 7-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. Measure for the correct pressure at each lamphead at the port located at the top and center of the lamphead between the cable connections. The port can be exposed by removing the Phillips-head screw.

**NOTE:** If the top of the lamphead is not accessible, take a reading in the duct work immediately preceding the lamphead.

In many applications there will be multiple lampheads obtaining their cooling air from a common source such as a plenum.

It is recommended that air flow adjustment dampers be added to the ducting as close to the lamphead as possible.

### *External Blowers – Ventilation Air*

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 450 cfm @ 2-in. W.C. to properly evacuate the heat and ozone from the lamphead.

## 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.

Figure 3-1 illustrates the physical dimensions of the lamphead. Install the lamphead screen (bulb end) the appropriate distance above the substrate for optimal focal positioning as defined by your reflector selection.

Distance for Focus reflectors will be:

- 53.3 mm for 2.1 in. reflectors
- 78.7 mm for 3.1 in. reflectors

**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. However, optimum performance can be achieved at a distance of 53.3 mm (2.1 in.)

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

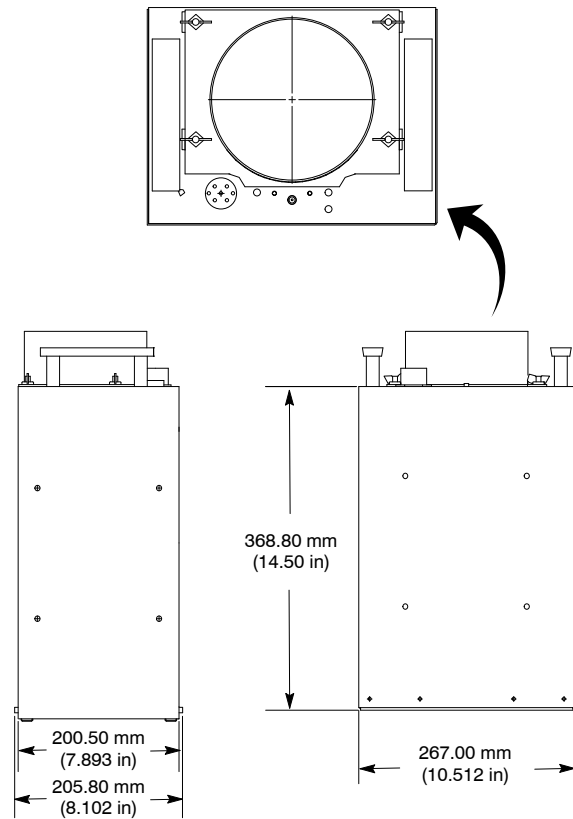


Figure 3-1 Lamphead Dimensions

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

## Light Shielding

- Provide adequate shielding of UV light. The lamphead must be enclosed such that no UV light is allowed to escape.
- Any louvered material used for exhausting must be of a light-shielding design.
- If UV light does escape the operator must wear approved UV-protective eyewear and long-sleeved clothing.

## RF Detector

See Figure 3-2.

- One RF detector is normally required for every 16 networked units within one curing enclosure. However, some applications and systems may require a 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.

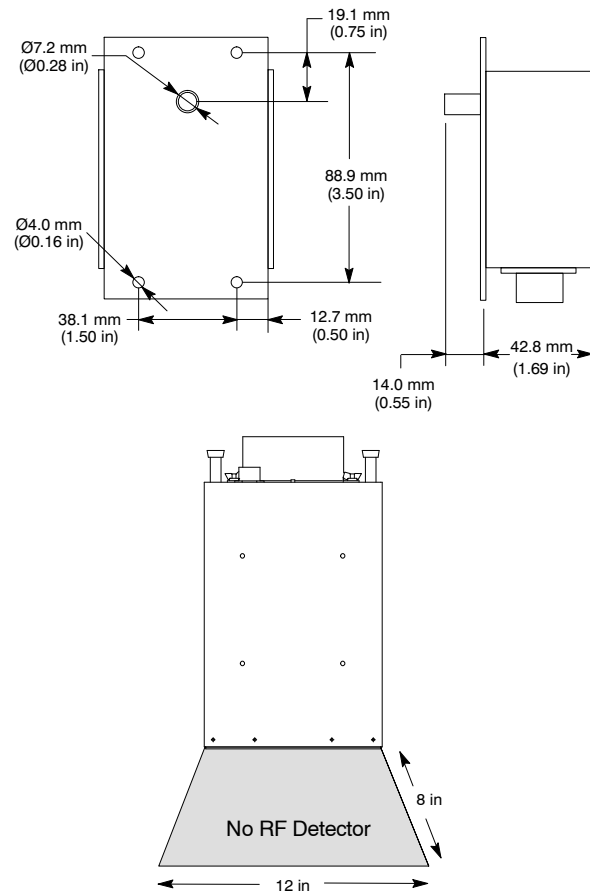


Figure 3-2 RF Detector

## Lamphead Cooling

Lamphead cooling is critical to the operation of the lamphead. The CW610 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:

- unimpeded and unrestricted flow of cooling air through the lamphead
- constant static pressure of 7-in. water column from the inside of the lamphead to ambient or the lamp face
- 350 CFM of airflow through the lamphead
- Minimum vent/extraction air of 450 CFM at 2-in. W.C.

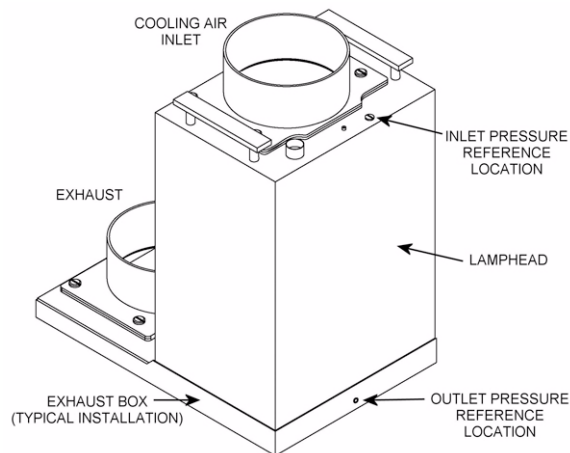


Figure 3-3 Lamphead cooling

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.

Careful measurement at installation is required to ensure proper lamphead cooling and account for the issues associated with a restricted lamphead exhaust.

