CoolWave® 2
610 UV Curing System

Customer Product Manual
Part 1085684A06
Issued 06/10

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

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Notice

Part 1085684A06

Change Record

Revision	Date	Change
A04	08/09	Part Number 1085680 replaced by 772214 under Repair Parts.
A05	06/10	Added Cooling Exhaust Air – Lamphead Chamber Cooling Air Removal text on page 3-12, 13. Under lamphead repair parts, part number 1102567 replaces part number 1088443 for internal blower filter kit, 4 pack.
A06	6/10	Updated UV contact information. Added information on T3 transformer. Added pressure table for Monitoring Static Pressure and Light Detector section. Updated new part numbers for the main control board (1101815), phase control board (1102449), and transformer step down kit for external blower (1102431).

Table of Contents

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.

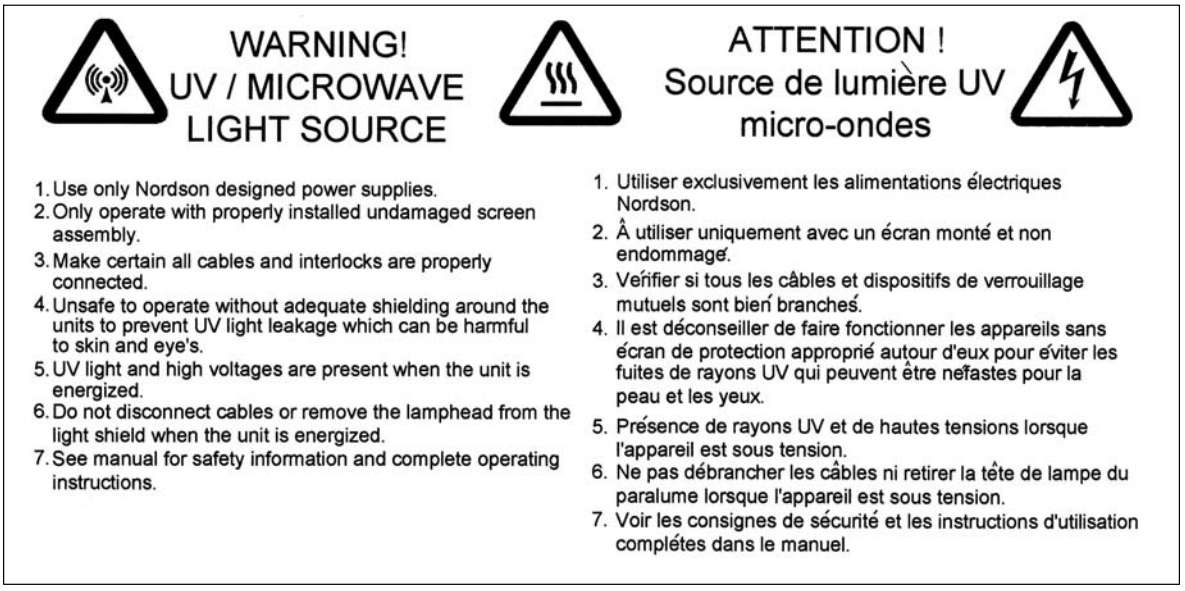


Figure 1-1 Microwave UV Warning

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^2 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 1-1. 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

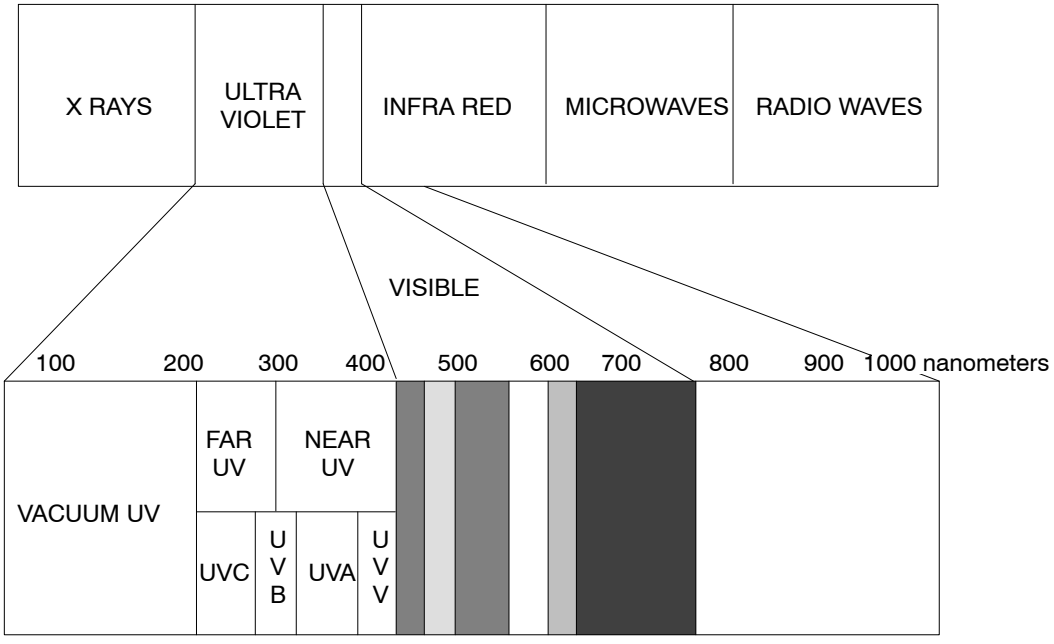


Figure 1-2 Ultraviolet Light Wavelength Bands

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

WARNING: 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 exceeds safe levels. Any excessive leakage will cause the system to shutdown.

Ozone

Ozone (O_3) 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 Temperatures

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. 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. 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:

Horizon Lamps
Bulb Disposal Department
2 Dan Forth 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:

- Disconnect and lock out electrical power.
- Identify the reason for the malfunction and correct it before restarting the equipment.

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 lamphead 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 lamphead and stored or shipped in the original shipping tube. The lamphead 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: UV/Microwave radiation hazard.

WARNING: Hot surface hazard.

CAUTION: Equipment hazard.

Section 2
Description

Introduction

The CoolWave 2 Ultraviolet Microwave-Applied Curing System consists of a MPS2-610 power supply and a CW2-610 lamphead. The power supply unit provides the high voltage supply for the lampheads and a control circuit to interlock the lampheads with the curing machine.

What is UV Curing?

Ultraviolet curing is achieved by a chemical reaction in special inks and coatings when intense UV energy is focused on them. Curing efficiency depends on UV power, coating weight, operation speed, type of substrates, material chemistry, and other factors.

The UV 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.

Table 2-1 and Figure 2-1 describe and illustrate the major components of a typical CoolWave ultraviolet microwave applied curing system. Your system may appear different depending on your application requirements.

How Does it Work?

A microwave generator (magnetron) operating at 2400 to 2500 MHz is used to excite a medium pressure mercury bulb installed in a lamphead. Ultraviolet light between 220 and 470 nanometers is emitted.

Microwave energy from a magnetron is directed into a cavity containing the UV bulb. A screen located at the opening of the cavity allows the UV light to pass through while the microwave radiation is contained.

In addition to ultraviolet light, the high-energy bulbs radiate heat. Therefore, a cooling system is incorporated to take away the excess heat and make sure that the bulbs and housings remain at an acceptable operating temperature.

The unit is fitted with interlocks and safety faults that prevent the operation of the system in an unsafe condition and indicate any faults that might occur on the front panel of the power supply.

Light shielding is required to ensure the stray UV light and heat meet agreed safety criteria.

System Components

Refer to Table 2-1 and 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, pressure and temperature sensors, 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. **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) to produce light at different wavelengths. Bulbs and controls are carefully matched to give optimum UV output and wavelength requirements.
3	Reflectors	Refer to *Reflectors* 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.
4	Starter Bulb	The starter bulb acts as the ignitor for the ultraviolet bulb. The starter bulb lights at the same time the magnetron is energized. After the UV bulb reaches full power the starter bulb turns off automatically.
5	Light Detector Pressure Transducer	Monitors the lamphead cooling and shuts down system power in the event of a cooling failure to prevent a catastrophic failure. Monitors the light from the lamphead bulb and shuts the system down if the bulb fails to emit enough light.
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 direct the RF energy into the UV bulb, thus exciting a UV emitting plasma within the bulb.

Item	Component	Description
7A	External Blowers for Cooling	Forced air is 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. **NOTE**: Pressure must be properly adjusted to provide sufficient cooling. The system can be used with external or internal blowers depending on the style of the user's system.
7B	Internal Blower	
8	Temperature Sensor	Monitors the cooling air temperature.
9	Power Supplies	Furnish power to the magnetrons.
10	RF Detector	Detects leakage of microwaves. Will shut down system if triggered.

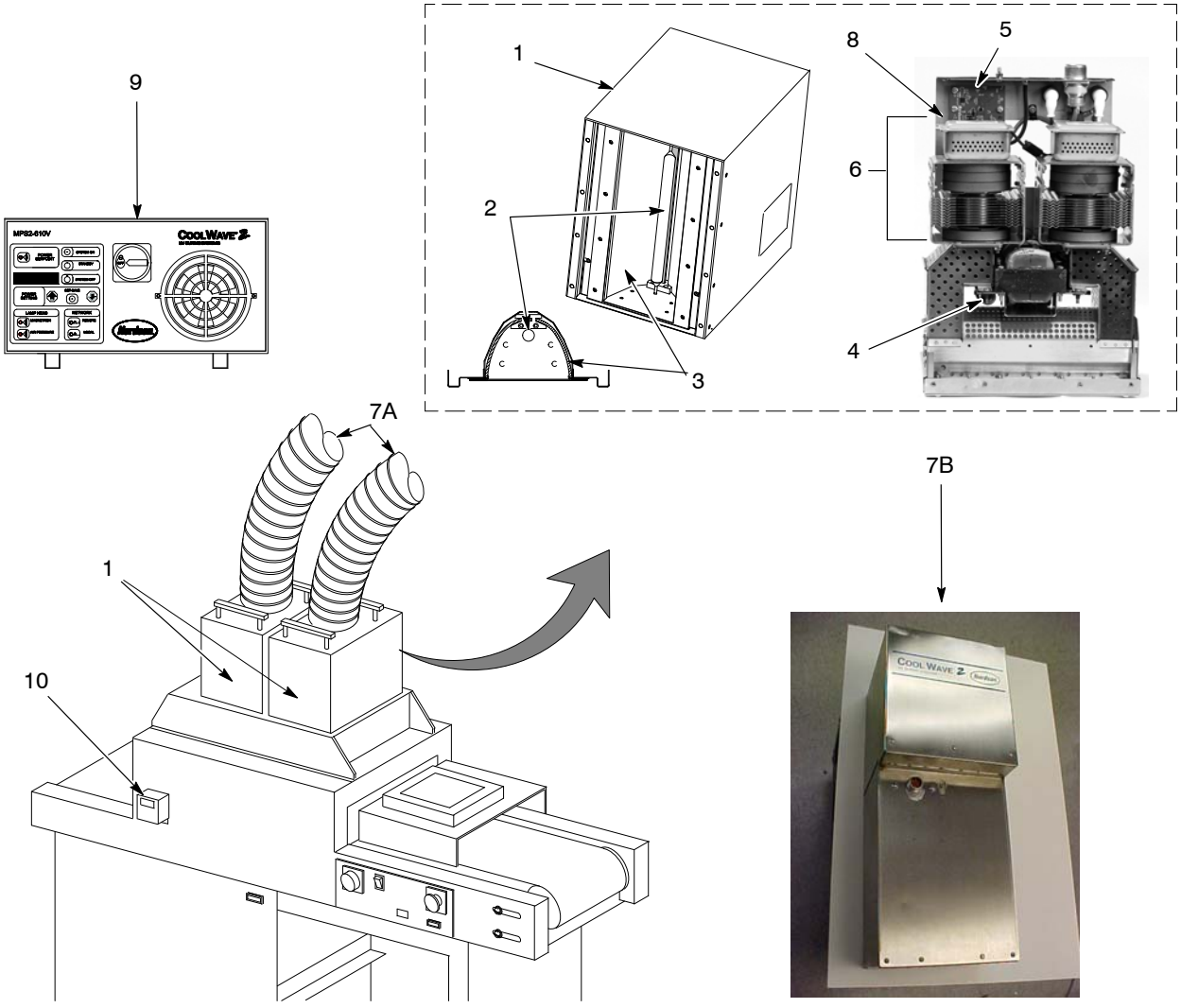


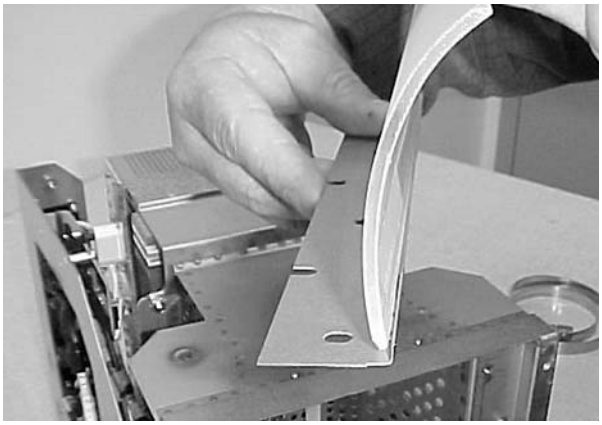
Figure 2-1 System Components (Typical UV Curing System Setup)

Reflectors

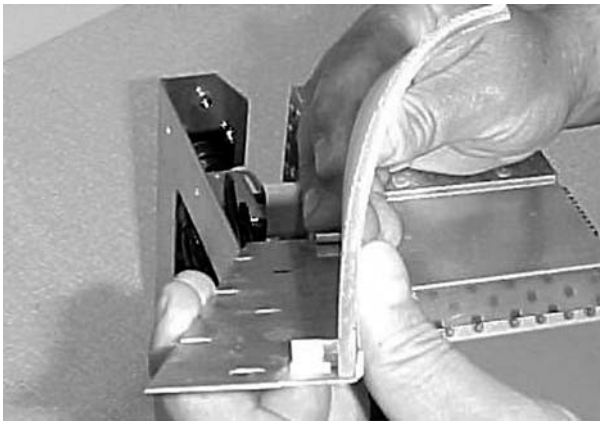
Two types of reflectors are available for the lamphead: focus and flood.

- The focus reflectors are available in 2.1 and 3.1 versions.
- The flood reflectors produce a wider band of light.

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



Focus Reflector and Bracket



Flood Reflector and Bracket

Figure 2-2 Reflector Types

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 information for installing the CoolWave 2 10-inch lamphead and power supply. 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 your Nordson representative.

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.

Power Supply Installation

Mounting Guidelines

WARNING: Heavy equipment. Be careful when moving the power supply. Use approved lifting equipment or get help. Failure to observe this warning could result in personal injury or equipment damage.

See Figure 3-1.

- The power supply can be mounted on any horizontal surface.
- Install the power supply so the operator panel and disconnect switch are easily accessible.
- The blowers mounted on the front and the rear of the power supply and the exhaust vents on the sides must not be obstructed.

- Leave at least six inches of ventilation clearance on all four sides of the power supply.
- If the power supply is mounted in an enclosure, there must be free and unobstructed ventilation from top to bottom and side to side within the enclosure.

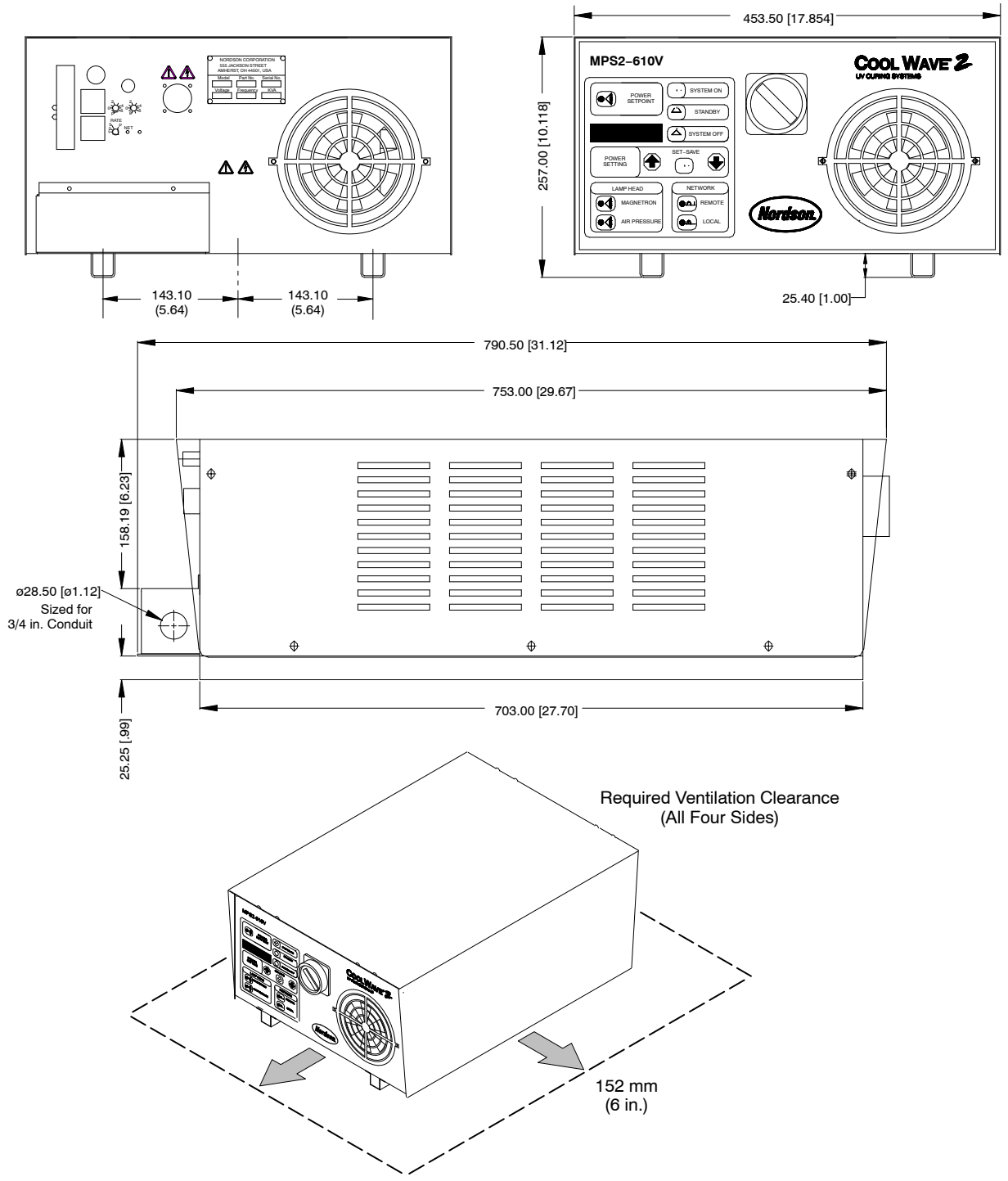


Figure 3-1 Power Supply Dimensions and Required Ventilation Clearance

Power Supply Electrical Connections

Power Connections

NOTE: Power must be supplied from a dedicated power line.

The customer power source must be wired in accordance with either the National Electric Code, Part I or the Canadian Electrical Code, Part I, or local codes. At a minimum, 10 AWG 600 volt wire is required unless superceded by local codes. Four #10–32 studs provide for line connection.

Refer to the power supply ID plate for the input voltage and verify the transformer tap wiring using Tables 3-1 and 3-2 . Measure the incoming power source voltage from the main power supply. Incoming voltage transients shall not exceed 150 volt amplitude and have a frequency content of less than 500 Hz.

- The power line input is three phase (three wire with ground).
- There are two large high-voltage transformers in the power supply. Each has a terminal block with H1, H2, and H3 terminals. Refer to Table 3-1.
- The power for the control electronics is provided from transformer T3. If an internal blower is used, a larger T3 is required. Both transformers have the same voltage range tap selections shown in Table 3-2.
- The transformer taps must be set in the same range. Only the taps on the two identical power transformers need to be changed.

Table 3-1 High Voltage Transformer Taps (T1 and T2)

Voltage Range	Transformer Tap
440–480	H1–H3
380–440	H1–H2

Table 3-2 Control Transformer Taps (T3)

Voltage	Transformer Tap
480	H1 and H4
400	H1 and H3
380	H1 and H2

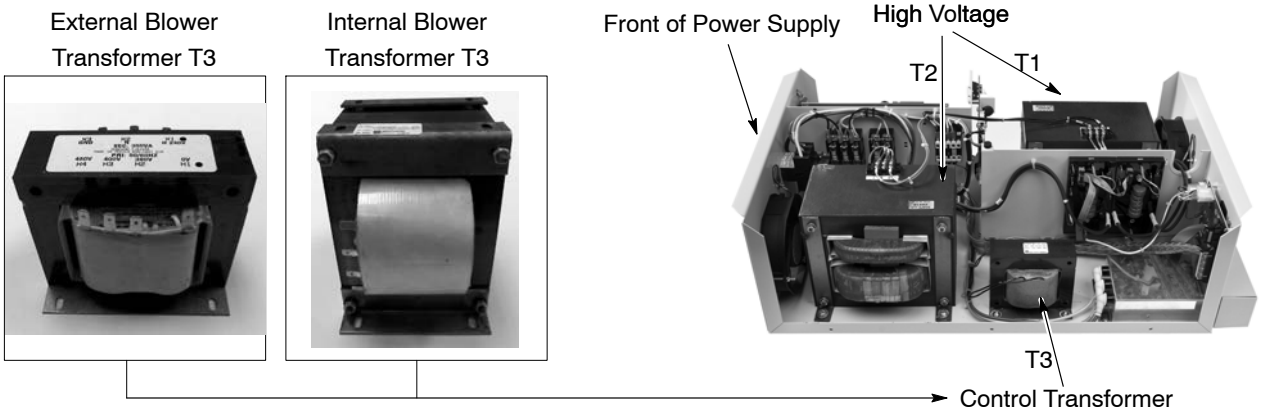


Figure 3-2 Transformers Identified in Power Supply

Power Connections *(contd)*

Refer to Table 8-2. Current ratings indicate current demand during normal full-power operation. Size supply wiring and circuit breakers or fuses to allow for heavy current draw during startup.