1. Remove the 10-32 screws at each reference location. Each location can accommodate a 10-32 barbed pressure fitting.
2. Measure the air pressure at both the Inlet reference and the Outlet reference, to ensure a minimum of 7-in. W.C. differential between the two reference locations.

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

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

## Lamphead Cable Connections



**CAUTION:** 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.

All cables must be securely fastened. Be sure to turn screw-type connectors until they are completely tight against their mating receptacle.

Before inserting 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.

The plug is keyed and can only be inserted into the receptacle when correctly oriented. Do not force the plug into the receptacle.

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 the plug while tightening the screw ring until the plug is firmly seated into the receptacle. Do not use the screw ring to pull the plug into the receptacle. In some 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.

Each unicable connector end features an indicator that identifies when the connector is fully mated. Tighten the screw ring by hand. When fully mated, no red should appear on the indicator locations and there is no movement between the plug and the receptacle.



Figure 3-4 Unicable connector partially installed

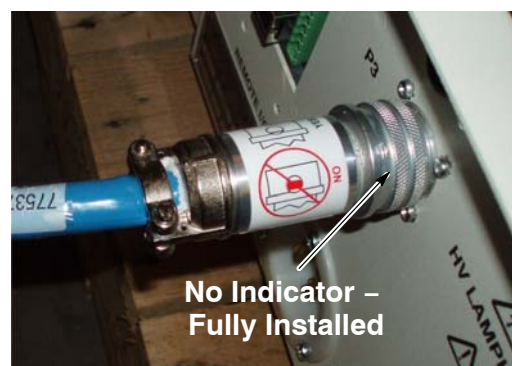


Figure 3-5 Unicable connector fully installed

Table 3-2 Lamphead Cable Connections

Cable	From	To	Length (ft)	Part
Unicable	Power supply unit connector P3	Lamphead	12	775374
			25	1059674
			50	775375
			75	755377
			100	775380



## 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 CW610 lamphead.

Recommended maintenance to the lamphead consists of changing bulbs and reflectors and cleaning or replacing filter material. It is also recommended that reflectors 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><b>NOTE:</b> 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>	after 3000 hours of operation or as needed
Magnetrons	<p>The magnetrons are 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> <p><b>NOTE:</b> Magnetrons are matched during assembly and must always be replaced as a paired set. It is not acceptable to take one magnetron from one pair and use it in a lamphead with a magnetron from another pair. To help identify the pair, both magnetrons are marked with the same serial number.</p>	after 3000 hours of operation or as needed

Component	Maintenance Guidelines	Replace component...
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> <div data-bbox="467 389 548 470">  </div> <p>Do not use damaged screens. This can result in RF leakage.</p>	as needed
Reflectors	<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> <div data-bbox="467 772 548 853">  </div> <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 lamphead cooling fan cools the system sufficiently to avoid pressure switch and other internal lamphead component failures.</p>	when failure occurs
Filters Remote blower cooling fan electrical enclosure/ lamphead	<p>Filter material is designed to capture dust and contaminants from the plant before entering the UV equipment. These filters are located on the lampheads, 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 lamphead 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.

## Bulb Replacement

1. Perform the *Preparation* procedure in this section.
2. See Figure 4-1. Turn or place the lamphead assembly so that the entire bulb area is exposed and accessible.
3. Remove the eight screws from the lamphead base to remove the RF screen.

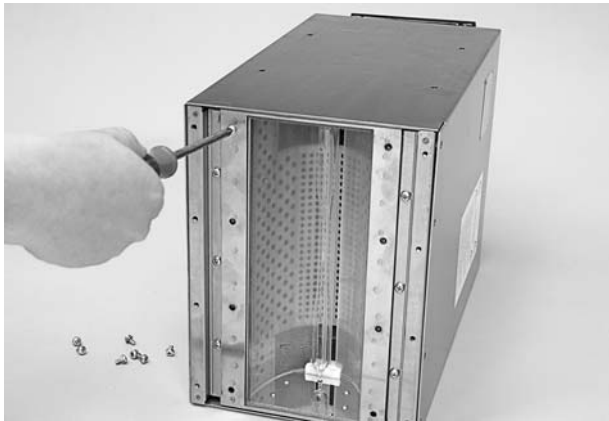


Figure 4-1 RF Screen Removal

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

3. Turn off the main electrical disconnect. Follow all relevant OSHA-established lockout procedures.
4. If the lamphead has a plastic and metal connector, disconnect the interconnect cables.
5. If necessary, loosen the lamphead mounting fasteners and remove the assembly from the brackets.
4. See Figure 4-2. Grasp the ends of the bulb and push it to one side. Lift one end of the bulb out of the retaining hole; the other end of the bulb should come out of the other retaining hole.
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 lamphead base with the eight screws. Torque to 1.1 N•m (10-in. lb).

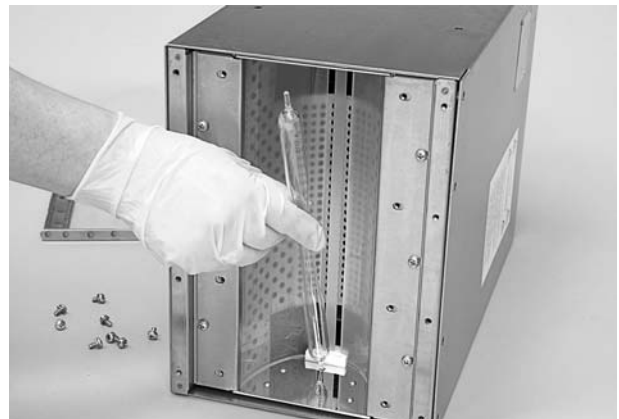


Figure 4-2 Bulb Replacement

## Reflector Replacement

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

### Reflector Removal

1. Perform the *Preparation* procedure on page 4-3.
2. Turn or place the cradle assembly so that the entire bulb area is exposed and accessible.
3. Remove the eight screws from the lamphead base to remove the RF screen.

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

4. Remove the bulb. Refer to *Bulb Replacement* beginning on page 4-3.
5. See Figure 4-3. Remove the six mounting screws and the two retaining bars from the lamphead base.
6. See Figure 4-4. Carefully slide the two reflectors from the lamphead base.

**NOTE:** Great care should be taken when replacing reflectors as they are made of glass and may break if dropped or forced.