To connect the power cord, remove the voltage cover on the back of the power supply unit. Connect the power cord to the terminals labeled A, B, C, and Ground.

Power Supply Balancing

If you are supplying power to more than one CW2 power supply from a single source, connect the power lines as shown in Figure 3-3 to balance out the load. If you have more than three power supplies, repeat the sequence again starting with the fourth power supply. Refer to Table 8-2.

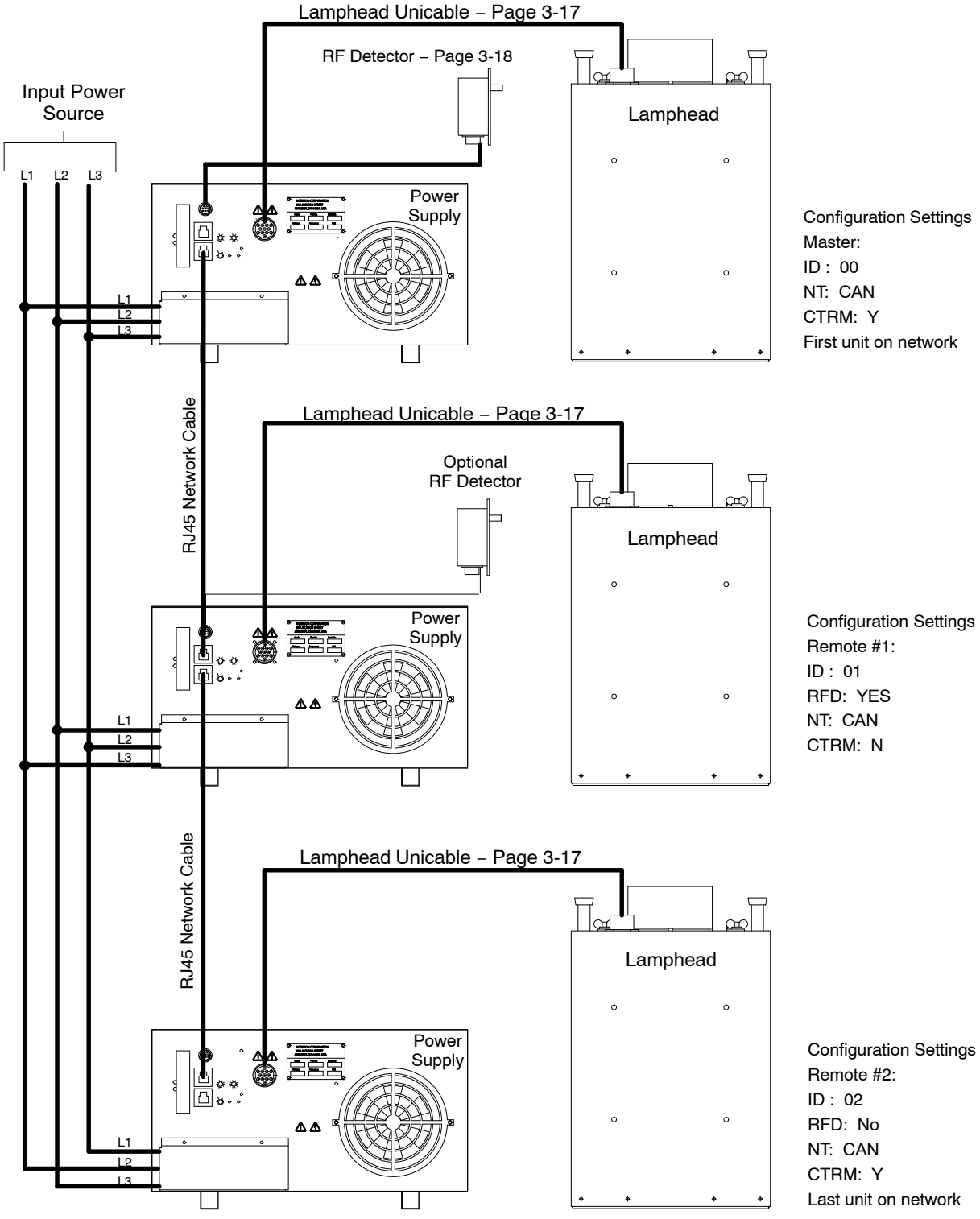


Figure 3-3 System Electrical Diagram – Power, Network, Lamphead, and RF Detector Connections

Network Connections

See Figure 3-3. Up to 16 power supplies can be connected together with RJ-45 cables to form a network which can then be operated from the master power supply front panel or from a remote source.

Master/Slave: When you configure the power supplies, you can set one unit (usually the first unit in the chain) as the Master with the rest as Slaves.

Termination: The first and last units on the network must also be terminated to prevent transmission line data errors. This is also done through software.

Refer to Power Supply Configuration on page 3-19 to make these settings.

Remote I/O Inputs and Outputs

Refer to Figure 3-4 and Table 3-3. All outputs from the output connector are normally open relay contacts and are rated at 120 Vac, one ampere maximum.

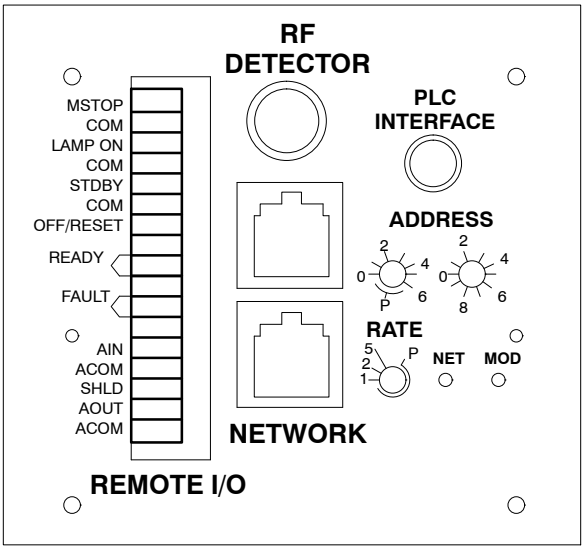


Figure 3-4 Remote I/O Connections

Table 3-3 Remote Inputs and Outputs

Connector Type	Pin	Function	Description
Input	16	Machine stop interlock (MSTOP) +	If this input is not interfaced to external equipment, a jumper must be installed across the pins. Opening this input turns off the lamp, sets the FAULT output, and causes the FAULT EXTERNAL INTERLOCK OPEN fault message to appear on the display. This interlock can be configured for normal contact closure (Default setting) or isolated 24VDC. Refer to Machine Stop Interlock Jumper Setting on page 3-8.
	15	Machine stop interlock (COM) –	
Input	14	Lamp ON (LAMPON)	Remotely controls the power supply unit when operating in the Remote mode. A pulse or momentary contact closure to this input turns the CoolWave lamphead to the on state. (The Off/Reset contact must be closed). The Off/Reset contact must be opened to turn the lamphead off.
	13	Lamp ON (COM)	
Input	12	Standby (STDBY)	**With Idle Mode Disabled** (see IDLE in the Power Supply Configuration section on page 3-21) – Remotely controls the power supply unit when operating in the Remote mode. A pulse or momentary contact closure to this input places the power supply unit in the Standby mode. (The Off/Reset contact must be closed) **With Idle Mode Enabled from Lamp ON State**– The first pulse or momentary contact closure to this input places the power supply in Idle Mode. A second pulse or momentary contact closure places the power supply in Standby. **With Idle Mode Enabled from Lamp OFF State** – A pulse or momentary contact closure to this input places the power supply in Standby. Note: Idle Mode can only be achieved from the Lamp ON state.
	11	Standby (COM)	
Input	10	Off/Reset	Remotely controls the power supply unit when operating in the Remote mode. This contact must be closed for the lamphead to be turned on. Opening the contact will turn the lamphead off and will clear a fault condition.
Output	9	Ready	Contact closes after the power supply unit has been turned on and the light detector senses light output. In a networked system all power supply units have to be turned on and all light detectors sense output.
	8	Ready	
Output	7	Fault	Contact closes whenever there is a fault present on the system.
	6	Fault	
Input	5	Analog Input (AIN) + Remote Power Level Control	Remotely varies the light output when the unit is in remote mode. The light output varies from 100% down to approximately 20% as the remote input is varied. This input can be configured for 4–20 mA or 0–10 Vdc. Refer to Power Supply Configuration on page 3-19 for instructions.
	4	Analog (ACOM) –	Common
Ground	3	Shield (SHLD)	Earth ground
Output	2	Analog Output (AOUT)	Not used. Do not connect.
	1	Analog Common (ACOM)	Not used. Do not connect.

Machine Stop Interlock

CAUTION: Allow only qualified personnel to service the equipment. All power must be disconnected. Follow the safety instructions in this document and all other related documentation.

The Machine Stop interlock (Remote I/O pins 15 and 16) can be configured for Normal or Isolated operation by changing the J1 and J2 jumper positions on the Remote I/O circuit board.

Jumper Position	Pins	Description
Normal	MSTOP (15, 16)	Input compatible looking for contact closure only.
Isolated (ISO)	MSTOP (15, 16)	External 24 Vdc @ 5 mA is required to maintain interlock contact closure.

See Figure 3-5. To access the Machine Stop Interlock jumpers remove the power supply cover. The jumpers are on the back of the I/O connector circuit board.

- The signal voltage range for the I/O Interlock isolated position is 20–30 volts.
- Both jumpers must be set shown in Figure 3-5.
- Any other jumper combination is invalid and may cause damage.

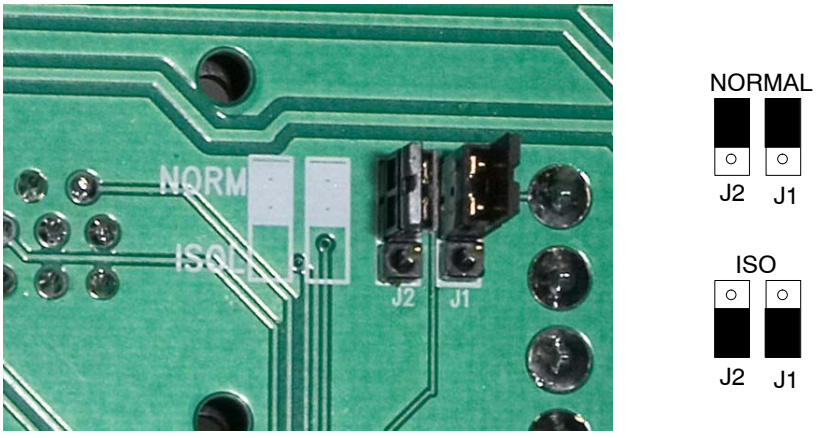


Figure 3-5 Machine Stop Interlock Jumper Settings – Shown Set To NORMAL

Remote Power Level Control

The Remote Power Level Control (AIN inputs 4 and 5) function adjusts the light output based on an external analog signal. This function must be enabled and configured for 4–20 mA or 0–10 Vdc.

Refer to Table 3-3 and Power Supply Configuration, Table 3-6, for configuration instructions. Refer to Table 4-4 step 5, in the Operation section for Power Level setting instructions.

Idle Mode

Idle Mode is a low power state used to rapidly cycle the lamp from curing power to an inactive, low light and heat state. See Table 3-4 for cycle timing.

System must be in Lamp ON state to activate Idle Mode from the power control, the Remote I/O, or through DeviceNet™.

NOTE: The lamp should not remain in Idle Mode for longer than necessary. After 10 minutes in Idle Mode the lamp will revert to Standby.

Table 3-4 Cycle Timing for Idle Mode

Cycle Timing	
Idle to Lamp ON	3 seconds
Lamp ON to Idle	2 seconds

Remote Standby and Lamp On

The Off/Reset contact must be closed for the unit to go to **Standby** or **On**. Once the lamphead is put into the Standby or On mode the lamphead will remain in that mode until the Off/Reset contact is opened.

Standard Startup: Use to go from off, through the warm-up sequence, to the SYSTEM ON mode.

1. On the host machine (or the master power supply selector), press the SYSTEM ON button.
2. The unit goes through the warm up cycle for 15 seconds before turning On.
3. After approximately 10 more seconds the unit has stabilized and is ready to run. The system ready output contact closes.

Rapid Startup: Use if your system will sit idle in the STANDBY mode before moving to SYSTEM ON mode.

1. On the host machine (or master power supply selector), press the STANDBY button. There is an approximately 10 second warm-up time for the magnetron filament.
2. After the 10 seconds the system goes into standby and remain there indefintely.

NOTE: Do not leave the power supply in the standby mode for longer than 30 minutes. Prolonged standby periods will shorten the magnetron life.

3. Press the SYSTEM ON button to enable the UV light. The light turns on instantly but takes approximately 8 seconds to stabilize. After 10 seconds, the system ready output contact closes.

Rapid Cycle Using Idle Mode

NOTE: IDLE configuration must be set to IDLE Y to enable Idle Mode. See IDLE in the Power Supply Configuration section on page 3-21.

1. Begin by using the Standard or Rapid startup procedures to achieve Lamp ON state.
2. Initiate Standby command (locally or remotely).
3. The unit will immediately switch to Idle State (achieved in 2 seconds).
4. To return to curing, initiate Lamp ON command (locally or remotely).
5. Lamp will be ready to cure within approximately 3 seconds.
6. The process can be repeated as required.

DeviceNet Installation

Chassis Isolation

DeviceNet Drain to Chassis	The drain wire is referenced to the chassis ground through one megohm resistance.
V+ and V– to Chassis	The DeviceNet power is not referenced to chassis ground with any impedance other than the stray capacitance due to the pc board layout. The board is designed to withstand +/– 500 volt test applied between the V+ and V– and the chassis.
CAN_H and CAN_L to Chassis	The circuit is designed to withstand the application of a +/– 500 volt test applied between these data lines and the chassis.
CAN_H to CAN_L Isolation	The CAN transceiver is fully compatible with the ISO 11898–24V specification. An un-powered node will not disturb the CAN bus lines.

BUS Power

BUS Sense Circuitry	CoolWave 2 has an isolated physical layer. An optical isolator is used to monitor the BUS power, the loss of which will result in an un-powered transceiver.
Hot Plugging	The CoolWave 2 unit can be hot plugged into a DeviceNet network. Inrush current is limited to less than 500 milliamps for less than 50 microseconds.
Mis-Wiring Protection	CoolWave2 supports mis-wiring protection as defined in the DeviceNet Specification (Section 10 of this manual).

Hardware Specifications

The hardware design of the DeviceNet Interface follows ODVA recommendations. The interface can be found on the rear of the CoolWave2 power supply.

Interface Connector	Sealed micro connector is specified in ODVA specifications Volume 1, Release 2.0, Errata 2. Appendix C, table C.3. CoolWave2 uses a Phoenix connector.
Indicators	Red and green LEDs indicate the status of the module and the network.
Node Address Switches	Two 10-position rotary switches for setting the MAC ID.
Data Rate Switch	A 10-position rotary switch to set the data rate to 125, 250, or 500k Baud.

Software Specifications

Refer to Section 10 for the DeviceNet Interface Module specifications.

Lamphead Installation

The lamphead mounting must include provisions for UV light shielding and cooling air ductwork and venting. Each application has different constraints and therefore requires custom-designed enclosures and light shielding. Contact Nordson UV systems engineering department for help with designs.

Mounting Guidelines

Figure 3-6 provides the physical dimensions of the CW2-610 lamphead. When using focus reflectors install the lamphead screen (bulb end) as follows for optimal focal positioning.

2-in. focus reflectors: 53.3-mm (2.1-in.) above the substrate
3-in. focus reflectors: 78.75-mm (3.1-in.) above the substrate

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

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 exhaust must be a light-shielding design.
- If UV light does escape the operator must wear approved UV-protective eyewear and long-sleeved clothing.

Internal Blower

Internal blower lamps do not require a cooling air source, however, exhaust air must be supplied.

Flow of cooling air must not be restricted or impeded, either at the inlet or the outlet. Use of quartz plates or any type of exhaust restricting devices must be evacuated to insure adequate cooling air flow.

External Blowers – Cooling Air

An external remote blower is required as a source of cooling air ducted to each lamphead. The following specifications must be maintained for all applications at all times or the life of the lamphead will be greatly reduced with the possibility of failure:

- unimpeded and unrestricted flow of cooling air through the lamphead
- constant static pressure of 7-in. water column measured from the inside of the lamphead to ambient or the lamp face
- 350 CFM of airflow through the lamphead

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. Size the blowers to accommodate all losses in the duct work and ensure that the specified air flow and pressure are delivered to the lamphead.

In many applications there will be multiple lampheads obtaining their cooling air from a common source such as a plenum. In these installations it is recommended that air flow adjustment dampers be added to the ducting as close to the lamphead as possible.

After installation of the ductwork, check the static pressure inside each lamphead with a manometer. Remove one of the cover screws and insert the manometer probe into the screw hole.

Cooling Exhaust Air – Lamphead/Chamber Cooling Air Removal

Lamphead cooling air must be exhausted when lampheads are enclosed in a cure chamber or when the air flow is restricted and/or captured at the exhaust of the lamphead face.

When lampheads are installed in a cure chamber and the lamphead cooling air is exhausted to the open air within the chamber you must size the chamber exhaust system to evacuate at least 130% of air flow into the lampheads. You must also factor in the capacity to remove all air in the chamber including air flow into the chamber through all openings, doors, conveyors, and cracks. The air flow required is the sum of all the lampheads and openings and must be at a static pressure great enough to keep a negative pressure in the chamber.

When an Air Shield, Quartz Plate, or any device restricts the lamphead cooling exhaust air flow, the exhaust system must evacuate at least 130% of the air flow into the lamphead at a static pressure that ensures that there is an even flow or a slight negative pressure at the lamp face.

The blower and duct size for each application will depend on many variables. Size all blowers to accommodate all losses in the ductwork and ensure that the specified air flow and pressure for each lamphead is maintained.

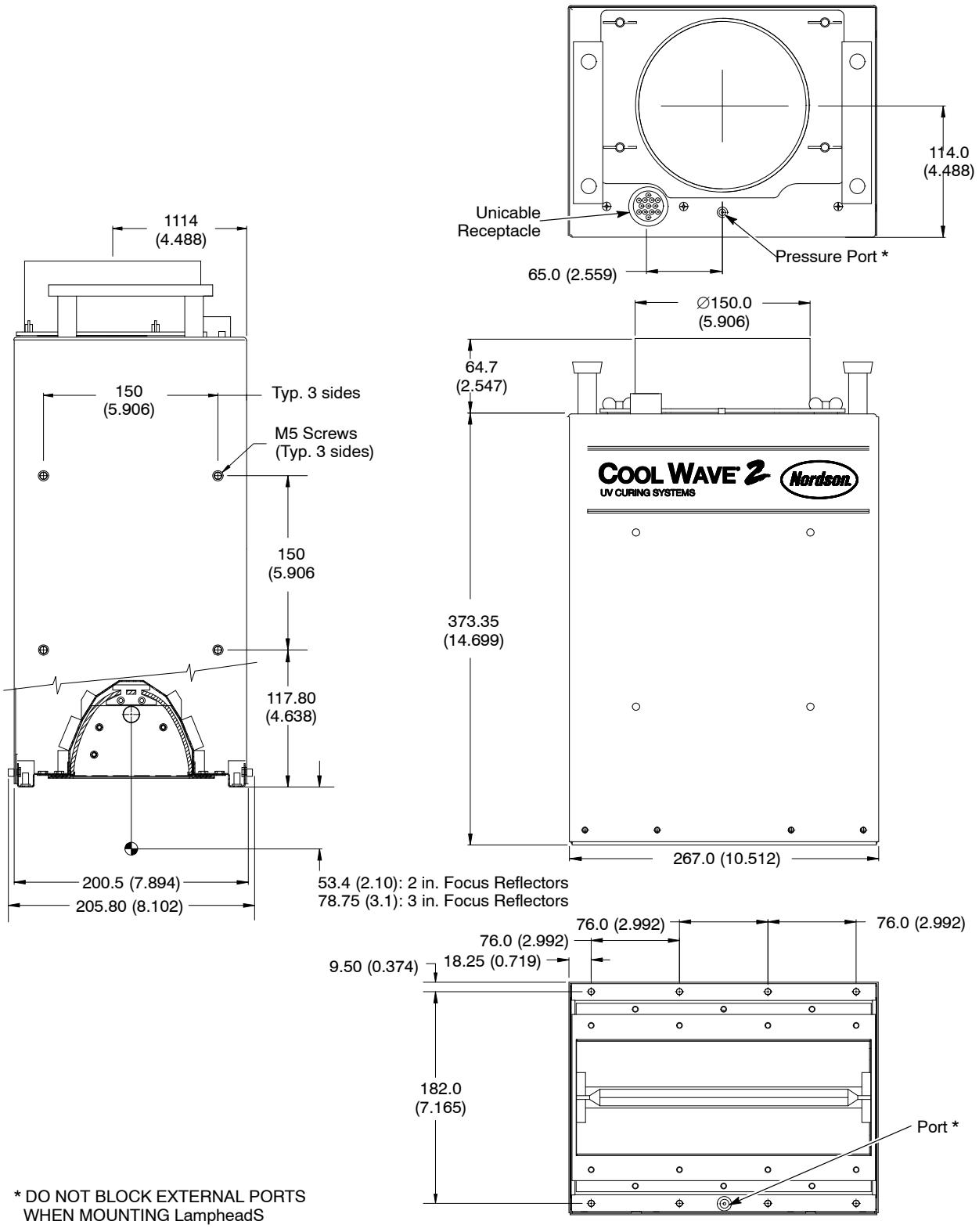


Figure 3-6 Lamphead Dimensions – External Blower

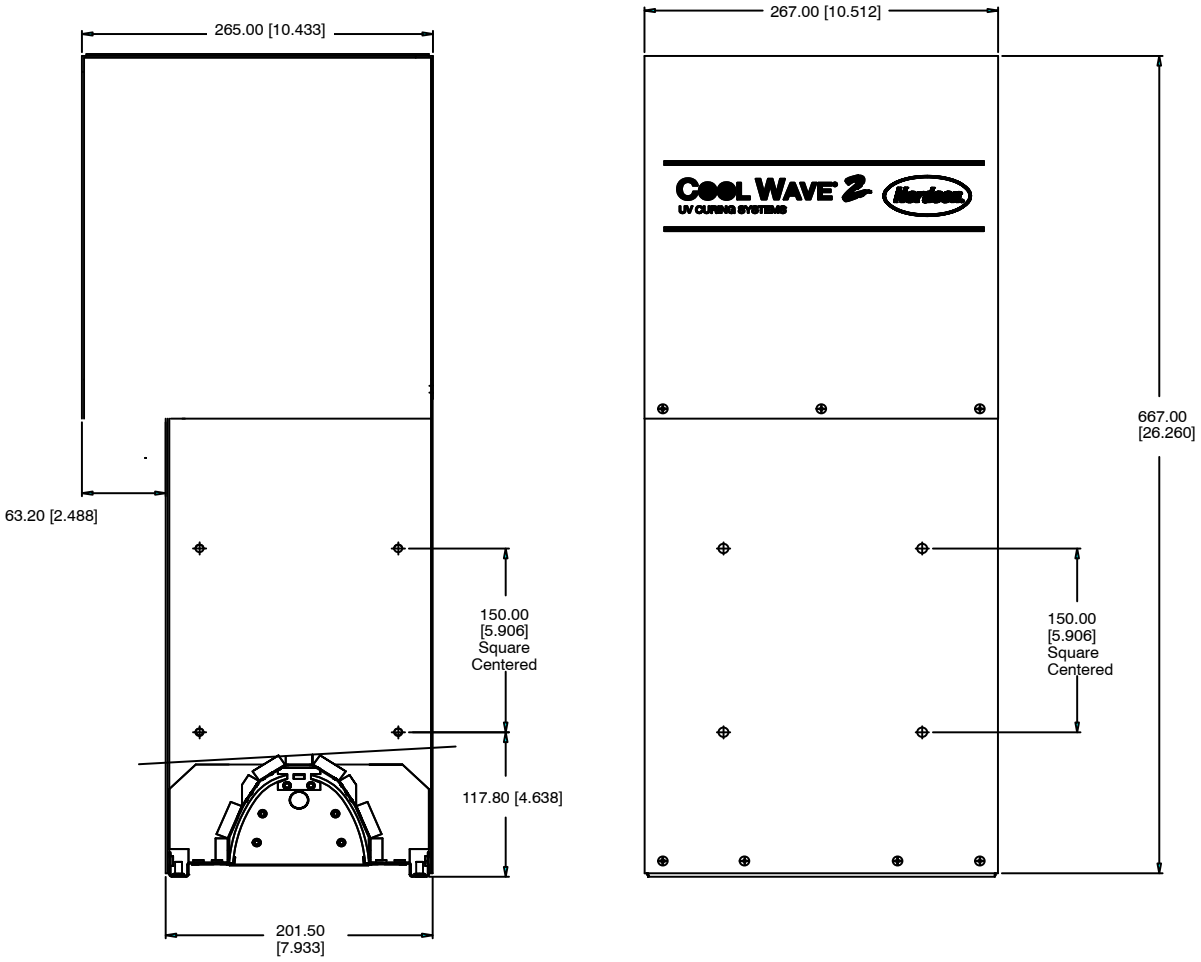


Figure 3-7 Lamphead Dimensions – Internal Blower

Monitoring Static Pressure

See Figure 3-8. The lamphead pressure sensor can be connected to a pressure port at the top of the lamphead or alternately to one at the bottom. (See Figure 3-6 for the location of the pressure ports.)

Top/Front Pressure Port

If the pressure from the exhaust air from the lamphead's internal or external blower is not restricted in any way the top pressure port can be used. Examples of this type of installation are when lamps are mounted in a large enclosure without dedicated individual exhaust or quartz windows between the lamps and the parts. Caution should be used when using the top pressure port as any restriction of the exhaust air will fool the pressure sensor and possibly damage the lamphead.

Bottom Pressure Port

In applications where there is a possibility of restricting the exhaust from the lamphead, the bottom pressure port must be used. Examples of this type of application are quartz windows, dedicated exhaust ducts, or any type of exhaust box or lamp face attachment that can restrict the air flow. When using the bottom pressure port the mating or mounting structure must be designed so that this port is open to the air exiting through the screen. Do not simply set the lamp in a bucket or on a ledge that could cover over the bottom pressure port hole.

The pressure control setpoints versus the power level output are shown in Table 3-5 for the internal blower with VSPD variable speed control enabled.

Table 3-5 Selected Power Level versus Pressure Setpoint

Power Level (%)	Operating Pressure Setpoint (inches of water)
100	7
90	6.5
80	5.7
70	5.3
60	4.6
50	4.1
45	3.7
40	3.4
30	3
20	3
Idle	3

Switching Pressure Ports

Use this procedure to switch the connection from one pressure port to the other:

1. Remove the lamphead cover.
2. Remove the barb fitting and the tube from the pressure port.
3. Feed the tube through the lamphead and install the barbed fitting and tube in the other pressure port.

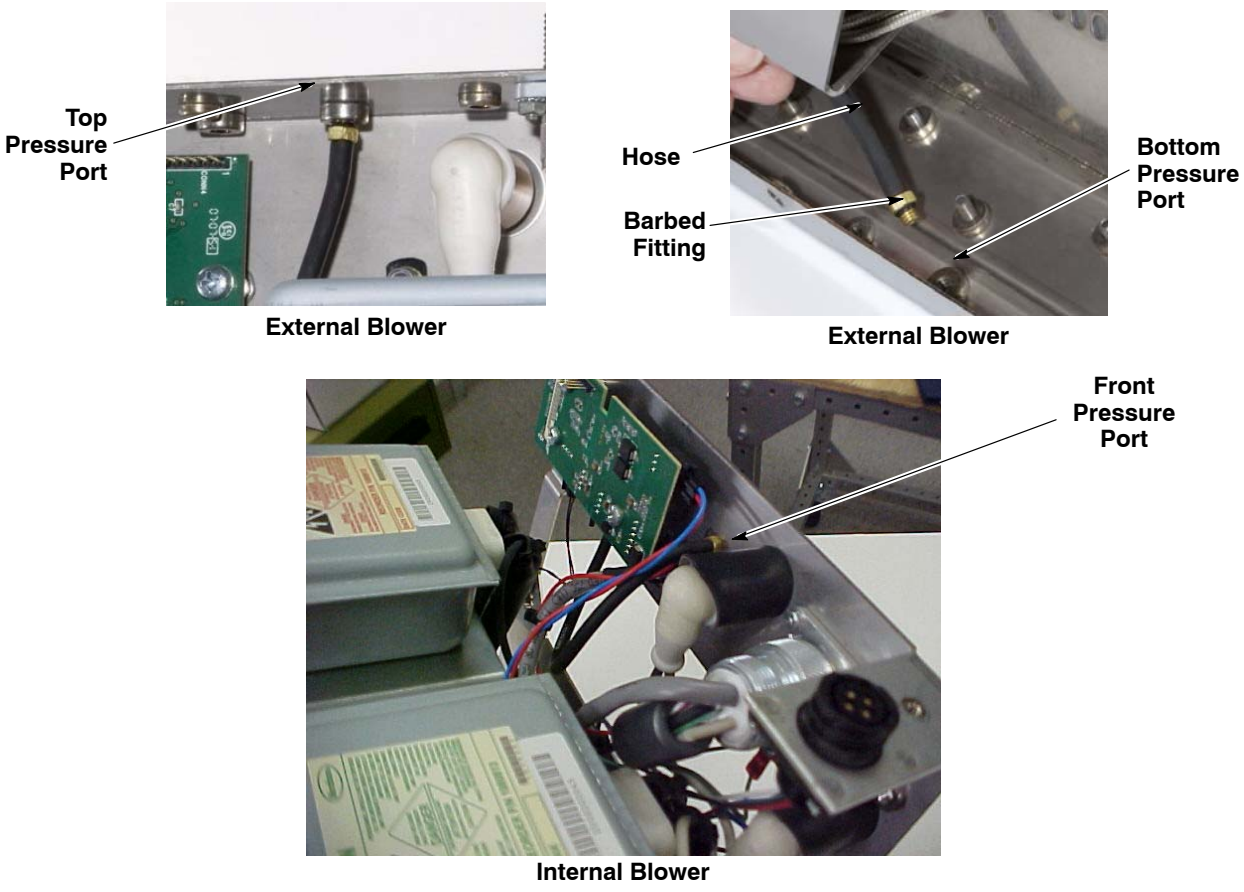


Figure 3-8 Pressure Port Connections

Lamphead Cable Connections

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

See Figure 3-3 and 3-9. Connect the unicable to the power supply and the lamphead. 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 damaged. Make sure also that there is no evidence of arcing on the pins and sockets.

NOTE: The unicable 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 rings 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.

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.

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.

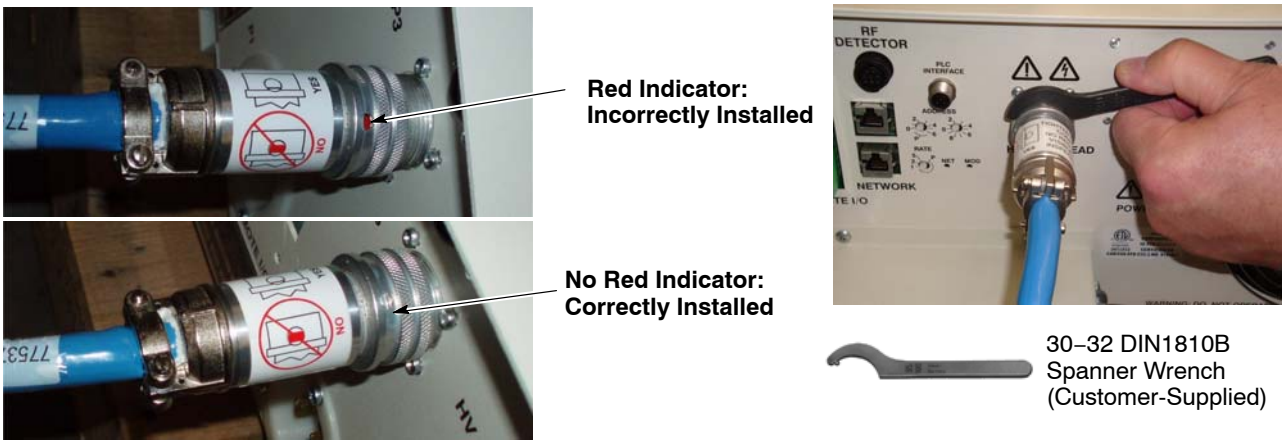


Figure 3-9 Unicable Connection

RF Detector Installation

See Figures 3-3, 3-4 for RF Detector connections and 3-10 for dimensions.

- The RF detector will shutdown the power supply if the lamphead RF screen is torn or incorrectly installed. The device reacts when the RF level is above the calibrated trip level.
- 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.
- The RF detector can be damaged when exposed to extreme RF fields. The device has a patented self test feature to make sure the device is working properly. If failure is detected, the unit is not serviceable and must be replaced.

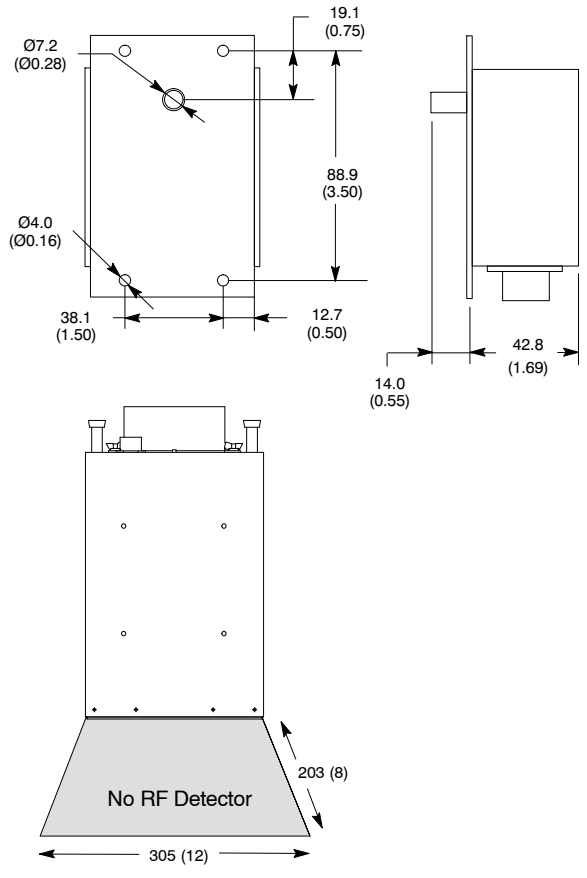


Figure 3-10 RF Detector Installation

Power Supply Configuration

Once the power supplies and lampheads are mounted and all connections made, the last step is to configure the power supply for your application, using the front panel display and keys and the configuration menus.

Use these keys to configure the power supply:

Key	Function
Nordson Oval	Press for 10–15 seconds to enter the configuration menu.
SET–SAVE	Set choice and advance to next configuration setting.
UP/DOWN	Scroll through setting choices.

1. Move the front power switch to the ON position. The system display will go through a power-up test, then display the installed software version numbers.
2. Press the Nordson Oval for 10–15 seconds to enter the configuration menu. The configuration settings will be displayed in the order listed in Table 3-6.
3. Press the UP or DOWN keys to scroll through the choices available for each setting. Press the SET–SAVE key to save the displayed choice and advance to the next setting.
4. The last display is PWROFF. Turn the power supply power switch to the OFF position to set the configuration in flash memory.

NOTE: The only configuration setting not done through the system software is the Remote I/O Machine Stop Interlock function. Refer to page 3-8 for this setting.

Table 3-6 Power Supply Configuration Settings

Display	Function	Configuration 1	Configuration 2
ID 00..15 (Unit ID)	Unit ID: Sets unit ID for network, identifies master or slave	Master = ID 00	Slaves = ID 01..15
	For a standalone power supply, set the unit ID to 00. For networked power supplies, set the master to 00 and set the slaves to 01, 02.....15. • Each power supply on a network must have a unique ID number.		
FLT (Fault)	Fault State: Sets Unit Fault to fault units separately or all together	FLT U = FAULT UNIT (Fault this unit only)	FLT A = FAULT ALL (Shuts down all units on the network)
	This setting is for multiple system master/slave networks. A networked power supply in a fault condition can fault only itself or the entire network. • All networked power supplies must have the same fault setting.		
RFD (RF Detector)	Sets RF detector status for each power supply	RFD Y = RF Detector connected	RFD N = No RF detector connected
	A Master power supply is automatically set to RFD Yes. Slave power supplies can be set to Yes or No. Only one RF detector is required for a network.		
NT (Network)	Specifies network communication protocol	NT CAN = CAN BUS protocol	NT 485 = 485 protocol
	The CAN BUS protocol is the preferred protocol for power supply networks. It must be selected for any network using DeviceNet. • All power supplies on the network must be set to the same protocol.		
CTRM	Can termination	CTRM Y = CAN termination Yes.	CTRM N = CAN termination No.
	Internal network termination setting. • Set to Yes for networked units that have only one network port connected (and so are on one end of the network). • Set to No for all networked units that have both network ports connected. • The Master power supply is typically on one end of the network.		
ANA	Remote Power Level Control enable/setting	ANA Y = Y (yes)	ANA N = N (no)
	Refer to Table 3-3 on page 3-7 for connections. • If set to ANA Y, then the next setting allows you to choose the input. When in Remote mode, light output is controlled by the input to the AIN and ACOM terminals (5 and 4). • If set to ANA N, then the light output is controlled from the power supply front panel in both Remote and Local modes.		
IN	Analog input selector	mA = 4–20 mA control	V = 0–10 Vdc control
	Specifies the input type for Remote Power Level Control. This selection appears if ANA Y is selected. Refer to Table 3-3 on page 3-7 for connections.		
CTL	Remote control source	IO = Use discrete remote I/O terminal	DN = Use DeviceNet for remote control
	Refer to Table 3-3 on page 3-7 for discrete remote I/O connections. IO is the default setting.		

Display	Function	Configuration 1	Configuration 2
PCTL	Power control algorithm	Y = Enable Power Control mode	N = Use current control mode (default)
	If set to PCTL Y, the power control algorithm controls the total power output to reduce the variation of power over the life of the magnetron. PCTL N is the default and preferred method of control (current control) and obtains the highest output. **NOTE:** The light output of the lamp when operating in power control mode (PCTL Y) is approximately 10% lower than when operating in current control mode.		
LAN	Language in which faults are displayed	ENG=English	FR=French IT=Italian GE=German SP=Spanish
	Use this setting to choose the language faults will be displayed. English is the default language.		
IDLE	Enabling IDLE mode allows return to Lamp ON mode within 3 seconds (utilize the Standby command for activation). This is done by operating the lamp system at a low power, which is not capable of curing with minimal heat on substrate.	IDLE N=No Not enabled	IDLE Y=Yes Operation of IDLE mode (local or remote) through Standby control. See Installation Section for proper sequence.
VSPD	Lampheads with an internal blower may incorporate variable speed control to provide consistent bulb temperature.	VSPD N=No Set to N if lamphead is not equipped with internal blower	VSPD Y=Yes Enables speed control **Note:** Set only if internal blower lamphead in utilized.
PWROFF	POWER OFF	No selection	No selection
	This is a message instructing you to turn the power supply switch OFF to save your settings in flash memory.		

Section 4
Operation

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

Introduction

Startup procedures will vary depending on how the UV system was integrated into other systems and equipment. As a result, the startup procedures documented in this manual are strictly for the UV equipment.

Display and Controls

See Figure 4-1 and Table 4-1.