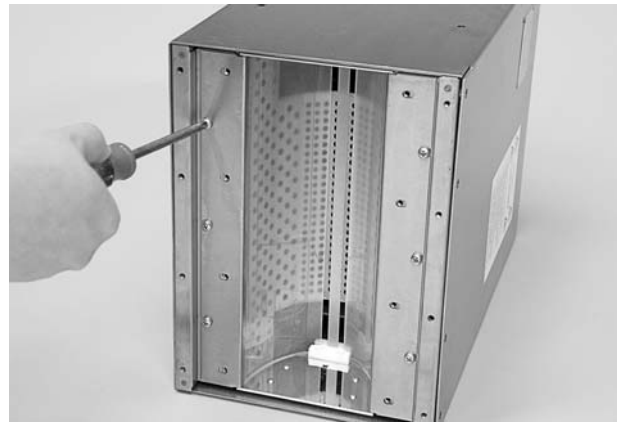


Figure 4-3 Retaining Bars Removal

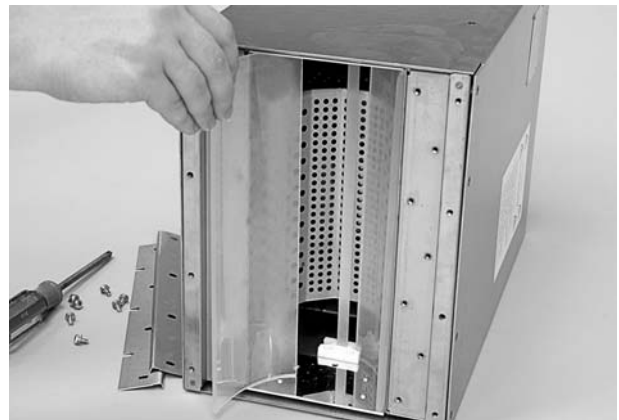


Figure 4-4 Reflector Replacement

### Reflector Installation

1. Slide the reflectors into the lamphead base.  
**NOTE:** The inside edge of the reflector should slide into the notches of the white retainers.
2. Set the retaining brackets in place. The placement of the retaining brackets differs between focus and flood reflectors.

**Focus Reflectors:** See Figures 4-5 and 4-6. The edge of the reflector will sit on the retainer springs on the inside edge of the bracket.

3. Install the six mounting screws to secure the reflectors and retaining brackets. Torque to 1.1 N•m (10-in. lb).
4. Install the bulb.
5. Install the RF screen to the lamphead base.

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

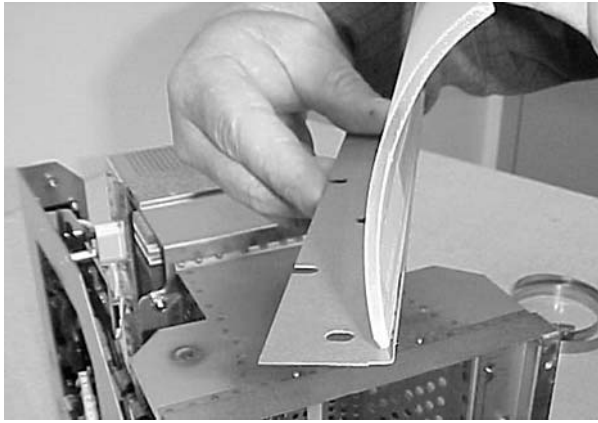


Figure 4-5 Focus Reflector Curve and Retaining Bracket

**Flood Reflectors:** See Figures 4-7 and 4-8. The edge of the reflector will sit on the retainer springs on the inside edge of the bracket.

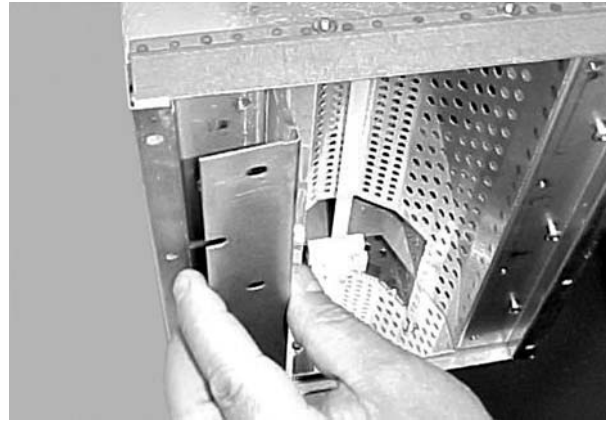


Figure 4-6 Placing the Focus Retaining Bracket

The lip on the flood bracket will go to the inside of the lamphead 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 lamphead. Line up the retaining bracket mounting holes with the mounting holes in the lamphead base.

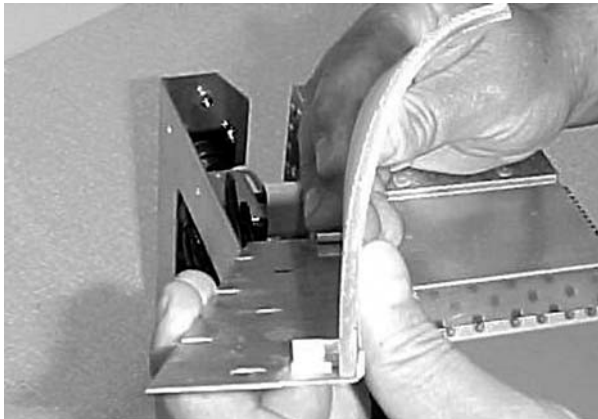


Figure 4-7 Flood Reflector Curve and Retaining Bracket

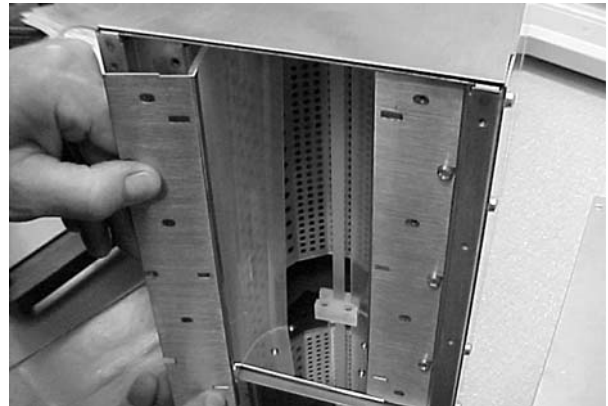


Figure 4-8 Placing the Flood Retaining Bracket

## Internal Component Replacement

Remove the lamphead cover to replace the following internal components:

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

**NOTE:** Steps 2 through 4 are optional and are taken only to prevent any damage to the RF screen or bulb.

1. Perform the *Preparation* procedure on page 4-3.
2. Turn or place the lamphead assembly so that the entire bulb area is exposed and accessible.
3. Remove eight screws from the lamphead base to remove the RF screen.

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

4. Remove the bulb. Refer to *Bulb Replacement* on page 4-3.
5. See Figures 4-9 and 4-10. Remove the 12 screws from the lamphead cover to remove the cover.

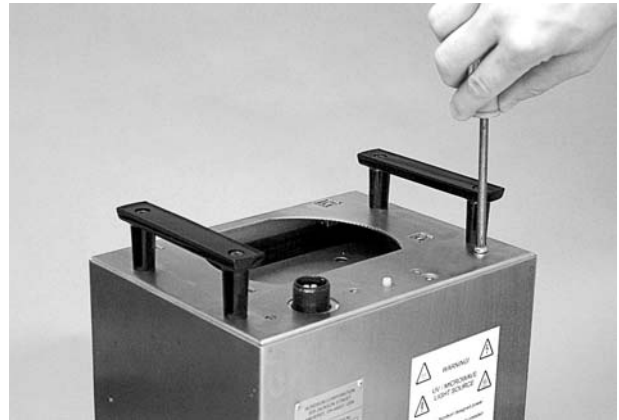


Figure 4-9 Lamphead Cover Removal  
(Top Four Screws)

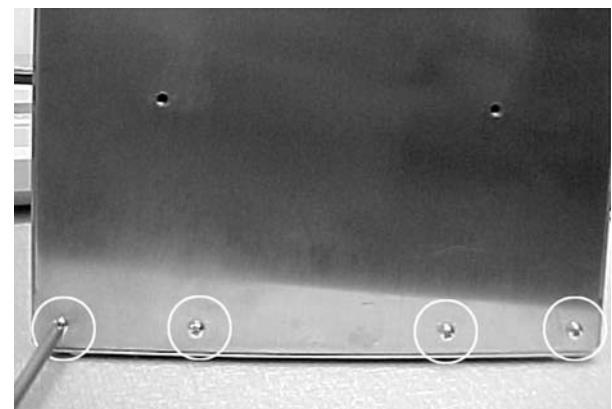


Figure 4-10 Lamphead Cover Removal  
(Eight screws –four on each side)

**NOTE:** Step six can be skipped if you are only replacing the pressure switch.

6. Remove the transformer and connector bracket by removing the three screws identified in Figure 4-11.

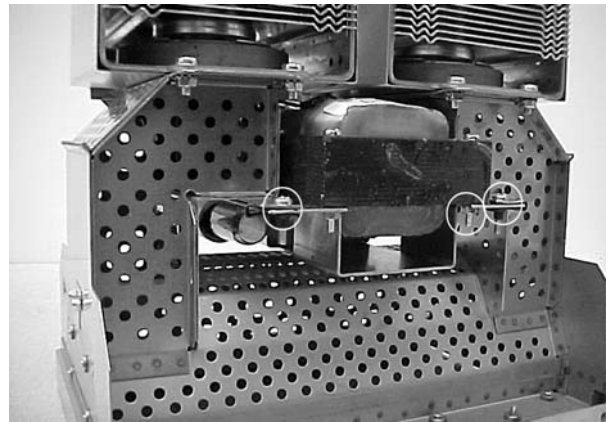


Figure 4-11 Transformer and Connector Bracket Removal

7. See Figure 4-12. Pull the the transformer and connector bracket from the lamphead base

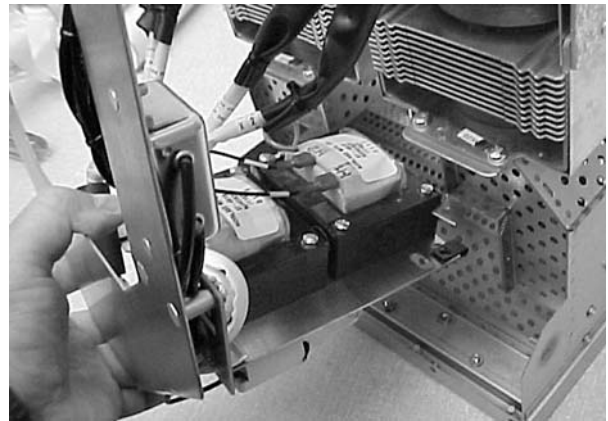


Figure 4-12 Transformer and Connector Bracket

## Pressure Switch

1. Follow steps 1–5 under *Internal Component Replacement* on page 4-6 to remove the lamphead cover.
2. Note the orientation of the pressure switch with regard to the airflow direction.
3. See Figure 4-13. Remove the screws securing the pressure switch to the insulating plate.

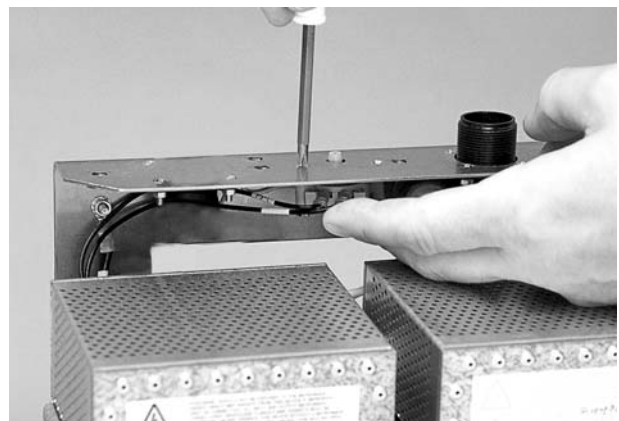


Figure 4-13 Pressure Switch Removal

4. See Figure 4-14. Disconnect the the two wires and connect them to the new pressure switch in the same orientation.
5. Fasten the pressure switch to the insulator plate and stainless steel mounting bracket with the fasteners.
6. Assemble the lamphead.