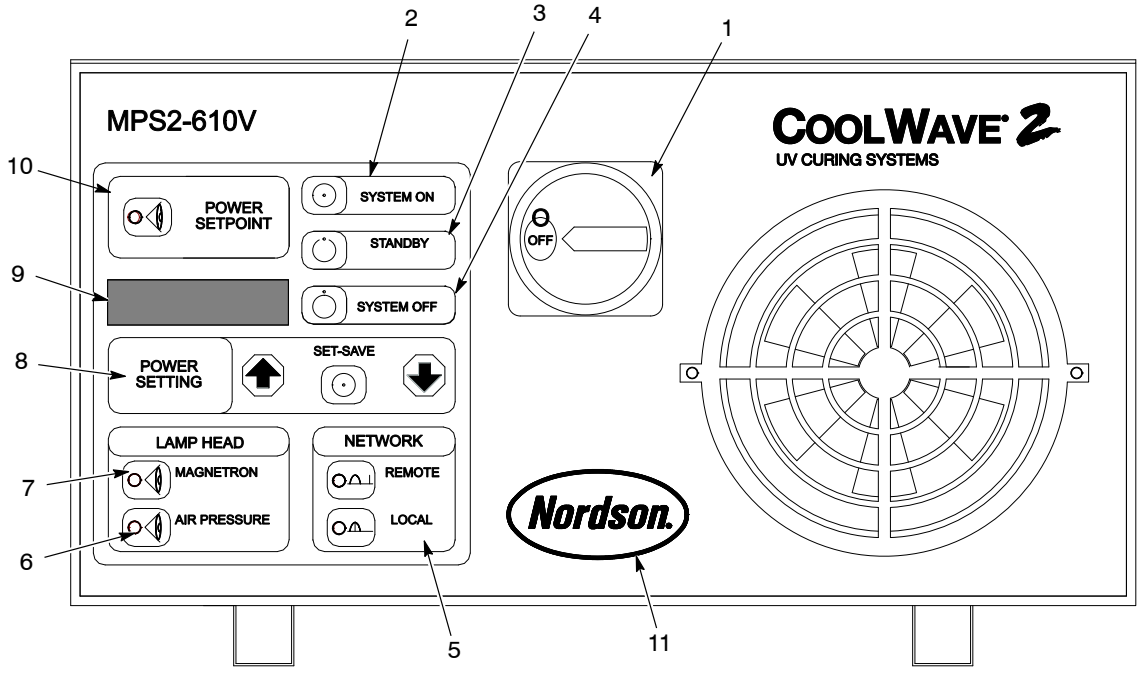


Figure 4-1 CoolWave 2 Displays and Controls

Table 4-1 CoolWave 2 Displays and Controls

Item	Control	Description
1	Main Power Switch	Turns the main power on and off to the CoolWave system.
2	SYSTEM ON	Turns the lamphead on after the magnetron filament is warm and LMPDLY is displayed and then LAMPON.
3	STANDBY	Applies warm-up power to the magnetron filament and the message WARMUP appears in the display while warming up. Once it is warm, STDBY appears. Excessive use of Standby will shorten magnetron life.
	IDLE (if enabled)	Allows a low power state used to rapidly cycle the lamp from curing power to an inactive, low light and heat state. The lamp should not remain in Idle Mode for longer than necessary. After 10 minutes in Idle Mode the lamp will revert to Standby.
4	SYSTEM OFF	Turns the lamphead off.
5	NETWORK	Sets system operation to LOCAL mode (system controlled from front panel) or to REMOTE mode (system controlled by a remote device or controller through discrete I/O or DeviceNet).
6	LAMPHEAD AIR PRESSURE	Displays lamphead pressure in XX inches w.c. (water column). **NOTE:** The digital display does not display the decimal point in the air pressure readout. For example PR 83 = 8.3 in. H_20
7	LAMPHEAD MAGNETRON	Displays the current through each magnetron in milliamps. Pressing the MAGNETRON button will scroll MAG A and MAG B and display the current for each magnetron. If power control mode is selected then *OPC* is displayed rather than current.
8	POWER SETTING	Use to adjust the UV output of the lamp. The power setting is an approximation of the UV output of the lamp, as a percentage of full power. It can be adjusted from 20% to 100%. At 100% the lamp will produce the maximum UV intensity it is capable of. At a setting of 50% the lamp will produce approximately 1/2 of what it does at 100%. Values less than 100% are only approximations and actual measured values may be higher or lower depending on the bulb type and the radiometer used to take the measurements. The system is factory set to operate at 100% output. To check the power level set point, press the SET-SAVE button. Change the output in 5% increments by pressing the UP or DOWN arrow buttons. Changes take place as soon as you press the arrow buttons. Press the SET-SAVE button in order to save your changes and return to normal operation. **NOTE:** The slave units determine their desired value by multiplying the master desired value (current power value the master is operating at) by the slave set point value (value input from front panel of the slave unit). If the Master power setting is 80%, then the output of a slave unit set at 50% is actually 40% of its potential output (50% of 80% = 40%). • The slave set point is always the value set from the front panel of the slave unit. • The Master set point is set from the front panel when it is in Local mode but it can be set by analog input or DeviceNet when in the Remote mode. • All systems can only be set to values between 20% and 100%. If any of the above cases calculate a value below 20% the control will stay at 20% until the calculated value is again above 20%. This will not set an error but the unit power will not go below 20%.

Item	Control	Description
9	Digital Display	Displays power levels, operation and fault messages.
10	POWER SETPOINT	Displays the percentage power output as controlled remotely and of the actual power level set on the unit.
11	Nordson Oval (System Configuration)	Sets up power supply configuration parameters. Refer to Table 3-4 in the *Installation* section for more information.

Additional Functions

Temperature

Internal temperatures of the lamphead and power supply can be displayed by pressing the OFF and SET-SAVE buttons simultaneously:

LH xxC = Lamphead Internal Temperature
LB xxC = Lamphead Circuit Board Temperature
MB xxC = Power Supply Control Board Temperature

Light Detector

The relative bulb output intensity can be monitored by pressing the DOWN ARROW and STANDBY buttons simultaneously.

Sensor Saturation = 920 counts
Alarm Trip Point for 50% to 100% Power Level = 600 counts
Alarm Trip Points for less than 50% Power Level = 300 counts

Starter Bulb Test

The starter bulb turns on for a few seconds during lamp ignition, to help the main UV lamp ignite. To verify that the starter bulb is functional, it can be turned on manually by pressing LOCAL for approximately 20 seconds.

Panel Lock

NOTE: For use with systems operated in remote modes.

All front panel control functions can be locked out by pressing REMOTE for approximately 20 seconds. The display will momentarily display LOCK. The period at the left of the display will remain on as long as the system is locked. To unlock the system press REMOTE for approximately 20 seconds. UNLOCK will display and the unit will return to the normal operation state.

Display Messages

Table 4-2 lists the display messages that indicate system operating status.

Table 4-2 Display Messages

Message	Description
OFF	The power is turned on to the power supply. The lamphead is in the Off mode.
WARMUP	The magnetron filament is energized. This message will only be present for the filament warm-up time period, which is about 15 seconds.
STDBY	The filament is warm and the unit is waiting for an On command.
LMPDLY Lamp Delay	Lamp ON has been enabled. The power contactor is closed, and high voltage has been applied to the magnetrons. This message is present only for the lamphead warm-up period, which is about 15 seconds.
LAMPON	Lamp is On at the set power level.
L COOL Lamp Cool Down	Lamp was On and a Standby command has been received. The magnetron power is shut off and the contactor is open. This message is present only for the cool down period, which is about 20 seconds. The lamphead then goes to a standby state. The unit will not restart until the delay time expires.
C DLY Cool Down Delay	An Off command was received. The lamphead power is turned off. The message is present only for the cool down period, which is about 60 seconds. The unit will not restart until delay time expires.
IDLE	Lamp is in a very low power state ≈ 5% of full power.

Fault Messages

When a fault is detected, the power supply shuts down the high voltage, turns on the FAULT relay output, and displays a fault message. Table 4-3 lists the fault messages.

Table 4-3 Fault Messages

No.	Fault Message	Description
0	NETWORK CONFIG	Duplicate system IDs on network.
2	FILAMENT FUSE BLOWN	There is no current detected on the filament transformer circuit when the power supply is turned on.
3	HIGH CURRENT ON MAG	High current has been detected on high-voltage circuit. The magnetron exceeds 950 Ma.
4	CURRENT IMBALANCE	The magnetrons are turned on (LAMPON) and the magnetron currents differ by more than 100 ma for a period exceeding about 600 ms.
5	ON NETWORK UNIT	There is a fault on a remote/slave unit.
6	MAG POWER WHEN OFF	Magnetron current sensed in standby mode.
7	NO LIGHT DETECTED	There was insufficient output from the light detector when the power supply energized the magnetrons in the Lamp On mode.
9	HARDWARE FAILURE	The power supply is not communicating with the light board.

Continued...

No.	Fault Message	Description
10	DeviceNet ERROR	There is a DeviceNet communication fault.
11	DeviceNet HARDWARE FAIL	There is no communication with DeviceNet processor.
12	MAG VOLTAGE ERROR	The magnetron voltage is too high.
13	NETWORK COMM ERROR	The control board can no longer communicate with a previously detected system.
15	POWER CONTROL AT LIMIT	The power control can not control the output within 5% of the setpoint.
16	LOW LAMPHEAD PRESSURE	There is insufficient or no air pressure in the lamphead.
18	POWER UNIT OVER TEMP	The power supply is over temperature
19	RF DETECTOR MISSING	The RF detector is not connected
20	RF DETECTOR TRIPPED	The RF detector has detected a high RF field.
21	EXT INTERLOCK OPEN	The external machine stop interlock is open or is not at 24 Vdc depending on jumper setting.
22	LAMPHEAD OVER TEMP	Lamphead temperature sensor is over temperature. Transformer thermal switch(es) open. May be caused by insufficient air flow through power supply cabinet.
23	HV CABLE UNPLUGGED	The power supply is not communicating with the lamphead. The high-voltage cable from the power supply to the lamphead is disconnected or damaged.
24	LOW CURRENT ON MAG	The magnetron is below 5mA minimum current value.
25	PHASE CONTROL AT LIMIT	The power supply can’t regulate to the power setpoint.
26	RF DETECTOR FAILED	The RF detector is defective and must be replaced.
27	PHASE CONTROLLER ERROR	The system control is not communicating with the phase board.
28	MAG FILAMENT IS OPEN	One of the two magnetron filaments has failed.

Resetting Faults

Operating in Local Mode: Press the Off button to reset a fault once it has been corrected.

Operating in Remote Mode: Open and close the Reset contact to reset a fault once it has been corrected.

NOTE: Once the fault has been corrected you can reset a fault on a unit operating in Remote Mode from the front panel of the master unit or a host controlling the master unit through either a discrete I/O or DeviceNet.

Startup

NOTE: Refer to the *Troubleshooting* section if the system fails during startup.

Locally Operated Units

Table 4-4 Startup Procedures for Locally Operated Units

Step	Single Unit Operated Locally	Multiple Units Networked to a Master Unit Operated Locally
1	Switch the electrical disconnect enclosure to ON.	
2	Turn the main power switch on the front of the power supply unit to the ON position. The power on message begins to scroll with the words UV CURING. Five numbers will then scroll listing the software versions for the display board, main control board, phase board, interface, and lamphead respectively.	
3	Make sure that all interlocked access doors are closed and that the exhaust fan is running if not directly connected to the power supply blower contacts. If external interlocks are wired and open, a fault message FAULT EXT INTERLOCK will appear in the display.	
4	On the NETWORK selector, press LOCAL.	Set the NETWORK configuration. • On the master unit NETWORK selector, press LOCAL. • On the slave unit NETWORK Selectors, press REMOTE.
5	Set the POWER SETTING. 1. Press the SET-SAVE button on the POWER SETTING selector until the power level is displayed. 2. Press the UP or DOWN arrows to set the desired power level. 3. Press the SET-SAVE button to save the setting.	Set the POWER SETTING. 1. On the master unit, press the SET-SAVE button on the POWER SETTING selector until the power level is displayed. 2. Press the UP or DOWN arrows to set the desired power level. 3. Press the SET-SAVE button to save the setting. 4. Set the POWER SETTING at each slave unit between 20 and 100 using the same procedure as the master unit. The actual power output of each slave is dependent on the Master POWER SETTING. For example, if your master unit POWER SETTING is 80 and your first slave unit POWER SETTING is 50, the actual output of the first slave unit will be 0.5 x 0.8 or 40%. **NOTE:** In most cases, slave units should be set to 100%. Each remote POWER SETTING can be different. Each setting is determined by the POWER SETTING entered in the master control unit and is proportional to the maximum set at each power supply.

Continued...

<table>
<tr><th>Step</th><th>Single Unit
Operated Locally</th><th>Multiple Units Networked to a Master Unit
Operated Locally</th></tr>
<tr><td>6</td><td colspan="2">Enable the cooling fan with an external/remote switch. If there is insufficient pressure there will be a system fault and the message FAULT LOW LAMPHEAD PRESSURE will appear in the display. (Check for proper pressure with the appropriate instrumentation.) The internal blower automatically turns on and off as required.</td></tr>
<tr><td>7</td><td colspan="2">Press system on to start up the lampheads.
LAMPON will appear when the lamphead is ready to cure.
Standard Startup – Preferred Method
Use this procedure to go directly through the warm-up to the LAMPON mode.
1. On the host machine (or master control unit selector) press SYSTEM ON. WARMUP will appear on the display.
2. After approximately 10 seconds the unit will display LMPDLY. It will take 10 seconds to stabilize as it goes thru the warm up cycle before turning to LAMPON.
3. After approximately 10 more seconds and the unit(s) has stabilized at the set power level, LAMPON will appear in the display and the system is ready to run.
Or
Rapid Startup
NOTE: Excessive use of the standby mode will shorten magnetron life. This method should only be used when rapid startup is required.
Use this procedure if your system will sit in an idle state in the STDBY mode before moving to the SYSTEM ON mode.
1. On the host machine (or master control unit selector) press the STANDBY button. There will be an approximate 10 second warm-up time for the filament transformer. WARMUP will appear on the display.
2. After approximately 15 seconds the system will display STDBY and remain there indefinitely.
NOTE: Do not leave the power supply in the standby mode for longer than 30 minutes. Prolonged standby periods will shorten the magnetron life.
3. Press the SYSTEM ON button. It will take approximately eight seconds to stabilize.
Rapid Cycle Using Idle Mode
NOTE: IDLE configuration must be set to IDLE Y to enable Idle Mode. See IDLE in the Power Supply Configuration section on page 3-21.
1. Begin by using the Standard or Rapid startup procedures to achieve Lamp ON state.
2. Initiate Standby command (locally or remotely).
3. The unit will immediately switch to Idle State (achieved in 2 seconds).
4. To return to curing, initiate Lamp ON command (locally or remotely).
5. Lamp will be ready to cure within approximately 3 seconds.
6. The process can be repeated as required.</td></tr>
</table>

Remotely Operated Units

NOTE: The system can be wired to initiate lamphead start from either the process machine or from the UV power supply control panel.

There are many ways that the system can be configured to operate Remotely. By using the power supply I/O the UV system can be controlled from a simple panel or by using the DeviceNet protocol it can be fully automated to work in concert with a complete process.

Table 4-5 Startup Procedures for Remotely Operated Units

Step	Single Unit and Units Networked to a Master Unit Operated Remotely
1	Switch the electrical disconnect enclosure to ON.
2	Turn the main power switch on the front of the power supply to the ON position. The power on message begins to scroll. The power on message begins with the words NORDSON UV CURING SYSTEMS. Five numbers will then scroll listing the software versions for the display board, main control board, phase board, interface, and lamphead respectively. If DeviceNet is enabled, DeviceNet software version will also be displayed.
3	Make sure that all interlocked access doors are closed and that the exhaust fan is running. If external interlocks are wired and open, a fault message FAULT EXT INTERLOCK will appear in the display.
4	On the front panel under NETWORK, press REMOTE. **NOTE:** For networked units, press REMOTE on each unit.
5	Set the POWER SETTING. There are three ways of setting the POWER SETTING. See Table 4-1 item number 8 on page 4-2.
6	Enable the cooling blower(s) by an external/remote switch. If there is insufficient pressure a system fault occurs and the message FAULT LOW LAMPHEAD PRESSURE appears in the display. (Check for proper pressure.)

Shutdown

The lamp will turn off if any of the following conditions occur:

Normal Shutdown

- SYSTEM OFF push button on UV operator station is pressed
- REMOTE OFF command: Remote I/O, DeviceNet
- The main power switch is turned to OFF. – Not recommended

Fault Shutdown

- Cooling air for the lamphead ceases or reaches an insufficient level
- Any of the safety interlocks wired into the UV equipment are interrupted. These include exhaust fan, access panels, doors and process equipment
- Any fault condition occurs

Table 4-6 Shutdown Procedures

Step	Shutting Down Systems Locally	Shutting Down Systems Remotely
1	Press the SYSTEM OFF button.	Press the SYSTEM OFF button on the remote or host machine.
2	Allow the lampheads five minutes of cool down time before shutting off the cooling air. **CAUTION:** Failure to all provide cool down time can cause problems restarting the lamps as well as greatly reduce the life of the lamphead bulbs.	Allow the lampheads five minutes of cool down time before shutting off the cooling air. **CAUTION:** Failure to all provide cool down time can cause problems restarting the lamps as well as greatly reduce the life of the lamphead bulbs. **NOTE:** Typically the cooling fan is controlled by the remote or host machine.
3	Turn off main power to all units.	

Section 5
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.

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

Power Supply Maintenance and Repair

Maintenance Schedule

Recommended maintenance for the power supply consists of cleaning or changing the cooling air filters and removing dust from the power supply.

Power Supply Repair Procedures

Preparation

1. Turn off the UV system from the process equipment controller or at the power supply 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.
3. Turn off the main electrical disconnect. Follow all relevant OSHA established lockout procedures or local codes as appropriate.

Fuses

See Figures 5-1 and 5-2 to identify the replaceable fuses in the power supply.

Use an appropriate tool to remove the fuses. Replace them with identical fuses. Refer to the *Parts* section for ordering information.

- F1: Blower
- F2: Blower
- F3: Board Power
- F4: Bulb Filament

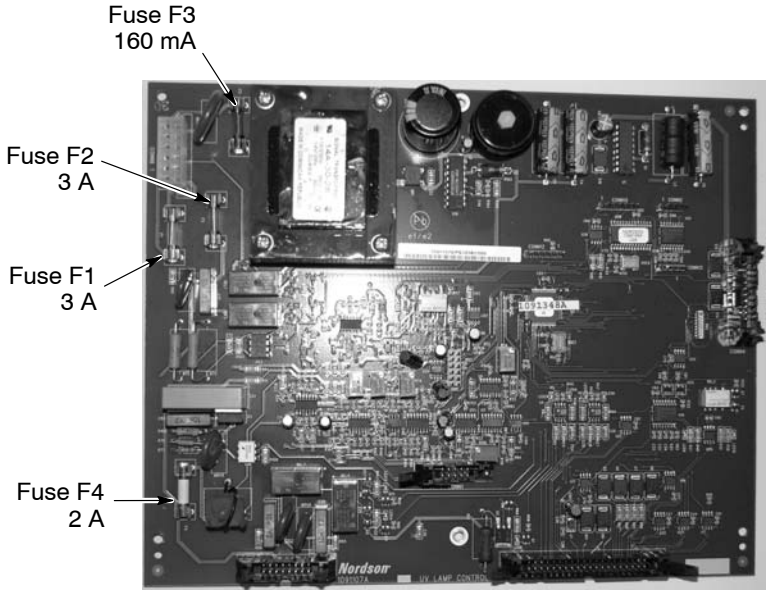


Figure 5-1 Main Control Board Fuses

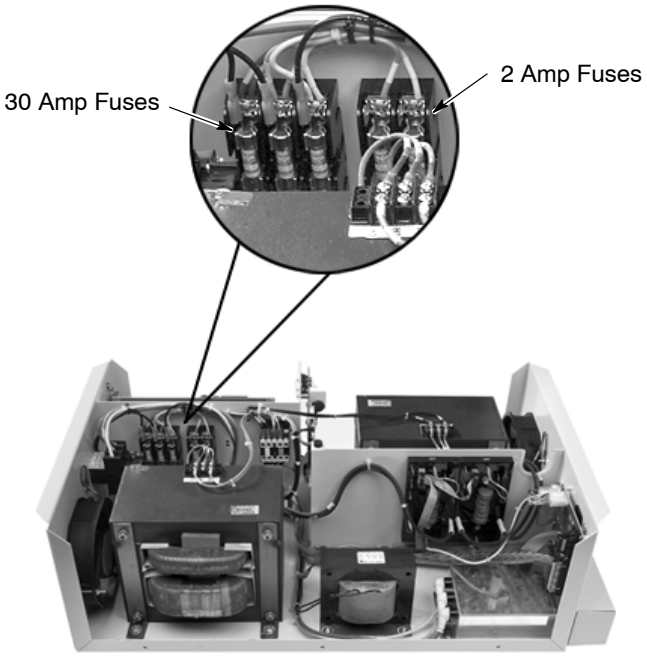


Figure 5-2 Power Supply Fuses

Power Supply Cooling Fan Cleaning

1. Turn off the main electrical disconnect. Follow all relevant OSHA-established lockout procedures or local codes as appropriate.
2. Locate the cooling fan on the power supply. It is located on the front side of the power supply.
3. Make sure the safety cover is clean and free of any debris.
4. Examine fan blades for contamination. Clean or replace if necessary.

Lamphead Maintenance and Repair

Table 5-1 lists typical maintenance guidelines and replacement schedules for the components of the CW2 610 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.

Table 5-1 Typical Lamphead Maintenance Schedule

Component	Maintenance Guidelines	Replace component...
UV Bulb	Bulbs are warranted for a specific number of hours when operating under manufacturer operation specifications (hours vary with differing bulbs). Depending on your application, some installations may provide acceptable curing well beyond the warranty. **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.	as needed
Magnetrons	The magnetrons are warranted for a specific number of hours when operating under the manufacturer operation specifications. Each application will be different and, in many cases, the magnetron life will last well beyond the warranty.	after 3000 hours of operation or as needed
Screen	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. Do not use damaged screens. This can result in RF radiation leakage.	as needed
Reflectors	Reflector surfaces should be cleaned every 500 working hours (more frequently in dirty environments) and at every bulb change. Wipe the reflector surface and the cavity with a clean, lint-free cloth dipped in a suitable solvent such as isopropyl alcohol. Be careful when replacing reflectors. They are made of glass and may break if dropped or forced. Never use metal polish or any abrasive media to clean the reflectors.	as needed
Filters (Customer Supplied) • Remote blower • Cooling fan electrical enclosure/ lamphead	Filters are designed to prevent dust and contaminants from entering the UV equipment. In some applications these filters are located on the lampheads, remote blowers, and some power supplies. Eventually, the filters become loaded with matter and start to impede the cooling air flow, causing excessive heat which will result in premature failure of the UV equipment. A dirty filter can also release matter into the air flow that may deposit on the part being cured as well as the bulb and reflector. Clean filters as needed.	Weekly or as needed
NOTE: Nordson does not supply filters on the power supply, the lamphead, or external blowers. Filters must be supplied by the customer. Internal blower lamphead filter is provided.		

Lamphead Repair 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.
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.

Bulb Replacement

1. Perform the *Preparation* procedure in this section.
2. See Figure 5-3. 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.

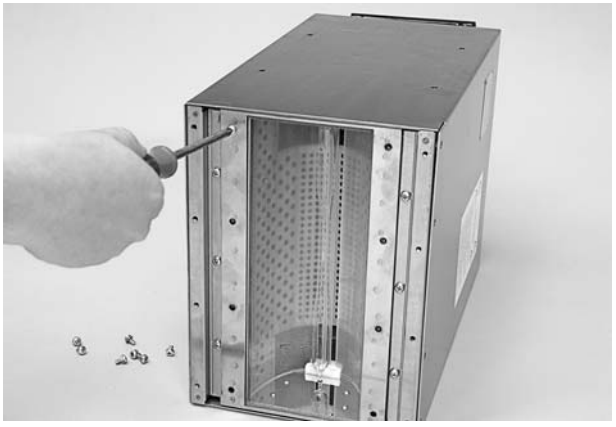


Figure 5-3 RF Screen Removal

Bulb Replacement *(contd)*

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

4. See Figure 5-4. 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 disposal policies. Refer to the *Safety* section for the bulb return policy.
7. Install the RF screen on the lamphead base with the eight M4 screws. Torque the screws to 1.8–1.57 N•m (0.871.16 lb-ft).

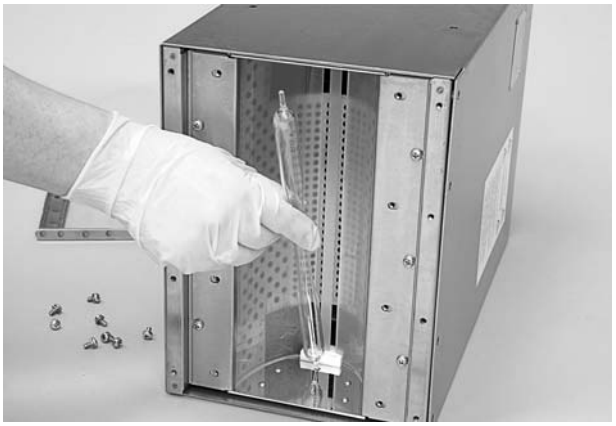


Figure 5-4 Bulb Removal

Reflector Replacement

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

1. Perform the *Preparation* procedure on page 5-5.
2. Turn or place the cradle assembly so that the entire bulb area is exposed and accessible.
3. Remove the screen and bulb as described in *Bulb Replacement*.

4. See Figure 5-5. Remove the six mounting screws and the two retaining bars from the lamphead base.

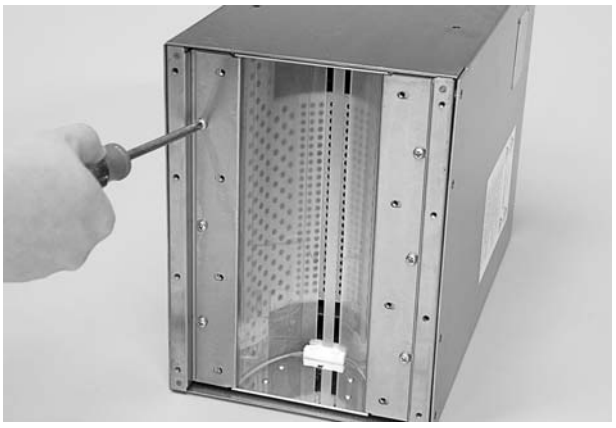


Figure 5-5 Retaining Bar Removal

5. 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.

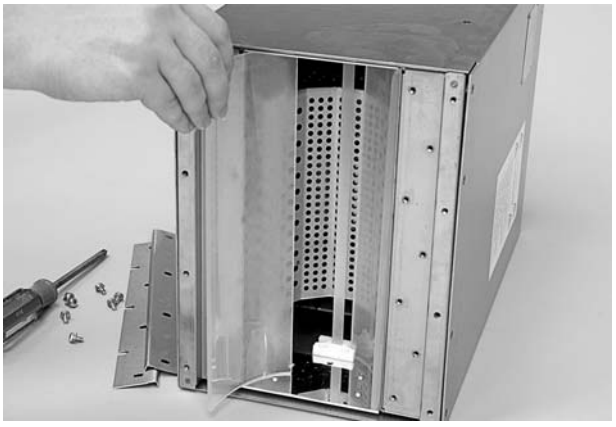


Figure 5-6 Reflector Removal

6. Slide the new reflectors into the lamphead base.

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

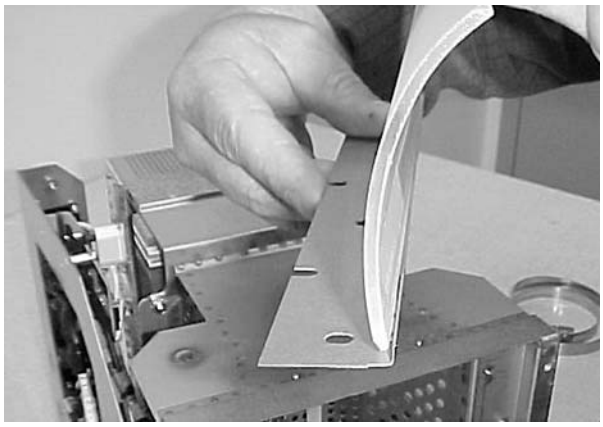
7. Set the retaining brackets in place. The placement of the retaining brackets differs between focus and flood reflectors.

   Focus Reflectors: See Figure 5-7. 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 lamphead and wrap around the reflector. Line up the retaining bracket mounting holes with the mounting holes in the lamphead base.

Reflector Replacement *(contd)*

Focus Reflector Curve and Retaining Bracket



Installing the Focus Retaining Bracket

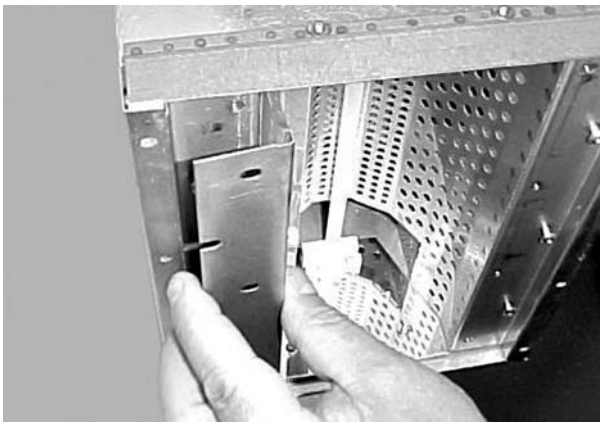
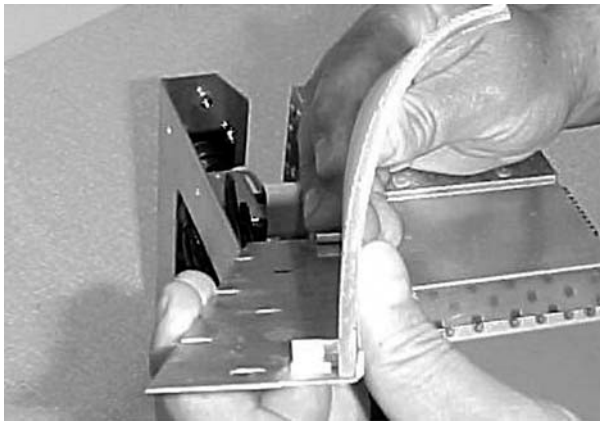


Figure 5-7 Focus Reflector Installation

Flood Reflectors: See Figure 5-8. The edge of the reflector will sit on the retainer springs on the inside edge of the 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.

Flood Reflector Curve and Retaining Bracket



Installing the Flood Retaining Bracket

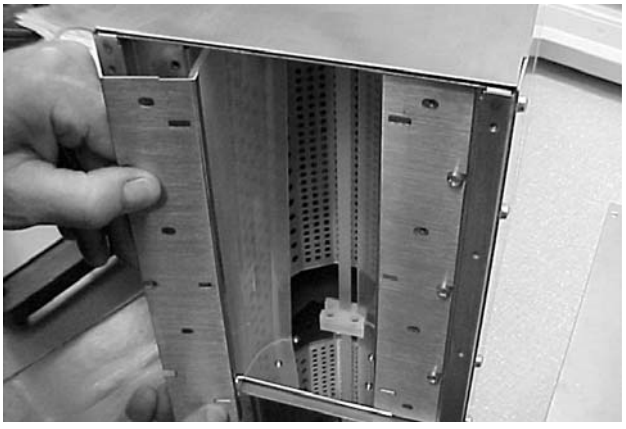


Figure 5-8 Flood Reflector Installation

8. Install the six mounting screws to secure the reflectors and retaining brackets. Torque the screws to 1.18–1.57 N•m (10.4–13.9 lb-in.).
9. Install the bulb and RF screen as described in *Bulb Replacement*.

Internal Blower Lamphead Cover Removal

1. Disconnect the unicable from the lamphead.
2. See Figure 5-9. Remove the top blower cover by removing the 6 screws (3 front and 3 rear) and set aside.
3. See Figure 5-9. Disconnect 2 screws on the sides of the unicable connector.

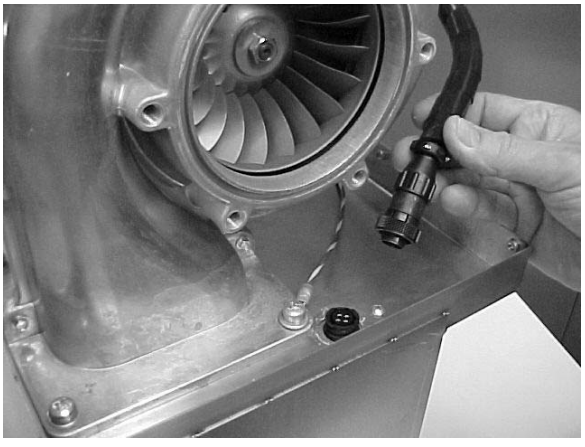
Removing Screws from Top Cover

Removing Screws By Unicable Connector

Figure 5-9 Removing Top Blower Cover

4. See Figure 5-10. Disconnect the blower plug and remove the screw next to the plug.
5. See Figure 5-10. Remove the 8 screws at the base of the lamphead (4 front and four rear).

Removing Blower Plug



Removing 8 Screws – 4 Front and 4 Rear

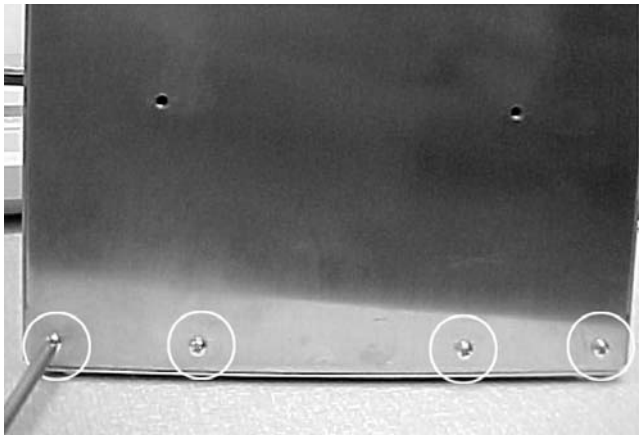
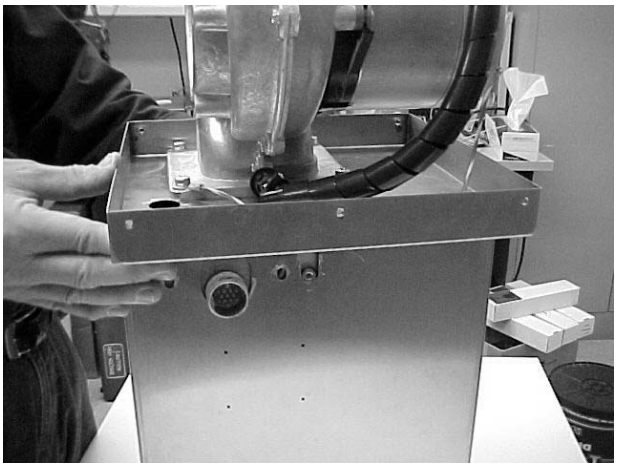


Figure 5-10 Removing Blower Plug and Screws

Internal Blower Lamphead Cover Removal *(contd)*

6. See Figure 5-11. Lift the bottom cover straight up and then push the unicable connector into the cover until it clears the cover housing.

Lifting Bottom Cover



Unicable Connector Clearing Housing

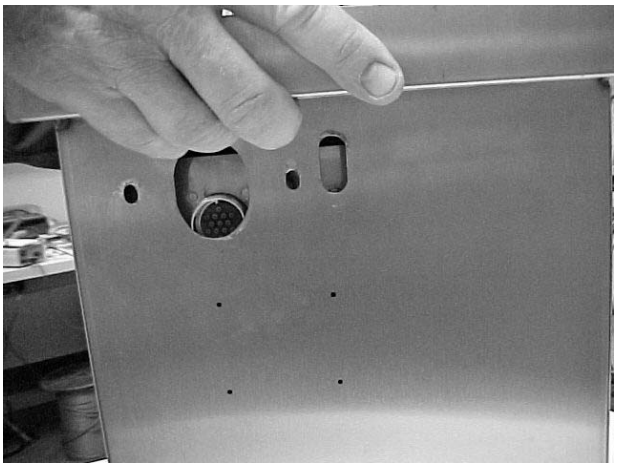


Figure 5-11 Removing Cover

7. Pull the cover the rest of the way up and off the lamphead and set aside.

Internal Blower Lamphead Cover Replacement

1. Replace the bottom lamphead cover by sliding it down over the lamphead until the unicable connector drops into the slot and the 8 holes at the bottom of the cover line up.
2. Replace the 8 screws at the base of the lamphead (4 front and 4 rear).
3. Reconnect the blower plug and replace the screw next to the plug.
4. Replace the top blower cover and secure with 6 screws (3 front and 3 rear).
5. Reconnect the unicable from the power supply.

Internal Lamphead Component Replacement

Remove the lamphead cover to replace the following internal components:

- Light pressure board
- Starter bulb
- Magnetrons

Preparation

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 5-5.
2. Remove the RF screen and bulb as described in *Bulb Replacement*.
3. For external blower units, remove the 11 screws from the lamphead cover to remove the cover. See Figure 5-12. For internal blower units see the *Internal Blower Lamphead Cover Removal* section on page 5-9 to remove the cover.

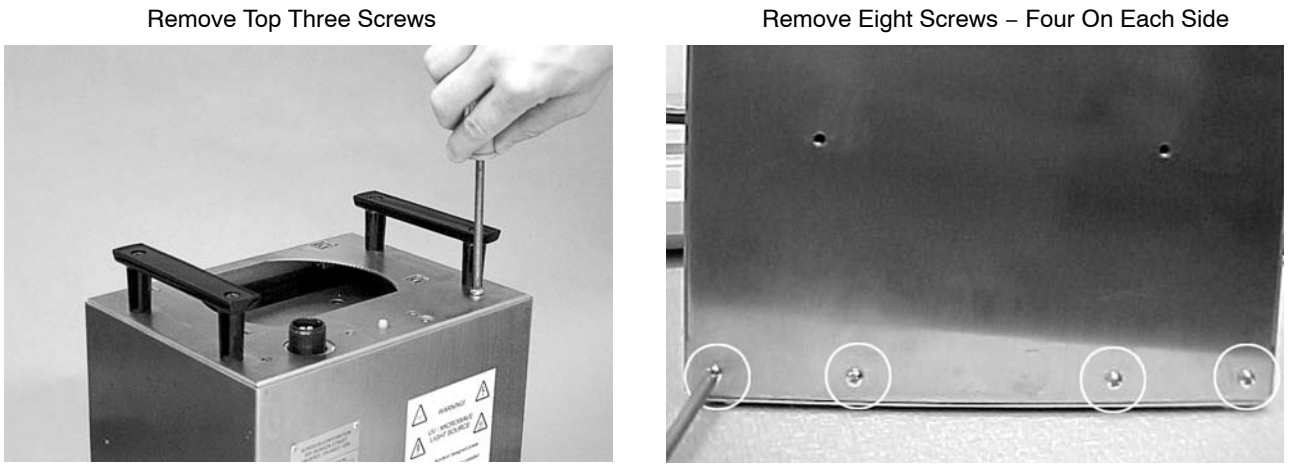


Figure 5-12 Lamphead Cover Removal

4. Remove the transformer and connector bracket by removing the 3 screws identified in Figure 5-13.

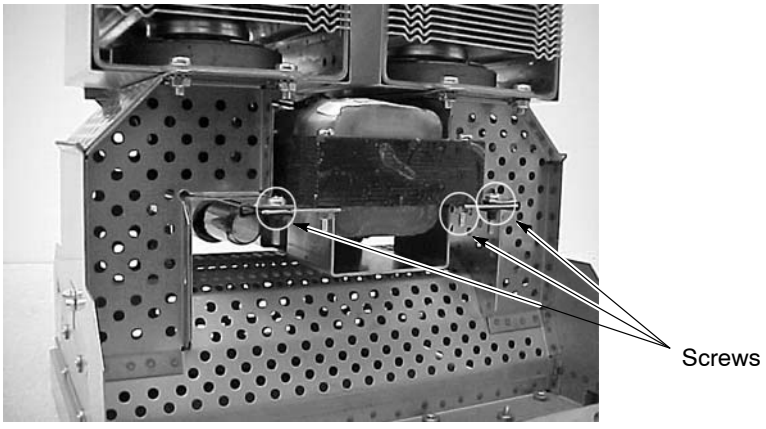


Figure 5-13 Transformer and Connector Bracket Removal

Preparation *(contd)*

5. See Figure 5-14. Pull the the transformer and connector bracket from the lamphead base.

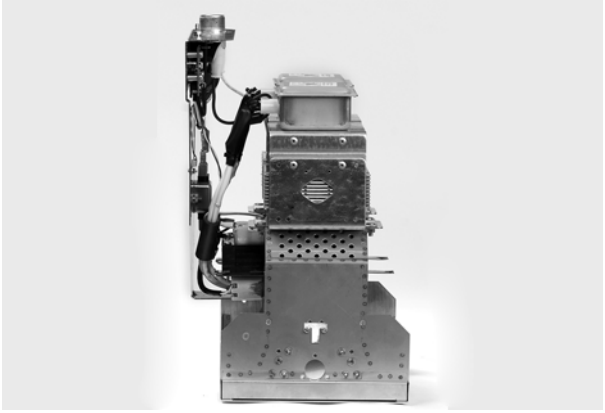


Figure 5-14 Transformer and Connector Bracket

Light Detector Board

1. Follow steps 1–5 under *Preparation.*
2. See Figure 5-15. Disconnect the light detector board.
3. Remove the three screws and the light detector board.
4. Install and connect the new board.
5. Install the transformer and connector bracket.
6. Install the cover on the lamphead base.
7. Install the bulb and RF screen, if removed.

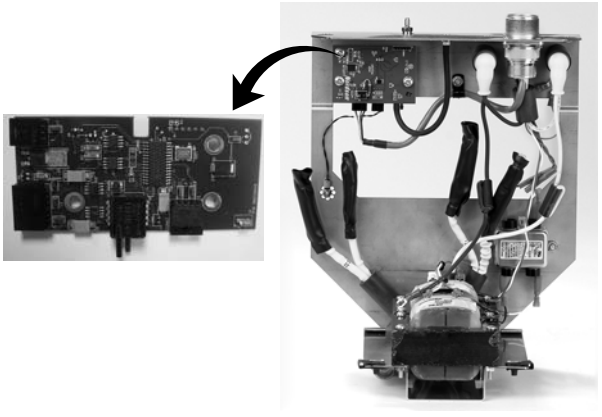


Figure 5-15 Light Detector Board Replacement

Starter Bulb Replacement

1. Follow steps 1–5 under *Preparation.*
2. See Figure 5-16. Cut or remove the RTV sealant from the base of the bulb to remove the bulb.
3. Apply a small dot of RTV 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 removed.