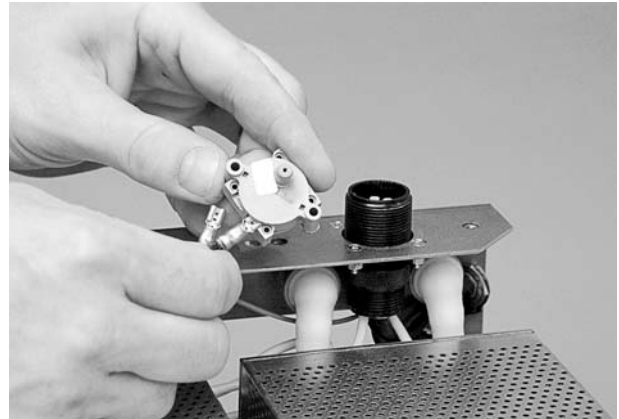


Figure 4-14 Pressure Switch Wires

### Light Detector Board

1. Follow steps 1–7 under *Internal Component Replacement* beginning on page 4-6 to remove the lamphead cover.
2. See Figure 4-15. Disconnect the light detector board.
3. Remove the two screws.
4. Replace and connect the new board and install it with the screws.
5. Install the transformer and connector bracket.
6. Install the cover on the lamphead base.
7. Install the bulb and RF screen, if necessary.



Figure 4-15 Light Detector Board Replacement

### Starter Bulb

1. Follow steps 1–7 under *Internal Component Replacement* beginning on page 4-6 to remove the lamphead cover.
2. See Figure 4-16. 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 transformer and connector bracket.
5. Install the cover on the lamphead base.
6. Install the bulb and RF screen, if necessary.

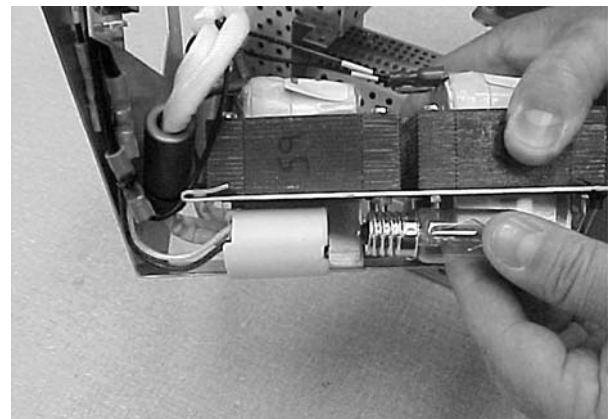


Figure 4-16 Starter Bulb Replacement

## Magnetron

**NOTE:** Each lamphead contains two magnetrons. The replacement procedure is the same for each magnetron.

### Magnetron Removal

1. Follow steps 1–7 under *Internal Component Replacement* beginning on page 4-6 to remove the lamphead cover.

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

2. See Figure 4-17. Cut the four ties securing the black sleeving over the high-voltage ring terminals.

**NOTE:** Magnetrons are matched during assembly and must always be replaced as a paired set. It is not acceptable to take one magnetron from one pair and use it in a lamphead with a magnetron from another pair. To help identify the pair, both magnetrons are marked with the same serial number.

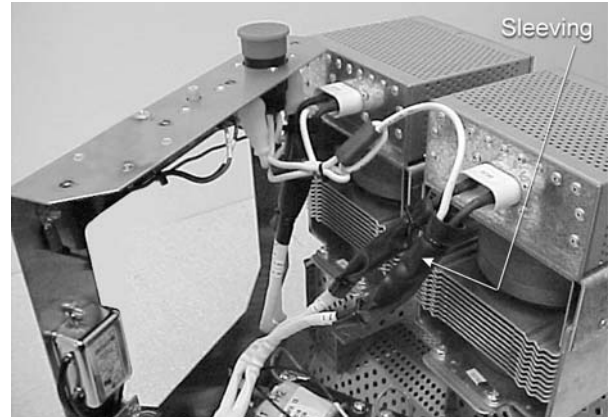


Figure 4-17 Black Sleeving

3. See Figure 4-18. Slide the sleeving down to expose the two ring terminals. Remove the two screws.



Figure 4-18 Ring Terminals

4. See Figure 4-19. Remove the four screws, washers and nuts that secure the magnetron to the lamphead base. Remove the magnetron.

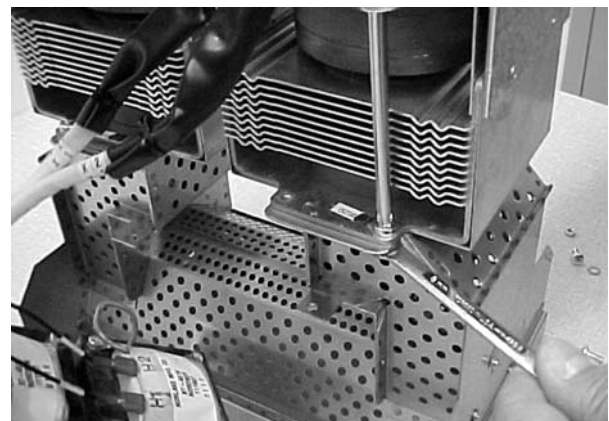


Figure 4-19 Removing the Magnetron

### ***Magnetron Installation***

1. See Figure 4-20. 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 lamphead base.
3. Make sure the magnetron gasket is sealed evenly on the flange and secure the magnetron to the lamphead with the four screws, washers, and nuts. Tighten the nuts to 1.9 N•m (17-in. lb).
4. Secure the two high-voltage ring terminal on each magnetron with the two screws.
5. Pull the black sleeving up over the high-voltage terminal and secure it in place with tie wraps.
6. Install the transformer and connector bracket.
7. Install the cover on the lamphead base.
8. Install the bulb and RF screen, if necessary.

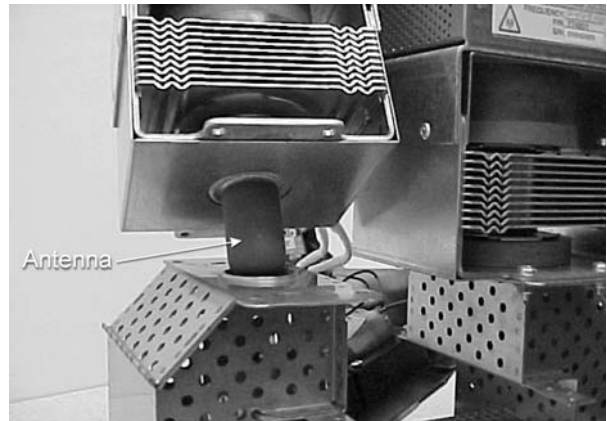


Figure 4-20 Installing the Magnetron



## 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 may result in premature bulb failure.

Problem	Possible Cause	Corrective Action
1. <b>Bulbs have white fingerprints on quartz</b>	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. <b>New bulb does not start</b>	Pressure seal has been broken	Replace the bulb.
3. <b>Quartz portion of bulb is rippled</b>	Bulb is overheating	Check the ventilation. Clean the filter material. Check the pressure switch, it may have failed.
4. <b>Quartz has a white or gray cloudy appearance</b>	Bulb is overheating	Replace the bulb. If UV output is below acceptable levels.

## Curing Process Problems

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



## Section 6

# Parts

### Introduction

To order parts, call the Nordson Customer Service Center or your local Nordson representative. Use this five-column parts list, and the accompanying illustration, to describe and locate parts correctly.

#### ***Using the Illustrated Parts List***

Numbers in the Item column correspond to numbers that identify parts in illustrations following each parts list. The code NS (not shown) indicates that a listed part is not illustrated. A dash (—) is used when the part number applies to all parts in the illustration.

The number in the Part column is the Nordson Corporation part number. A series of dashes in this column (- - - - -) means the part cannot be ordered separately.

The Description column gives the part name, as well as its dimensions and other characteristics when appropriate. Indentions show the relationships between assemblies, subassemblies, and parts.

- If you order the assembly, items 1 and 2 will be included.
- If you order item 1, item 2 will be included.
- If you order item 2, you will receive item 2 only.

The number in the Quantity column is the quantity required per unit, assembly, or subassembly. The code AR (As Required) is used if the part number is a bulk item ordered in quantities or if the quantity per assembly depends on the product version or model.

Letters in the Note column refer to notes at the end of each parts list. Notes contain important information about usage and ordering. Special attention should be given to notes.

Item	Part	Description	Quantity	Note
—	0000000	Assembly	1	
1	000000	• Subassembly	2	A
2	000000	• • Part	1	

## Coolwave 610 Lamphead with Unicable

See Figure 6-1.

Item	Part	Description	Quantity	Note
1	1059013	FOCUS LAMPHEAD, CoolWave, 2.1, w/unicable	1	
1	1059015	FLOOD LAMPHEAD, CoolWave, w/unicable	1	
1	1059014	FOCUS LAMPHEAD, CoolWave, 3.1, w/unicable	1	
2	775042	• MERCURY BULB, CoolWave, 10 in., H	1	A, B
2	775043	• IRON BULB, CoolWave, 10 in., D	1	A, B
2	775044	• GALIUM BULB, CoolWave, 10 in., V	1	A, B
2	775045	• INDIUM BULB, CoolWave, 10 in., Q	1	A, B
2	775046	• MERCURY PLUS BULB, CoolWave, 10 in., H+	1	A, B
3	775060	• BRACKET, retaining reflector, CoolWave, focused, PR	2	
3	775061	• BRACKET, retaining reflector, CoolWave, flood, PR	2	
4	773200	• SWITCH, pressure, CoolWave, 10	1	B
5	775064	• FILAMENT TRANSFORMER, CoolWave	2	B
6	775040	• BULB, starter	1	
7	1101443	• FOCUSED REFLECTOR, CoolWave, 2.1, standard, each	2	B, C, D
7	775092	• FOCUSED REFLECTOR, CoolWave, 3.1, each	2	B, C, D
7	1103118	• FLOOD REFLECTOR, CoolWave, standard	2	B, C, D
8	775115	• DEFLECTOR, strip, quartz, CoolWave	1	B
9	775120	• SCREEN, lamphead, CoolWave	1	B
10	775130	• MAGNETRON PAIR, 3.0 Kw, CoolWave	1	B,E
11	775139	• KIT, sensor, light, CW 10/6	1	B
12	-----	• SCREW, M4 mounting holes	8	
13	-----	• PAN HEAD SCREW, M4 x 8, Phillips, steel, zinc plated	14	
14	-----	• PAN HEAD SCREW, M4 x 8, Phillips with lock washer, steel, zinc plated	8	
15	-----	• BUTTON HEAD SOCKET SCREW, M3 x 10, with Nylok nut	4	
16	-----	• BUTTON HEAD SOCKET SCREW, M3 x 5, stainless steel	8	
17	-----	• PAN HEAD SCREW, M5 x 8, Phillips, steel, zinc plated	4	
18	-----	• SCREW, M5 mounting holes	12	
19	1053767	• RETAINER, glass, 2.1 focus, kit	1	D
19	1053768	• RETAINER, glass, 3.1 focus, kit	1	D
19	1053769	• RETAINER, glass, flood, kit	1	D

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 reflector for your particular system.

D: Order the correct PTFE upper retainer for your glass reflectors.

E: Magnetrons are matched during assembly and must always be replaced as a paired set. It is not acceptable to take one magnetron from one pair and use it in a lamphead with a magnetron from another pair. To help identify the pair, both magnetrons are marked with the same serial number.