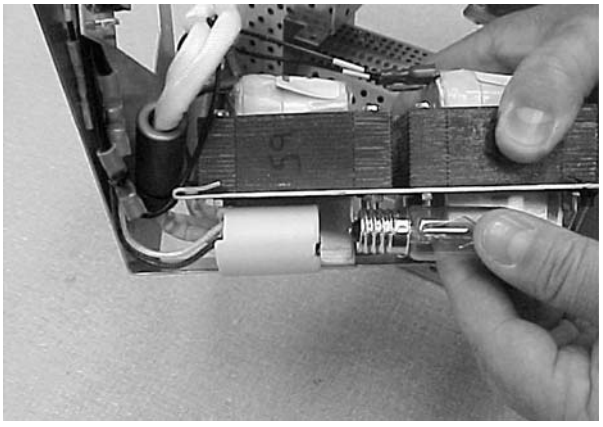


Figure 5-16 Starter Bulb Replacement

Magnetron Replacement

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

1. Follow steps 1–5 under *Preparation.*

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

2. See Figure 5-17. Cut the four ties securing the black sleeving over the high-voltage ring terminals.

Magnetron Replacement *(contd)*

3. Slide the sleeving down to expose the two ring terminals. Remove the two screws.

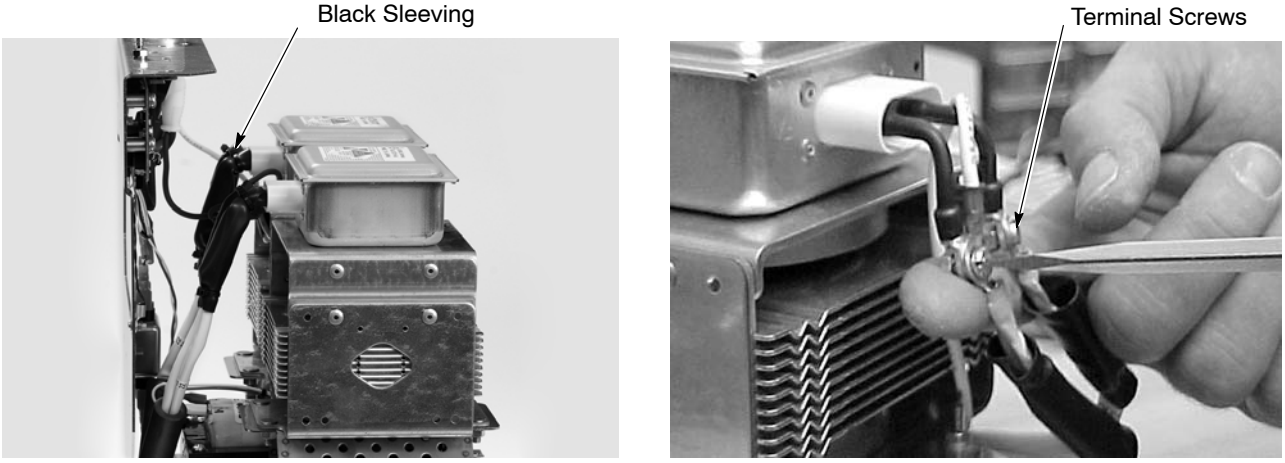


Figure 5-17 Magnetron Removal

4. See Figure 5-18. Remove the four screws, washers and nuts that secure the magnetron to the lamphead base. Remove the magnetron.

   Check for signs of arcing or burning around the flange. If arcing or burn marks are present, replace the magnetron.

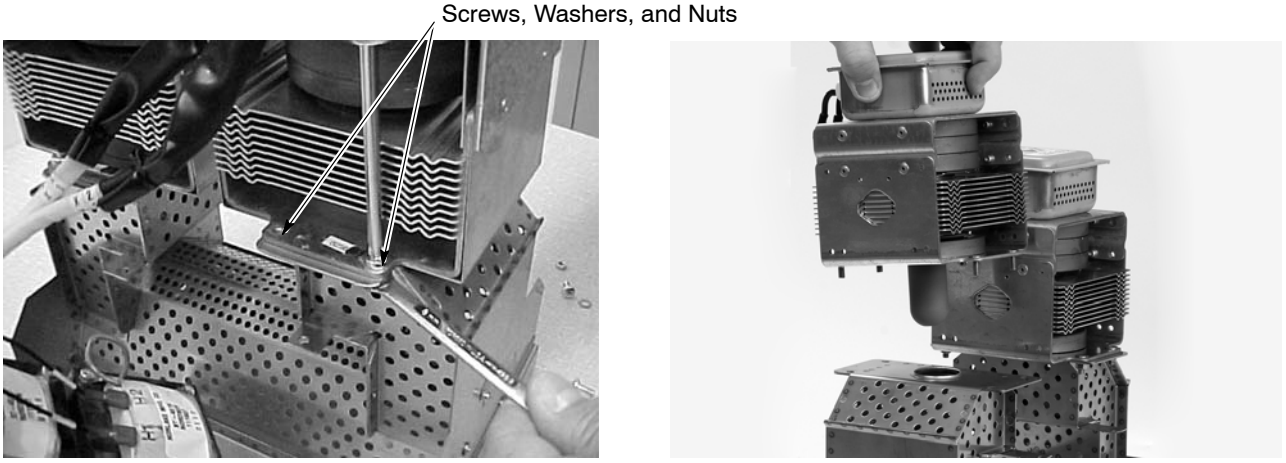


Figure 5-18 Magnetron Removal

5. See Figure 5-18. Inspect the gasket around the antenna of the new magnetron, making sure it is smooth and free of debris.
6. Carefully insert the antenna through the hole in the lamphead base.
7. Make sure the magnetron gasket is sealed evenly on the flange and secure the magnetron to the lamphead with the four nuts, washers, and screws. Tighten the nuts to 1.9 N•m (17-in. lb).

8. Secure the two high-voltage ring terminals on each magnetron with the two screws.
9. Reconnect the high voltage silicon insulated wire to the FA terminal.
10. Pull the black sleeving up over the high-voltage terminal and secure it in place with tie wraps.
11. Install the transformer and connector bracket.
12. Install the cover on the lamphead base.
13. Install the bulb and RF screen, if removed.

Section 6
Troubleshooting

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

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

System Software Versions

If you call for technical support, you may be asked to furnish the support person with the version numbers for the software installed in your system. During power up, the power supply displays the software versions for the following components, in this order:

V DXXX = Display Board
V MXXX = Main Control Board Microprocessor
V PXXX = Phase Board Microprocessor
V IXXX = Main Control Board CAN Interface
V LXXX = Light Detector Board (Lamphead)
V OXXX = I/O Board to DeviceNet

NOTE: V OXXX is only present for systems using DeviceNet.

General Troubleshooting

Use the charts on the following pages to troubleshoot your system.

NOTE: If a power supply does not start up, disconnect power to the power supply, then remove the cover and check the fuses. Refer to the *Maintenance and Repair* section for fuse locations.

Fault Message Troubleshooting

Problem	Possible Cause	Corrective Action
Fault Message 0: FAULT NETWORK CONFIGURATION Network detecting multiple units with same ID.	Incorrect unit ID setting, two or more units with same ID	Reconfigure ID settings so that all units have a unique ID number. Refer to *Power Supply Configuration* in the *Installation* section.
Fault Message 2: FAULT FILAMENT FUSE BLOWN Open filament transformer circuit. No filament current.	Filament transformer fuse blown	Excessive power line noise. Refer to *Power Line Connections* in the *Installation* section.
Fault Message 3: FAULT HIGH CURRENT ON MAG High current on high-voltage circuit. Current exceeds limit.	Magnetron has failed	Replace the magnetron.
	Short in lamphead cable	Inspect the high-voltage cable.
	Short in the lamphead	Inspect the wiring inside the lamphead.
Fault Message 4: FAULT CURRENT IMBALANCE Magnetron current imbalance. The current level of magnetron A and B differs by more than 100 mA.	Magnetron end of life	Replace the magnetron.
	Improper wiring	Verify the wiring connections of the magnetron.
Fault Message 5: FAULT ON NETWORK UNIT Fault on slave unit.	Displays on master unit when a fault occurs on a slave unit	Correct fault on slave unit.
Fault Message 6: FAULT MAG POWER WHEN OFF Phase control board failure Magnetron current detected when in Standby or Off mode	Failure on phase control board	Replace phase control board.

Continued...

Problem	Possible Cause	Corrective Action
Fault Message 7: FAULT NO LIGHT DETECTED Lamp Fault The light detector does not sense sufficient light output.	Bulb has failed	Replace the bulb.
	Sensor has degraded	Replace the light detector board. The recommended replacement interval is 10,000 hours of operation. Refer to the *Maintenance and Repair* section for more information.
Fault Message 9: FAULT HARDWARE FAILURE Control board failure Main controller not communicating with lamphead interface chip	Failure on main control board	Replace main control board.
Fault Message 10: FAULT DeviceNet ERROR DeviceNet Error. DeviceNet communications failure.	DeviceNet is not properly configured	Review DeviceNet software specification and reconfigure.
Fault Message 11: FAULT DEVNET HARDWARE DeviceNet Hardware Error. Communication between control board and I/O board is lost.	Hardware failure	Replace the I/O board or control board or replace the ribbon cables.
Fault Message 12: FAULT MAG VOLTAGE ERROR Magnetron voltage error. Magnetron voltage maximum exceeded or the difference between the magnetrons is too great.	Magnetron failure	Replace the magnetrons.
Fault Message 13: FAULT NETWORK COMM Network Fault Master/remote network connection lost	Remote unit not connected or power off	Check the connection and power of remote units
	Damaged cables	Replace the cables.
	Improper network setup	Refer to *Network Connections* and *Power Supply Configuration* in the *Installation* section.
Fault Message 15: FAULT POWER CTRL AT LIMIT Power control at limit. Power supply is unable to regulate output.	Magnetrons have failed	Replace the magnetrons.

Continued...

Problem	Possible Cause	Corrective Action
Fault Message 16: FAULT LOW LAMPHEAD PRESSURE Pressure Fault Lamphead air pressure is below 6.5 in. WC	Blower is off	Turn the blower on.
	Blower is restricted	Remove the restriction blocking the blower.
	Large pressure drop in blower ducting	Ducting to the remote blower must be large enough with minimum bends to supply proper air pressure. If low pressure faults persist, consider mounting the blower closer to the lamphead, increasing the duct size, or increasing the blower size.
Fault Message 17: FAULT EXT INTERLOCK Interlock Fault MSTOP I/O open or under voltage	Open external interlock	Check all system interlocks and the MSTOP connection.
	I/O jumpers are set incorrectly	Verify that the jumper position matches the interlock method.
Fault Message 18: FAULT POWER UNIT OVER TEMP Power Supply Overtemp Power supply temperature is over 65 °C	Power supply cooling fans are restricted or not operating	Remove fan restrictions or replace the fans.
Fault Message 18: FAULT POWER UNIT OVER TEMP Power Supply Overtemp Power supply temperature is over 65 °C	Ambient temperature is above specification	Reduce the ambient temperature to 5–40 °C (41–104 °F)
Fault Message 19: FAULT RF DETECTOR MISSING RF Fault System does not sense the RF detector	RF detector is not properly connected	Check the connections.
	RF cable is damaged	Check the continuity of the cable. Replace the cable if necessary.
Fault Message 20: FAULT RF DETECTOR TRIP RF Fault High RF field detected	RF Detector is detecting a high level of RF	Ensure the screen is not missing, loose, or damaged.
Fault Message 22: FAULT LAMPHEAD OVER TEMP Lamphead over temperature. Lamphead temp is over 95 ° C.	Cooling air is being restricted	Make sure there is proper exhaust air. Refer to Corrective Actions for Fault 16.

Continued...

Problem	Possible Cause	Corrective Action
Fault Message 23: FAULT HV CABLE UNPLUGGED Irradiator will not light. Power supply not communicating with lamphead	Unicable not connected or damaged	Check the cable connections. Check the continuity of cables.
	Light detector board internally unplugged	Check the internal connections to the light board in the lamphead
Fault Message 24: FAULT LOW CURRENT ON MAGS Magnetron Current Fault Magnetron current cannot be maintained	Magnetrons at end of life	Replace the magnetrons.
	Wiring not connected properly after maintenance	Verify connections to the magnetrons
	HV transformer taps set incorrectly	Refer to the *Transformer Tap Table* in the *Installation* section to verify settings.
Fault Message 25: FAULT PHASE CTRL AT LIMIT Phase control at limit. Power supply is unable to regulate the system to the specified output level.	HV transformer taps set incorrectly	Refer to the *Transformer Tap Table* in the *Installation* section to verify settings.
Fault Message 26: FAULT RF DETECTOR FAILED RF Fault RF Detector failed self-test	RF detector self test fails or unit has been permanently damaged by a very high RF field **NOTE:** This failure is only possible under extreme conditions.	Replace the RF detector.
Fault Message 27: FAULT PHASE CONTROLLER ERROR Control does not detect the phase board.	Phase control board failure	Replace phase control board.
Fault Message 28: FAULT MAG FILAMENT IS OPEN Low filament current.	Magnetron failure	Replace magnetron.

Bulb Troubleshooting

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. Bulbs have white fingerprints on quartz	Quartz was touched when bulb was installed: Finger dirt and oils on the quartz was 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	Bulb is damaged or power supply has faulted	Check the power supply for fault messages. Replace the bulb.
3. Quartz portion of bulb is rippled	Bulb is overheating	Clean all customer supplied filter material. Check the lamphead ventilation by measuring the pressure at the external pressure port. Check that proper bulb for lamp is being used.
4. Quartz has a white or gray cloudy appearance	End of life	Replace the bulb.
	Bulb is overheating	If UV output is below acceptable levels. Check the system cooling then replace the bulb if necessary. Check that proper bulb for lamp is being used.
5. Bulb does not fit securely in lamphead	Mounting tips on bulb are chipped or broken	Replace the bulb.
6. The bulb is overheating	Reflectors not properly installed	Refer to the *Maintenance and Repair* section for instructions on how to properly install the reflectors. Replace the reflector if necessary. Check that proper bulb for lamp is being used.

Curing Process Troubleshooting

Problem	Possible Cause	Corrective Action
System running ok but material not curing	Reflectors are installed in the wrong orientation	Check to make sure reflectors are installed correctly.
	Reflectors are badly damaged or dirty	Clean or replace the reflectors.
	RF screen dirty	Remove and clean the RF screen.
	Lamp not in focus	Focus the lamphead.
	Incorrect bulb type	Replace with the correct bulb type.
	Low power level setting	Increase the power level on the power supply.
	Material issue	Contact the material supplier to verify the UV spectrum/intensity output.

General Lamphead Troubleshooting

Problem	Possible Cause	Corrective Action
Low lamphead pressure	Refer to *Fault Message Troubleshooting* in this section.	
Magnetron failure	Refer to the *Fault Message Troubleshooting* in this section.	
RF fault on power supply	There is a tear in the RF screen on the front of the lamphead	Replace the screen.
	The RF screen on the front of the lamphead is not securely fastened	Tighten the screen.
	The lamphead bulb has failed	Replace the lamphead bulb.
	The RF detector was improperly installed	Refer to the *Installation* section for the proper procedures and installation requirements.
The lamphead is showing signs of electrical arcing	There are loose screws in the lamphead	Refer to the *Maintenance and Repair* section to replace any damaged lamphead parts. Tighten all the appropriate screws.

Section 7
Parts

Introduction

To order parts, call the Nordson Finishing Customer Support Center at (800) 433-9319 or contact your local Nordson representative.

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	

CW-2 Power Supplies

Part	Description	Note
60 Hz Applications:		
1084107	Power Supply, standard, 480V, no DeviceNet, boxed	
1084113	Power Supply, standard, 480V, no DeviceNet, wood shipping crate	A
1075557	Power Supply, 480V, onboard DeviceNet, boxed	
1084110	Power Supply, 480V onboard DeviceNet, wood shipping crate	A
1084623	Power Supply, 480V, int blower, no DeviceNet	
1086251	Power Supply, 480V, int blower, no DeviceNet, wood shipping crate	A
1083275	Power Supply, int blower	
1086252	Power Supply, 480V, int blower, wood shipping crate	A
50 Hz Applications:		
1084109	Power Supply, standard, 400V, no DeviceNet, boxed	
1084112	Power Supply, standard, 380/415V, no DeviceNet, wood shipping crate	A
1084111	Power Supply,380/415V, onboard DeviceNet, boxed	
1079706	Power Supply,380/415V, onboard DeviceNet, wood shipping crate	A
1086229	Power Supply, 380/415V, int blower, no DeviceNet, boxed	
1084625	Power Supply, 400V, int blower, no DeviceNet	A
1086250	Power Supply, set to 380/415V, int blower, boxed	
1083276	Power Supply, 400V, int blower, onboard DeviceNet, wood shipping crate	A
NOTE A: Recommended for power supplies shipping outside the USA.		

Repair Parts

See Figure 7-1.

Item	Part	Description	Quantity	Note
–	- - - - - -	50/60 HZ POWER SUPPLY, CW2	1	
1	1077135	• CONNECTOR, I/O board, kit, CW2	1	
2	1077121	• TRANSFORMER, HV, kit, CW2	2	
3	1102431	• TRANSFORMER, step down, kit, CW2, external blower	1	
3	1089207	• TRANSFORMER, control, kit, internal blower	1	
NS	1077125	• MEMBRANE, kit, CW2		
4	775080	• FUSE, kit, CW2, external blower	1	A, B
4a	- - - - - -	• • FUSE, 30 amp	3	B
4b	- - - - - -	• • FUSE, 2 amp	2	B
4c	- - - - - -	• • FUSE, 160 ma, 250 volt	1	B
4d	- - - - - -	• • FUSE, 2 amp, 250 volt	1	B
4	1091465	• FUSE, kit, CW2, internal blower	1	A, C
4a	- - - - - -	• • FUSE, 30 amp	3	C
4b	- - - - - -	• • FUSE, 10 amp 250 volt	2	C
4c	- - - - - -	• • FUSE, 160 ma, 250 volt	1	C
4d	- - - - - -	• • FUSE, 2 amp, 250 volt	1	C
5	772214	• FAN, 6 in x 1.5 in, 240 VAC	2	A
6	1098890	• MAIN CONTROL BOARD, kit, CW2	1	
7	775142	• PCB, display, kit CW10	1	
8	1102449	• PHASE CONTROL BOARD, kit, CW2	1	
9	1077131	• I/O CONNECTOR BOARD, kit, CW2, with DeviceNet	1	
9	1083974	• I/O CONNECTOR BOARD, kit, CW2, without DeviceNet	1	
10	1077128	• DIODE, HV, kit, CW2	2	
11	- - - - - -	• SCREW, M5 x 10	10	
12	1086731	DETECTOR, RF, kit, CW	1	
NS	1083259	HARNESS, power supply, unicable, kit, external blower	1	
NS	1089206	Harness, power supply, unicable, kit, internal blower	1	

NOTE A: Recommended spare part. Keep this part in inventory to avoid unplanned downtime.

B: Fuse kit 775080 contains three 30 amp, 500 volt main fuses; two 2 amp, 500 volt fuses for the step down transformer; one 160 microamp, 250 volt control board fuse; one2 amp, 250 volt fuse for the filament transformer, and two 3 amp, 250 volt fuses (not used on this power supply).

C: Fuse kit 1091465 contains three 30 amp, 500 volt main fuses; two 10 amp, 250 volt fuses for the step down transformer; one 160 microamp, 250 volt control board fuse; one2 amp, 250 volt fuse for the filament transformer.

NS: Not Shown

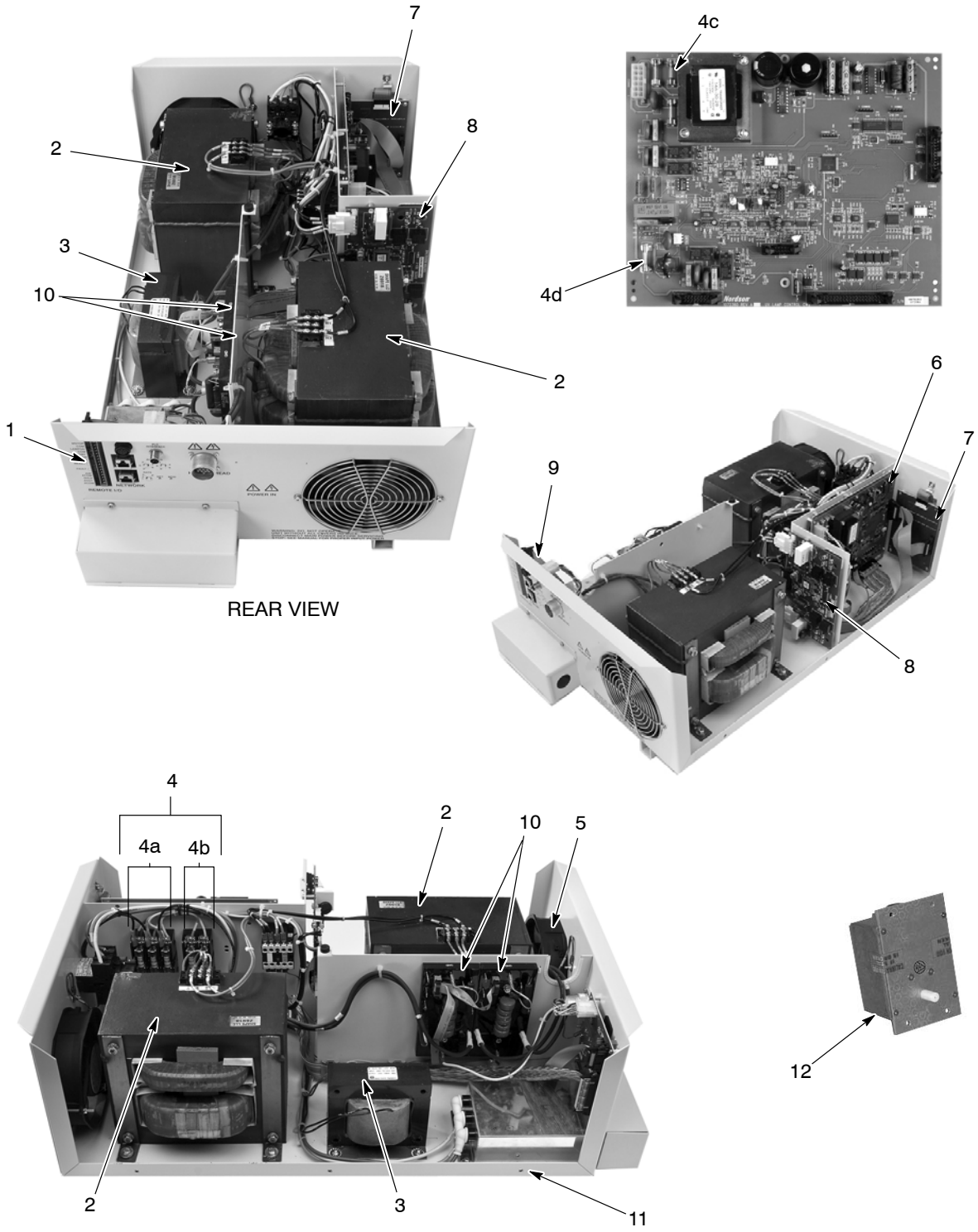


Figure 7-1 CoolWave Power Supply and RF Detector

CW-2 Lampheads

See Figure 7-2.