NS: Not Shown

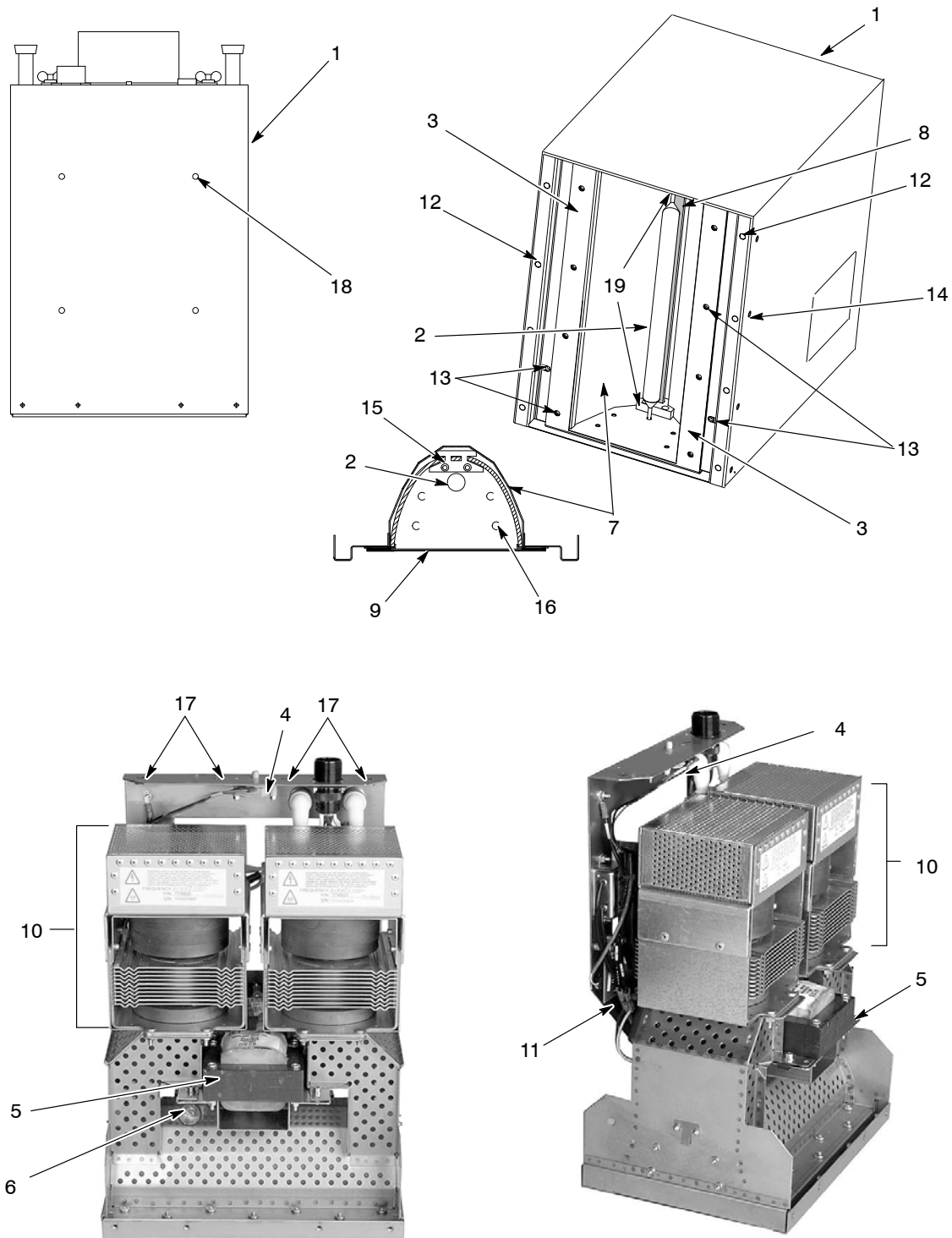


Figure 6-1 CoolWave Lamphead

## Coolwave 610 Cables

**NOTE:** Item numbers 23 and 24 are listed in the Recommended Spare Parts list on page 6-5.

See Figure 6-2. 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	
20	775380	100 ft UNICABLE	1	
21	1061134	12 ft CABLE, RF detector, 6/10	1	
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	775162	60 Hz BLOWER, external, 60 Hz (single lamp)	1	
NS	775165	50 Hz BLOWER, external, 50 Hz (single lamp)	1	

NS: Not Shown

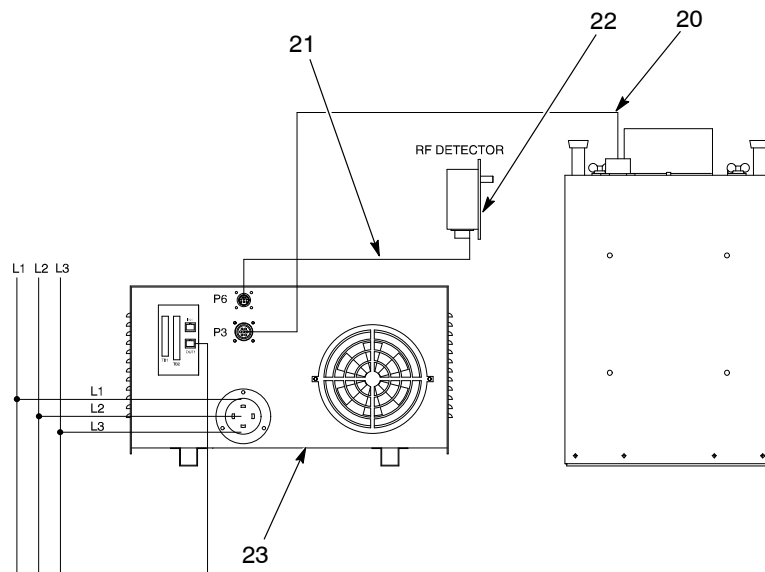


Figure 6-2 CW610 Cables

## Reflector Conversion Kits

**NOTE:** The following kits are used with CW 610 and CW 410 lampheads.

Part	Description
1103600	KIT, reflector conversion, 2.1 focus, CW10
1053794	KIT, reflector, conversion, 3.1 focus, CW10
1103601	KIT, reflector conversion, flood, CW10

## Recommended Spare Parts

Keep the following parts in inventory to avoid unplanned downtime. Quantities listed support one lamphead or power supply.

**NOTE:** Most of the recommended spare parts are listed with a level number (1, 2, or 3) to identify the part's level of importance to system operation. Level 1 parts are generally considered to be wear items and are critical to the day-to-day operation of the UV curing system, so be sure to keep these parts in inventory.

Part	Description	Quantity	Level	Note
775042	MERCURY BULB, CoolWave, 10 in., H	1	1	A
775043	IRON BULB, CoolWave, 10 in., D	1	1	A
775044	GALLUM BULB, CoolWave, 10 in., V	1	1	A
775045	INDIUM BULB, CoolWave, 10 in.	1	1	A
775046	MERCURY PLUS BULB, CoolWave, 10 in., H+	1	1	A
773200	SWITCH, pressure, CoolWave, 10	1	1	
775120	SCREEN, lamphead, CoolWave	1	1	
775130	MAGNETRON PAIR, 3.0 Kw, CoolWave	1	1	
775056	QUARTZ PLATE, exhaust, duct, enclosure	1	1	
775040	BULB, starter	1	2	
775022	RF DETECTOR, CoolWave 6/10	1	2	C
775177	POWER SUPPLY, MPS610D, Hi/Med/Lo, 50/60 Hz	1	2	D
1059013	FOCUS LAMPHEAD, CoolWave, 2.1, w/unicable	1	3	
1059015	FLOOD LAMPHEAD, CoolWave, w/unicable	1	3	
1059014	FOCUS LAMPHEAD, CoolWave, 3.1, w/unicable	1	3	
1101443	FOCUSED REFLECTOR, CoolWave, 2.1, standard, each	2	3	B
1103118	FLOOD REFLECTOR, CoolWave, standard, each	2	3	B
775092	FOCUSED REFLECTOR, CoolWave, 3.1, each	2	3	
775115	DEFLECTOR, strip, quartz, CoolWave	1	3	
775139	KIT, sensor, light, CW 10/6	1	3	
1074165	MANUAL, CW610 lamphead with Unicable	1	3	
1074164	MANUAL, MPS610V power supply with Unicable	1	3	
775136	QUARTZ PLATE, deflector, kit, lamphead	1	-	

NOTE A: Order the correct bulb for your particular system.  
 B: Order the correct reflector for your particular system.  
 C: Item 22 in Figure 6-2.  
 D: Item 23 in Figure 6-2.





## Section 7

# Specifications

### Lamphead

Table 7-1 Lamphead Specifications

Item	Specification
Dimensions	
length	264.50 mm (10.41 in.)
width	201.00 mm (7.91 in.)
height	435.10 mm (17.13 in.)
Weight	19 kg (42 lb)
High Voltage Power	5000 Vdc @ 850 ma
Filament Voltage	3.4 Vac
Cooling Air	350 cfm @ 7 in. W.C.; measured at lamphead (595 m <sup>3</sup> @ 1780 Pascal)
Ventilation Air	450 cfm @ 2 in. W.C. (minimum)
Reflector	Borosilicate glass with dichroic coating 220–470 nm; focus/flood profiles
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	254 mm (10 in.)
Power	600 watts/in. maximum
Types	Mercury, Mercury +, Iron, Gallium, Indium

## **System Drawing**

Figure 7-1: Lamphead Dimensions

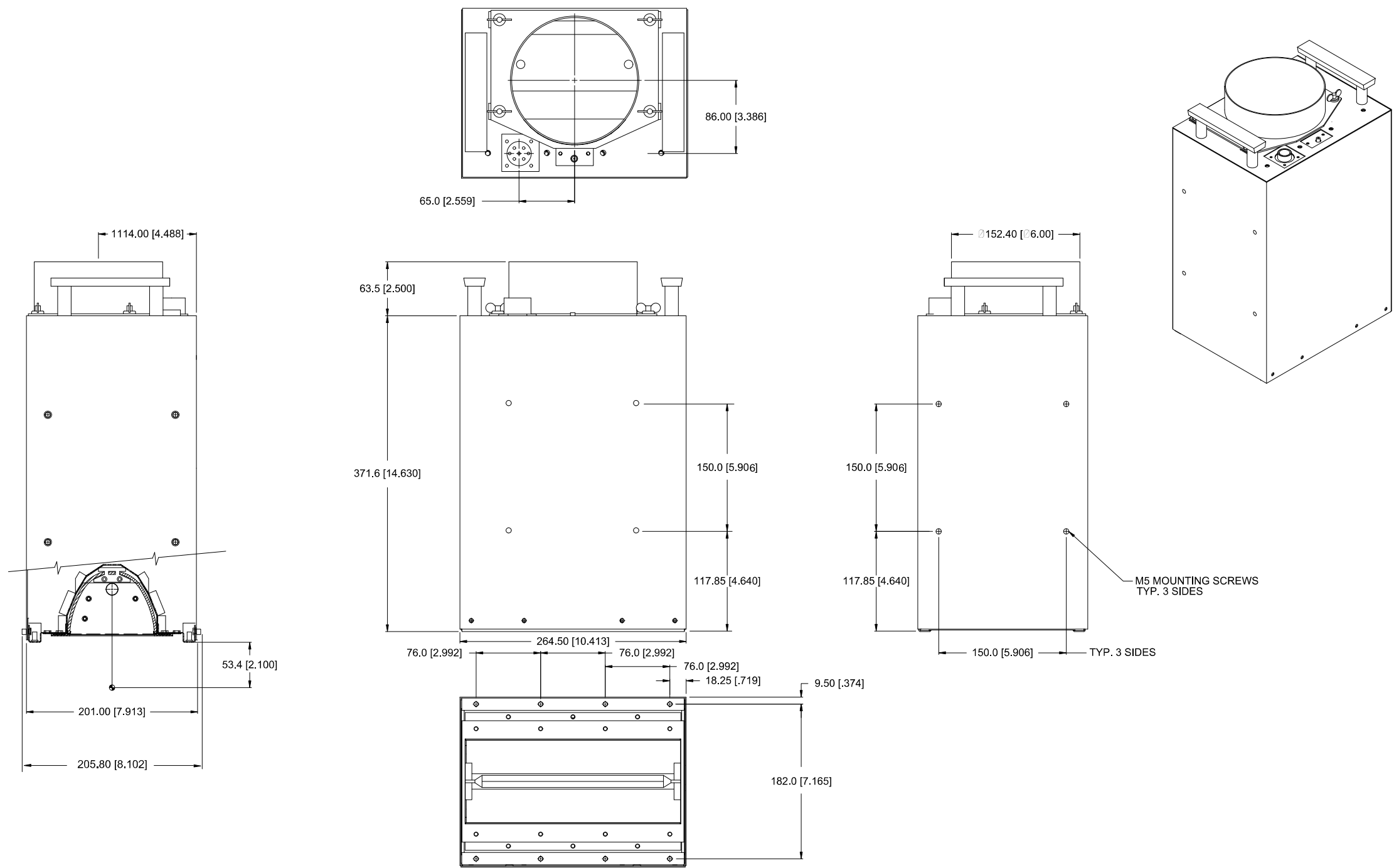


Figure 7-1 Lamphead Dimensions

# DECLARATION of CONFORMITY

**Product:** Cool Wave, Cool Wave 2 and Cool Wave 2 Plus

**Models:** CW-610V, CW2-610V, CW2+-610V, CW2I-610V, CW2+I-610V  
CW2-410V, CW2+-410V, CW2I-410V, CW2+I-410V

**Description:** Ultraviolet curing equipment, designed for accelerated curing of UV inks, adhesives and coatings.

**Applicable Directives:**


2006/42/EC – Low Voltage Directive  
2004/108/EEC – EMC Directive

**Standards Used for Compliance:**

EN/ISO12100	EN55011	EN61000-4-2	EN61000-4-5
UL61010A-1	EN61000-6-2	EN61000-4-3	EN61000-4-6
CSA22.2 No. 61010.1	EN61000-6-4	EN61000-4-4	SEMI F47-0706

**Product Certificates:**

ETL Certification for US and Canada  
Quality System Certificate – ISO9000 through



Hallie Smith-Petee  
Engineering Manager  
Industrial Coating Systems

Date: 16 December 2014

**Nordson Authorized Representative in the EU**

**Person authorized to compile the relevant technical documentation.**

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