Item	Part	Description	Quantity	Note
1	1074677	LAMPHEAD, focus, 2.1, external	1	
1	1075554	LAMPHEAD, focus, 3.1, external	1	
1	1075555	LAMPHEAD, flood, external	1	
1	1083279	LAMPHEAD, focus, 2.1, internal	1	
1	1083291	LAMPHEAD, focus, 3.1 internal	1	
1	1083293	LAMPHEAD, flood, internal		
2	1087356	• BULB, UV, microwave, CW610, H (Mercury)	1	A, B
2	775043	• BULB, UV, microwave, CW610, D, (Iron)	1	A, B
2	775044	• BULB, UV, microwave, CW610, V (Gallium)	1	A, B
2	775045	• BULB, UV, microwave, CW610, Q (Indium)	1	A, B
2	775046	• BULB, UV, microwave, CW610, H+ (Mercury Plus)	1	A, B
2	1051461	• BULB, UV, microwave, CW610, M (Lead)		A, B
3	775060	• BRACKET, retaining reflector, focus, PR, kit, CW10	2	
3	775061	• BRACKET, retaining reflector, flood, PR, kit, CW10	2	
4	1077320	• LIGHT DETECTOR, kit	1	B
5	1079419	• TRANSFORMER, filament, kit	2	B
6	775040	• BULB, starter, kit, CW10/6	1	B
7	775090	• REFLECTOR, focus, 2.1, standard, kit, CW10, each	2	B, C, D
7	775092	• REFLECTOR, focus, 3.1, kit, CW10, each	2	B, C, D
7	775100	• REFLECTOR, flood, standard, kit, CW10	2	B, C, D
8	775115	• DEFLECTOR, strip, quartz, kit, CW10	1	B
9	775120	• SCREEN, lamphead, kit, CW10	1	B
10	1075164	• MAGNETRON PAIR, 3.0 Kw, kit	1	B
11	- - - - - -	• SCREW, M4 mounting holes	8	
12	- - - - - -	• PAN HEAD SCREW, M4 x 8, Phillips, steel, zinc plated	14	
13	- - - - - -	• PAN HEAD SCREW, M4 x 8, Phillips with lock washer, steel, zinc plated	8	
14	- - - - - -	• BUTTON HEAD SOCKET SCREW, M3 x 10, with Nylok nut	4	
15	- - - - - -	• BUTTON HEAD SOCKET SCREW, M3 x 5, stainless steel	8	
16	- - - - - -	• PAN HEAD SCREW, M5 x 8, Phillips, steel, zinc plated	3	
17	- - - - - -	• SCREW, M5 mounting holes	12	
18	1053767	• REFLECTOR BULB MOUNTING, focus, 2.1, glass, kit, CW10	1	D
18	1053768	• REFLECTOR BULB MOUNTING, focus, 3.1, glass, kit, CW10	1	D
18	1053769	• REFLECTOR BULB MOUNTING, flood, glass, kit, CW10	1	D

Continued...

Item	Part	Description	Quantity	Note
19	775116	• REFLECTOR, end, RR, kit, CW10	1	
NS	775056	PLATE, quartz, duct, exhaust, enclosure, kit, CW10	1	E
NS	1083258	HARNESS, lamphead, kit external blower	1	
NS	1089205	HARNESS, lamphead, kit internal blower	1	
NS	1092143	KIT, internal blower	1	
NS	1102567	KIT, 4 pack, internal blower filters	1	

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: Optional equipment.

NS: Not Shown

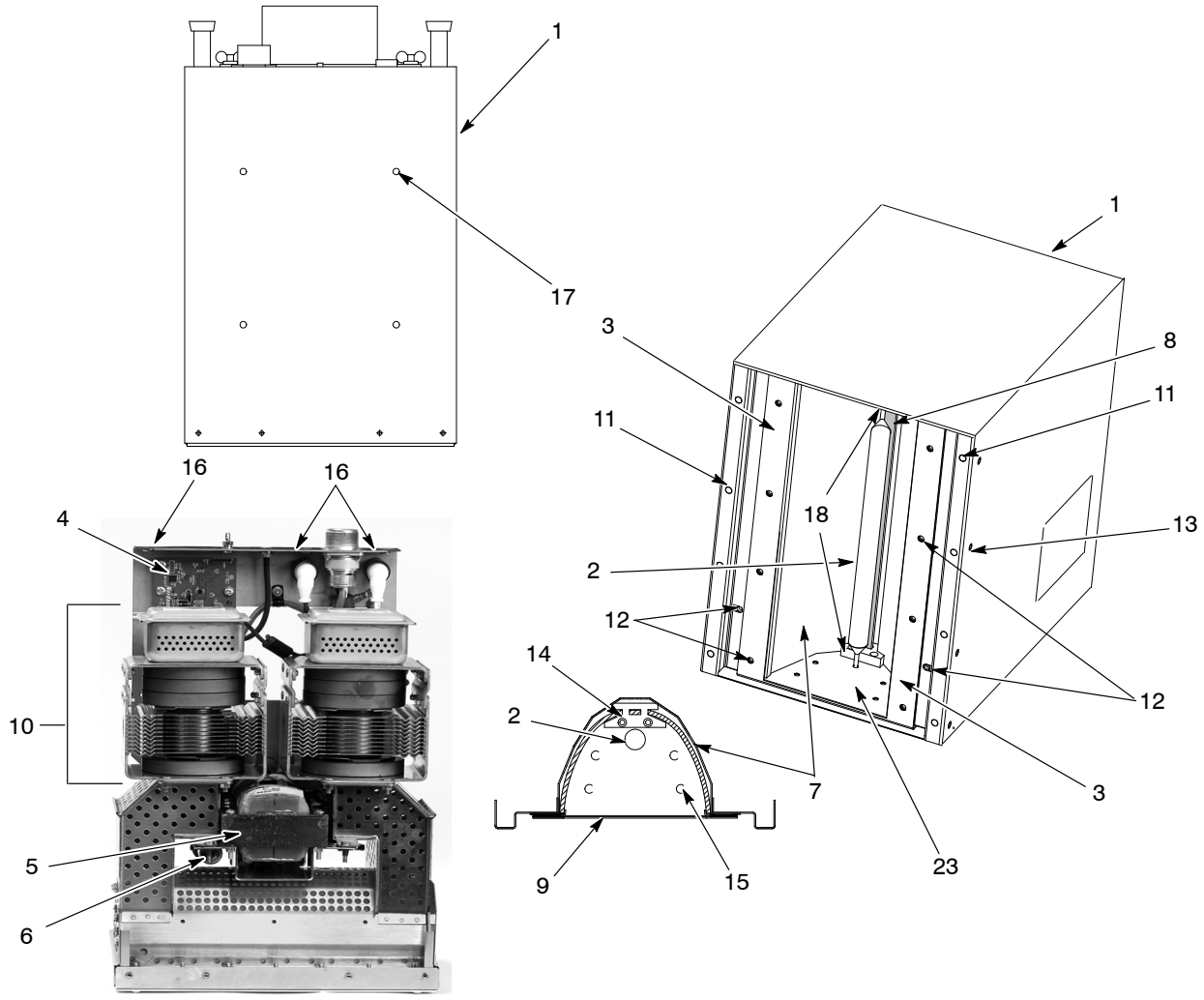


Figure 7-2 CoolWave Lamphead

System Cables

See Figure 7-3. Order the correct cable length for your particular system.

Item	Part	Description	Quantity	Note
1	775374	12-ft UNICABLE	1	
1	775023	25-ft UNICABLE	1	
1	775375	50-ft UNICABLE	1	
1	775377	75-ft UNICABLE	1	
1	775380	100 ft UNICABLE	1	
2	1061134	12 ft CABLE, RF detector	1	
2	775029	25 ft CABLE, RF detector	1	
2	775050	50 ft CABLE, RF detector	1	
2	775051	75 ft CABLE, RF detector	1	
2	775052	100 ft CABLE, RF detector	1	
3	775031	NETWORK CABLE, 6 ft	1	

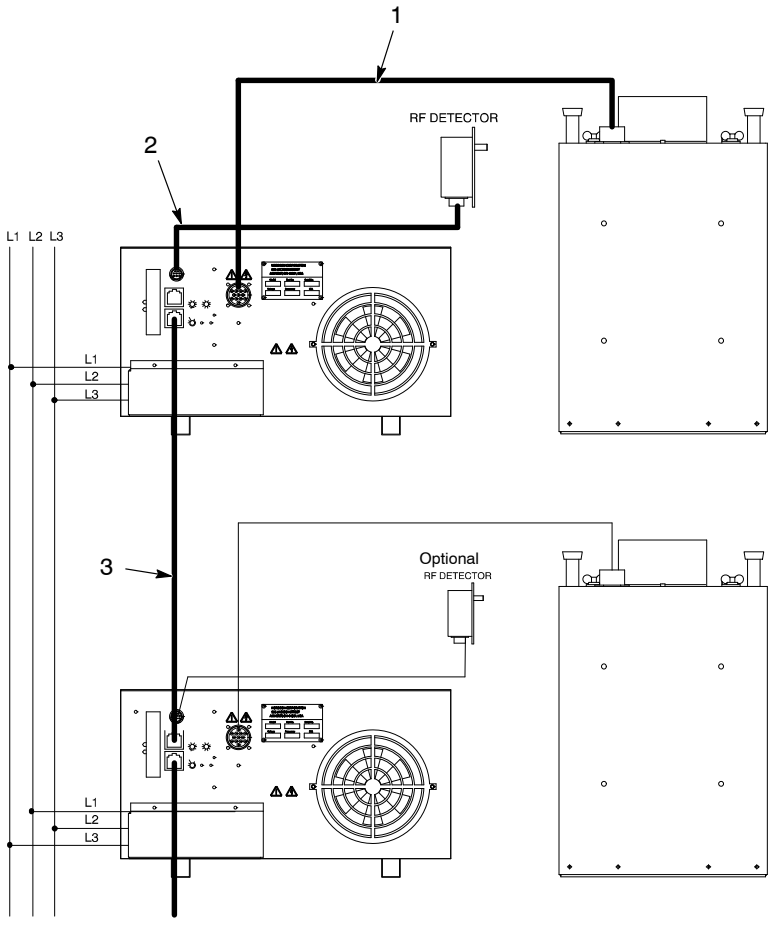


Figure 7-3 System Cables

RF Detector

Part	Description	Note
1086731	Detector, RF	A
NOTE A: Refer to System Cables on page 7-7 for RF Detector cables.		

External Blowers

Item	Part	Description	Quantity	Note
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				

Reflector Conversion Kits

NOTE: The following kits are used with CW610 and CW 410 lampheads.

Part	Description
1053793	KIT, reflector conversion, 2.1 focus, CW10
1053794	KIT, reflector, conversion, 3.1 focus, CW10
1053795	KIT, reflector conversion, flood, CW10

Accessories

Part	Description
AirShield™ Ventilation System – Captures the heated exhaust air from the lamphead and exhausts it to a separate exhaust duct.	
775055	KIT, duct, exhaust, CW10, encl, quartz (for CW-410/CW-610T lampheads)
1068608	KIT, duct, exhaust, deep, CW10, encl, quartz (for CW-410/CW-610T lampheads using a bottom pressure port)
LiteTite™ Shutter System – A pneumatically powered shutter opens and closes instantly to block UV light without turning off the lamphead or power supply.	
775198	KIT, shutter, LH, CW10

Section 8
Specifications

Power Supply

Table 8-1 Standard and Enclosure Mounted Power Supply Specifications

Item	Specification
Dimensions	
length	753 mm (29.65 in.)
width	465.5 mm (18.33 in.)
height	256.3 mm (10.09 in.)
Weight	118 kg (260 lb)
Voltage	440/480 Vac, 3⊘, @ 60 Hz or 380/440 Vac, 3⊘, @ 50 Hz
Current	Refer to Table 8-2
Environmental Operating Conditions	
Ambient Temperature	5–40 °C (41–104 °F)
Altitude	Up to 2000 meters (6561 ft)
Rh	80% up to 31 °C (88 °F), decreasing linearly to 50% at 40 °C (104 °F)
Ingress Protection Rating	IP–21
RF Detector	
Max. Temperature	60 °C (140 °F) Ambient

Table 8-2 Power Line Current for 610V External Blower

Line	60 Hz		50 Hz	
	Amps @ 440 Vac	**Amps @ 480 Vac**	**Amps @ 380 Vac**	**Amps @ 440 Vac**
L1	14	13	17	16
L2	22	19	26	24
L3	14	15	17	16

Table 8-3 Power Line Current for 610I Internal Blower

Line	60 Hz		50 Hz	
	Amps @ 440 Vac	**Amps @ 480 Vac**	**Amps @ 380 Vac**	**Amps @ 440 Vac**
L1	14	13	17	17
L2	22	20	28	27
L3	14	15	17	17

Light Output Settings

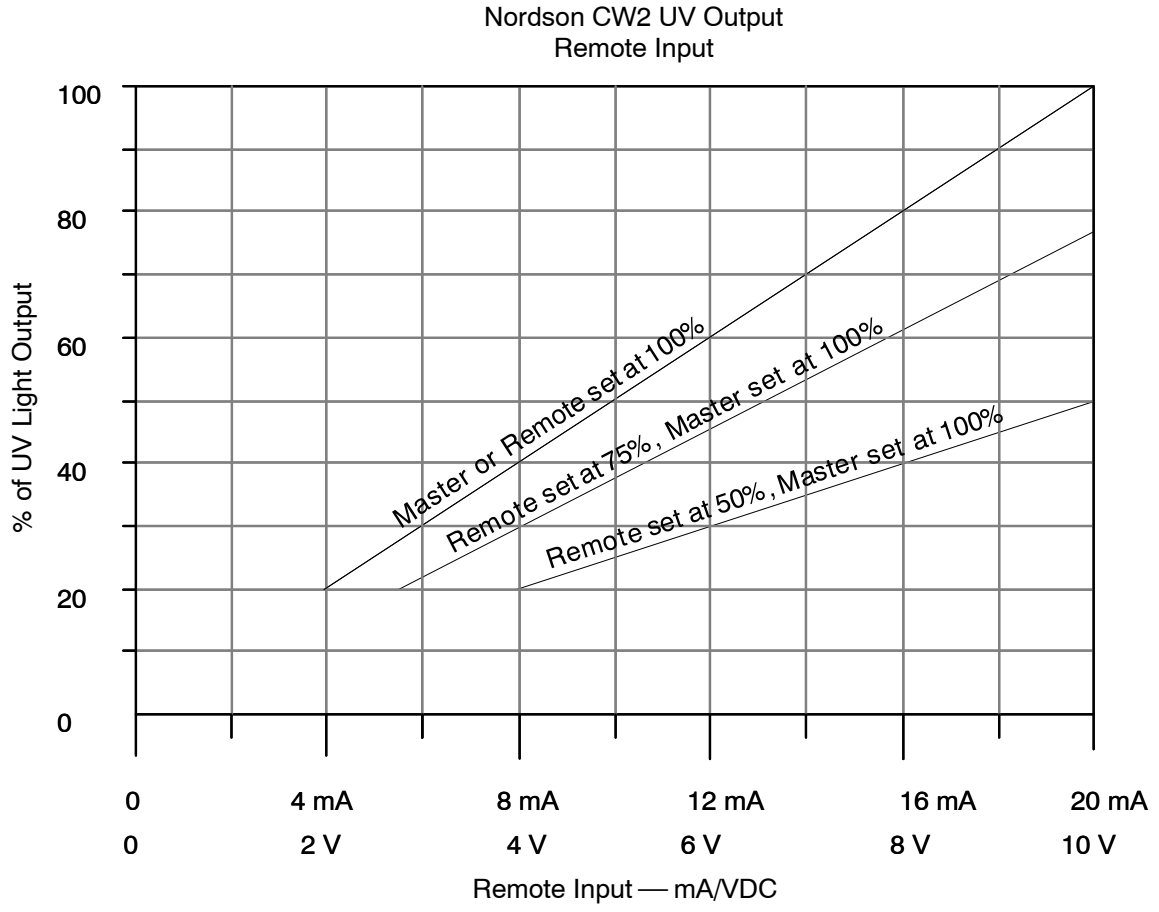


Figure 8-1 Light Output Settings

Master/Remote Power Setting Examples

If the Master Unit is set at	and the Remote Unit is set at	The Remote Unit will run at
100%	100%	100% of 100%
100%	75%	75% of 100%
50%	75%	75% of 50%
75%	50%	50% of 75%
NOTE: The standard setting is Master Unit 100%, Remote unit 100%.		

Lamphead

Table 8-4 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	With External Blower – 19 kg (42 lb), With Internal Blower – 25 kg (55lb)
Cooling Air	350 cfm @ 7 in. W.C.; measured at lamphead (9.9 mm^3 @ 1780 Pascal)
Reflector	Glass with a proprietary coating 220–470 nm; focus/flood profiles
Focal Length	2.1, 3.1, and flood
Interlocks	Light on detector Cooling air sensor Unicable detection RF leakage detection

Bulb

Table 8-5 Bulb Specifications

Item	Specification
Length	254 mm (10 in.)
Power	600 watts/in. maximum
Types	Mercury, Mercury +, Iron, Gallium, Indium, Lead

System Schematic

See Figure 8-1 and 8-2.

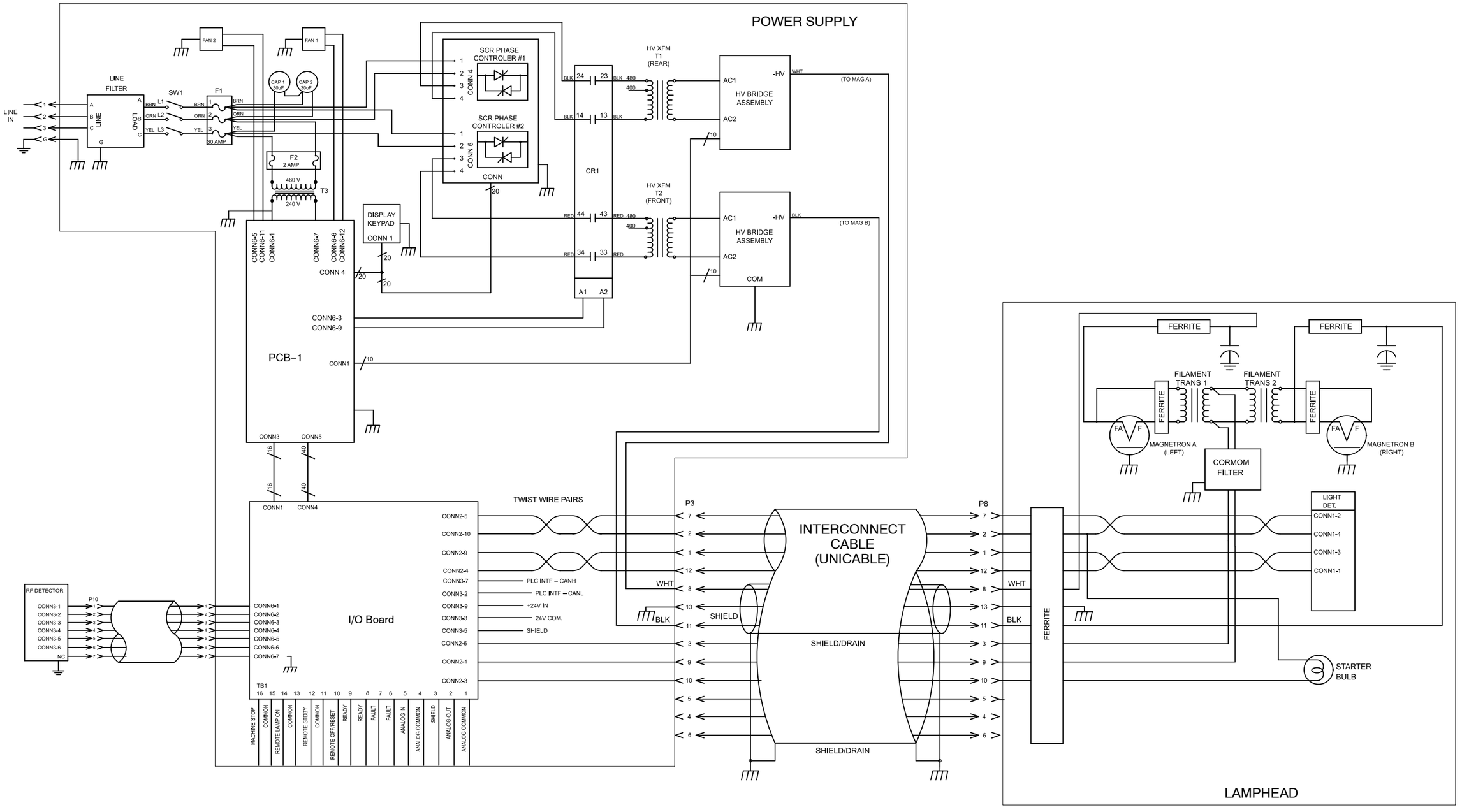


Figure 8-1 External Blower System Schematic

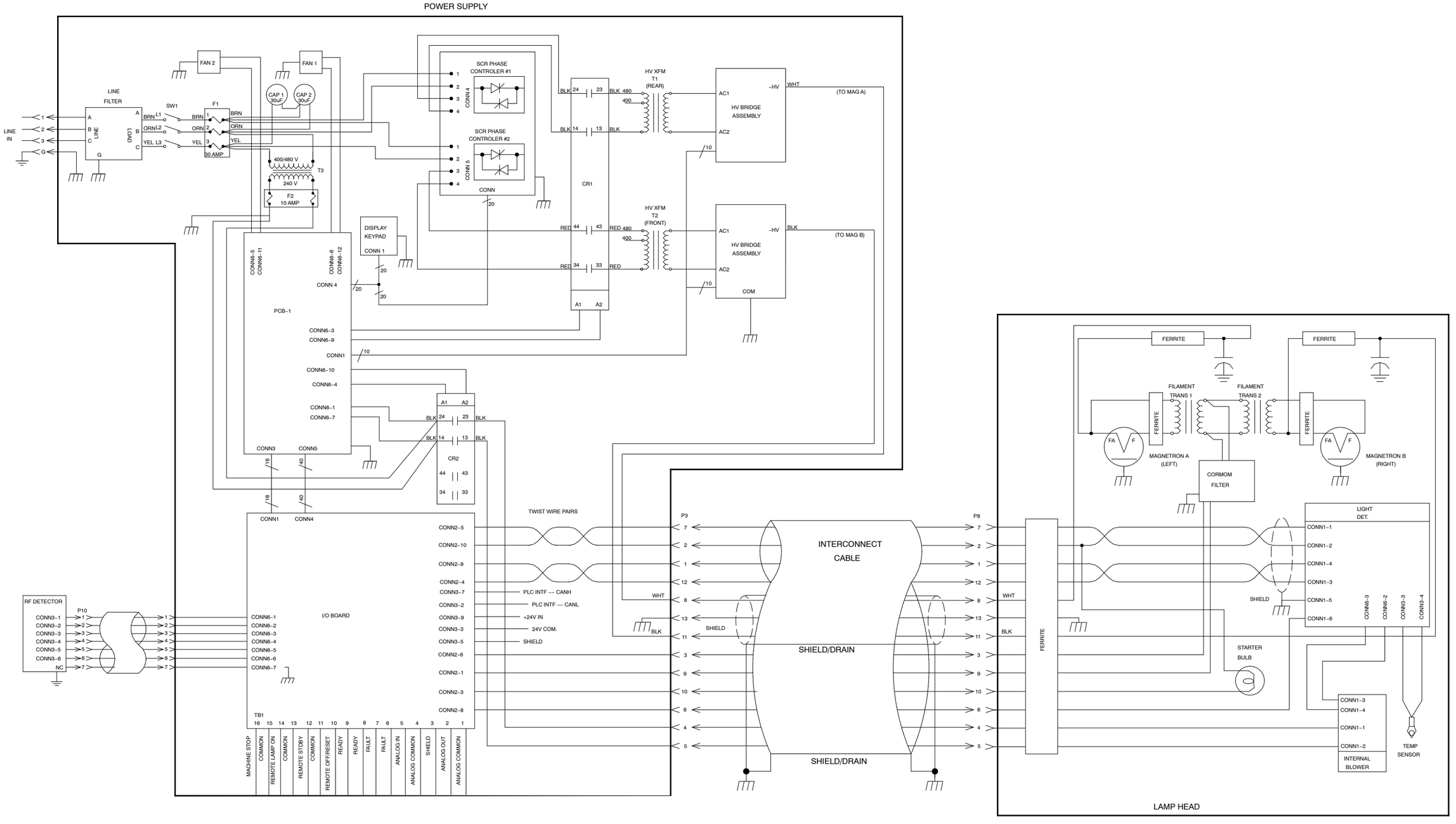


Figure 8-2 Internal Blower System Schematic

Section 9
UV Glossary

absorption — Not reflecting. The partial loss in energy that results when light passes through or reflects off a medium.

additive bulb — A mercury bulb that contains metal additives such as iron, gallium, indium, or others. These bulbs produce variations in spectral output as compared to mercury only bulbs.

ASTM spec D3359–95a — Refer to tape test.

black light UV — Low powered UV composed of wavelengths in the UVA band. Usually powered with several 100-watt power supplies or less instead of several 1000-watt power supplies. Nordson's UV Star and CoolWave product lines are much higher in irradiance and energy density than black light UV products.

bulb — A sealed quartz tube that contains a mixture of inert gas and mercury under medium pressure. Electrode bulbs are fitted with electrical connections at the ends of the bulb. Microwave bulbs contain no electrical connections. The mercury and inert gas are energized (vaporized) by either a voltage arc or microwave energy. The vaporized plasma gas emits UV light.

capacitor — Corrects the power factor in the main power supply to reduce current levels in the UV system.

cold mirror — A reflector that is coated with a dichroic material that absorbs or passes wavelengths in the infrared range while reflecting those in the UV range. Refer to dichroic.

cross hatch test — Refer to tape test.

cure — A UV drying process that occurs through a chemical reaction between a UV ink or coating and UV light.

dichroic — A coating designed to pass certain wavelengths and reflect other wavelengths. In UV lampheads, dichroics are used on reflectors to pass or absorb infrared energy and reflect UV energy.

devitrification — The act of making quartz glass opaque and porous through prolonged heating and UV exposure.

doped bulb	Refer to additive bulb.
dose (dosage)	Refer to energy density.
dose rate (dosage rate)	Refer to irradiance.
dynamic exposure	Exposure to a varying irradiance. It occurs when a lamphead passes over a substrate without pausing or when a substrate passes under a lamphead without pausing.
dynamic range	The span between the minimum irradiance and the maximum irradiance to which a radiometer will accurately respond. Measured in joules/cm^2.
effective cure length	The length of a bulb that delivers optimal UV output. For electrode bulbs, the effective cure length is always less than the arc length. For microwave bulbs, the effective cure length is the length of the bulb.
electrodeless	A microwave-powered UV system.
electromagnetic spectrum	The full wavelength range of electromagnetic radiation, including microwave, ultraviolet, visible, and infrared energy.
energy density	The total amount of UV energy delivered to a particular area, measured in joules/cm^2. Also referred to as total energy. Improperly referred to as dose.
flood	An unfocused band of UV light that is more evenly and diffusely distributed across the width of the reflector.
flux	The flow of photons, measured in einsteins/second.
focal distance (length)	The perpendicular distance from the edge of the lamphead to the point where the UV light emitting from the bulb converges. This is the location of maximum UV concentration.
focus	The band where the UV energy reflected from the lamphead is at the highest concentration.
frequency	The number of times a periodic wavelength cycle occurs in one second, measured in Hertz (Hz).
gallium	A bluish-white metallic element used in additive mercury bulbs. The gallium additive provides a yellowish tint to an un-energized UV bulb and a violet coloration to the UV output. Gallium bulbs have a spectral peak around 417 nm and a spectral concentration between 400 and 450 nm. They are often used when deeper cure is required or with white coatings containing titanium oxides. In some industries, microwave gallium bulbs are referred to as V bulbs.

germicidal UV — Low-powered UV in the UVC band. Usually powered with several 100-watt power supplies or less instead of several 1000-watt power supplies. Nordson's UV Star and CoolWave product lines are much higher in irradiance and energy density than germicidal UV products.

indium — A silver-white metallic element used in additive mercury bulbs. The indium additive provides a yellowish tint to an un-energized UV bulb and a violet coloration to the UV output. Indium is used to shift the spectral output past 400 nm. In some industries, indium bulbs are referred to as Q bulbs.

infrared energy — Energy having wavelengths between 1 and 100 μm.

integral cooling fan (blower) — The bulb-cooling fan when it is mounted to the lamphead.

integral shutter — A shutter assembly that is built into the lamphead. Common designs include a pneumatically actuated clam shell that blocks the light when closed and acts as a reflector when open and a pneumatic slide mechanism that moves the lamphead behind an internal louver when shuttered. Shutters are typically associated with electrode systems.

intensity — The amount of UV energy delivered to a particular area per unit time, measured in joules/cm^2/sec or watts/cm^2/sec. Also referred to as watt density. Improperly referred to as dose rate.

iron — A white metallic element used in additive mercury bulbs. The iron provides a reddish tint to an un-energized UV bulb and a bluish coloration to the UV output. Iron is used to concentrate the spectral output between 350 and 400 nanometers. In some industries, iron bulbs are referred to as D bulbs.

irradiance — Radiant power arriving at a surface from all forward angles per unit area, measured in watts/cm^2.

irradiator — Refer to lamphead.

joule — Metric unit for measuring work or energy. One joule is equivalent to the work done by a force of one Newton acting through a distance of one meter. (1 KW-hour equals 3.6×10^6 joules).

lamp — Refer to bulb.

lamphead — Assembly containing a sheet metal housing and cover and integral or remote cooling fan. An electrode system also contains cradles and a microwave system contains magnetrons, a cavity, and a screen.

light detector — A photocell inside a microwave lamphead that confirms UV output.

long UV — Refer to UVA.

louver	A part of a UV shutter system or shielding section that blocks the UV light while allowing cooling air to pass through.
magnetron	Assembly contained inside a microwave lamphead that converts high-voltage electrical input into RF energy.
mercury	A silver-white metallic element that is liquid at room temperature and is used to create a vaporized, UV-emitting gas plasma inside a quartz tube when it is energized through the use of either a voltage arc or microwave energy. When energized the bulb produces a bright white UV output. Mercury bulbs have a peak spectral output around 365 nm and a concentration around 254 nm. In some industries, mercury bulbs are referred to as H bulbs.
mercury plus (H+)	Mercury plus bulbs are only available in microwave systems as it is difficult to vaporize the additional mercury in an electrode bulb.
metal halide bulb	Refer to additive bulb.
micrometer (μm)	Unit of length equivalent to one millionth of a meter.
microwave	That part of the electromagnetic spectrum associated with the larger infrared waves and the shorter radio waves.
monomers	A molecule of relatively low molecular weight and simple structure capable of combining with itself or other similar molecules to form polymers.
nanometer (nm)	Unit of length equivalent to one billionth of a meter.
negative cooling	When the cooling air for the lamphead is drawn from the area surrounding the substrate being cured and through the lamphead. Negative cooling provides exhaust for the UV system if it is ducted to atmosphere. Negative cooling is most often supplied through a remote cooling fan.
nitrogen blanketing	Refer to nitrogen inerting.
nitrogen inerting	When the coating or ink is flooded with a nitrogen blanket to prevent the coating or ink from oxidizing before cure. Nitrogen inertion reduces oxygen inhibition.
oligomers	A low molecular weight resin or polymer used in a radiation curable coating.
out-of-focus	When a lamphead is located further away from the substrate or closer to the substrate than the focal distance.
oxidizing	When the coating or ink reacts with oxygen and slows the polymerization process of the cure.

oxygen inhibition	Oxygen slows the cure response of UV curable coatings. The higher the ratio of exposed surface area to coating mass, the greater the impact oxygen has on the coating.
ozone (O_3)	An unstable, colorless gas with a penetrating odor that is generated by the reaction of short-wave UV light (≈184 nanometers) with air.
ozone-inhibiting (ozone-free) bulbs	Bulbs where the quartz is manufactured with an additive that prevents the transmission of UV beneath 200 nm in wavelength. It is the reaction of short-wave UV light (≈184 nanometers) with air that produces ozone.
Parts Per Million (PPM)	The units of the Threshold Limit Value (TLV) when referring to the maximum level of a substance that a person should inhale over an 8-hour shift during a 40-hour week without producing an ill effect. Also refer to Threshold Limit Value.
peak irradiance (peak power density)	The maximum irradiance measured over a sample period, measured in joules/cm^2/sec or watts/cm^2.
photoinitiator	A molecule which when exposed to a specific wavelength of energy forms a reaction that begins the cure process.
photopolymerization	Turning a liquid (wet) into a solid (dry) through exposure to UV light.
planar shutter	A shutter assembly that is attached to the outside of a lamphead. The louvered shutter moves perpendicular to the emitted UV light.
polymer	A macromolecule consisting of a large number of monomer units.
positive cooling	When the cooling air for the lamphead is blown through the lamphead and onto the substrate being cured. Positive cooling can be supplied through either an integral or remote cooling fan. With positive cooling, an additional exhaust system is required to remove heat and ozone.
post cure	The continuation of chemical reactions in the ink or coating after exposure to UV has ceased.
power density	Refer to irradiance.
quartz plate	Plates that allow UV energy to penetrate with minimal loss in intensity and are mounted in front of the lamphead. The plates are used to prevent positive cooling air and airborne contaminants from contacting the substrate, negative cooling air from contaminating the bulb and reflectors, or to remove some of the infrared that is radiated from the UV bulb. If the goal is to reduce the amount of heat contacting the substrate, additional cooling air must be blown across the quartz. If additional air is not used, the quartz will eventually heat up and begin radiating heat onto the substrate. To further reduce heat, the quartz can be coated with a material that passes UV light and absorbs infrared energy.

quartz tube	(1) A sealed tube made from a silicate material that is filled with a precise mixture of mercury and various inert gases and sometimes fitted with electrical connections. The vapor emits light when it is energized through the use of either a voltage arc or microwave energy. Often used to refer to the bulb. (2) An open tube made from a silicate material through which a substrate can pass. The tube is often placed in front of a UV lamphead and flooded internally with Nitrogen. Parts traveling through the tube are then safeguarded from exposure to the oxygen and ozone in the lamphead cooling air.
reflector	Reflect and concentrate the UV light onto the substrate. Rolled from highly polished aluminum sheet metal or formed from borosilicate into elliptical or parabolic profiles. Elliptical profiles optimize the concentration of UV energy that is reflected by guiding the radiation into a tightly focused UV band while parabolic reflectors result in a flood of UV light. Holes or slots in the reflector allow cooling air to pass through. The holes or slots are engineered for size and location to provide both optimal and balanced airflow across the length of the bulb.
remote cooling fan (blower)	The cooling fan when it is mounted separate from the lamphead and ducted in to the lamphead.
RF	Radio Frequency. Any frequency between normally audible sound waves and the infrared light portion of the spectrum lying between 10 KHz and 1,000,000 MHz.
RF detector	Monitors RF levels in the vicinity of the UV system and signals the power supply to shut off the UV if RF levels exceed allowable limits.
screen	A wire mesh assembly attached to a microwave lamphead that allows UV to pass through but prevents RF from leaking from the unit.
short UV	Refer to UVC.
single	An electrode lamphead assembly with a cradle that supports only one bulb and one reflector.
shutter	An assembly designed to block UV light while passing cooling air.
solarization	The effect of the UV light on the quartz bulb. Over time, UV light and heat will cause the quartz to devitrify or revert back to a crystalline and porous state.
spectral output	The various wavelengths of light emitted from a UV bulb.
spectral output efficiency graph	A graph or chart showing the relative concentration of UV at various wavelengths for a particular bulb type. Typically, the concentration is provided as a normalized percentage where the energy is integrated over 10-nanometer bands to reduce the difficulty of quantifying the effects of line emission spectra.

starter bulb	Used in the start up of microwave systems to ignite the mercury vapor in the bulb.
static exposure	Exposure to a constant irradiance for a controlled period of time.
surface cure	When the UV material is cured only on the surface exposed to the UV.
tape test for measuring adhesion	When an X-cut or lattice pattern of 6 or 11 cuts are scratched through the UV cured material to the substrate. Pressure-sensitive tape is then applied over the cuts and removed. Pulling the tape away from the substrate will reveal the degree of adhesion. If any material between the lines is pulled off with the tape, the adhesion is poor. If the material remains, the adhesion is good. The recommended guidelines for testing and evaluation are documented in the ASTM spec D3359-95a under Methods A and B. Method A employs the X-cut and is used for coatings that are 5 mils or greater. Method B calls for lattice cuts and is recommended for coatings with 0–5 mils of thickness.
through cure	When the UV material is cured down to and including the material / substrate interface.
Threshold Limit Value (TLV)	The maximum exposure a person should receive over an 8-hour shift during a 40-hour week without producing an ill effect. Often reported in (mg / m^3) or ppm.
Time-Weighed Average (TWA)	Refer to Threshold Limit Value (TLV).
total energy	Refer to energy density.
transmittance	The ratio of the radiant energy passed through a body to the total radiant energy received by the body.
ultraviolet light	Radiant energy in the wavelength band of 100 to 400 nanometers.
UVA (315–400 nanometers)	The portion of the electromagnetic spectrum ranging between 315 and 400 nm. UVA represents the largest portion of UV energy and is commonly referred to as long UV. UVA is most responsible for skin aging and increased skin pigmentation. UVA is at the lower limit of sensitivity to the human eye.
UVB (280–315 nanometers)	The portion of the electromagnetic spectrum ranging between 280 and 315 nm. UVB is most responsible for reddening and burning of the skin and damage to the eyes.
UVC (200–280 nanometers)	The portion of the electromagnetic spectrum ranging between 200 and 280 nm. UVC is typically referred to as short UV.
UVV (400–445 nanometers)	The portion of the electromagnetic spectrum ranging between 400 and 445 nm. The V stands for visible UV.

vacuum UV (100–200 nanometers)	The portion of the electromagnetic spectrum ranging between 100 and 200 nm. UVV does not transmit in air.
viscocity	The state or quality of having a cohesive and sticky fluid consistency.
vitrification	The act of changing pure opaque quartz into clear non-porous quartz through a fusion process.
watt	One joule per second.
watt density	Refer to irradiance.
waveguide	Directs microwaves toward the bulb in microwave UV systems.
wavelength	The measured cycle length of a wave in the direction of propagation.

Section 10

DeviceNet Software Specifications

Introduction

This section covers the specifications and requirements for the CoolWave 2 DeviceNet Interface Module Revision 0.62. This specification describes the unit configuration, unit initialization, the DeviceNet Network Model and the interface to the Nordson Coolwave2 module. It describes the functionality required of the network interface module. It does not describe implementation details or specify the requirements for the PCB or enclosure.

Definitions

Network Host: The DeviceNet network Host (commonly a scanner card in a Programmable Controller).

Network Slave: A DeviceNet device which implements server functionality in a DeviceNet system.

Programmable Controller: Programmable Logic Controller – the DeviceNet Network Host.

Reference Documents

The CIP Networks Library Volume 1: Common Industrial Protocol, Edition 3.1, ©2007 ODVA

The CIP Networks Library Volume 3: DeviceNet Adaptation of CIP, Edition 1.3, ©2007 ODVA

Governing Body

Open DeviceNet Vendor Association, Inc. (www.odva.org) ODVA is an independent supplier organization that manages the DeviceNet specification and supports the worldwide growth of DeviceNet.

System Operation

MAC ID / Baud Rate Configuration

Three rotary switches are defined for user configuration of the device. The three rotary switches are defined as follows:

Rotary switches S2 (MSD) and S3 (LSD) are used to select the DeviceNet MAC ID address. The valid range of addresses is 0 – 63. All combinations above 63 set the device address to the last address the device was powered up at and allow software configuration tools to modify the MAC ID address.

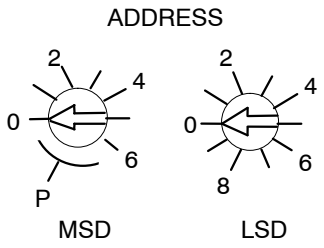


Figure 10-1 MAC ID Switches S2 and S3

Rotary switches S1 (BAUD) is used to select the DeviceNet Baud Rate. The valid range of baud rates is 0–3 (0=125K, 1=250K, 2=500K). All values above 2 set the baud rate to the last baud rate the device was powered up at and allow software configuration tools to modify the baud rate.

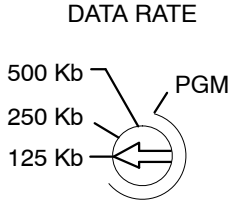


Figure 10-2 Baud Rate Switch S1

LED Operation

There are two LEDs on the rear panel. The first bicolor LED indicates Network Status as listed in the following table:

Table 10-1 Network Status LED Operation

Color	State	Indication
None	Off	No Power
Red	Solid	Unrecoverable Fault
	Flashing	Output error or configuration error
Green	Solid	Normal runtime operation
	Flashing	Device is in idle or not allocated to a master

The second bicolor LED indicates Module Status as listed in the following table:

Table 10-2 Module Status LED Operation

Color	State	Indication
None	Off	No Power
Red	Solid	Fatal Error
	Flashing	• If the Network Status Led is Solid Red, DeviceNet Power is not present • Baud Rate / Mac ID switch value changed, next power up uses a new configuration
Green	Solid	Normal Operation
Red/Green	Flashing	Device is in self test mode

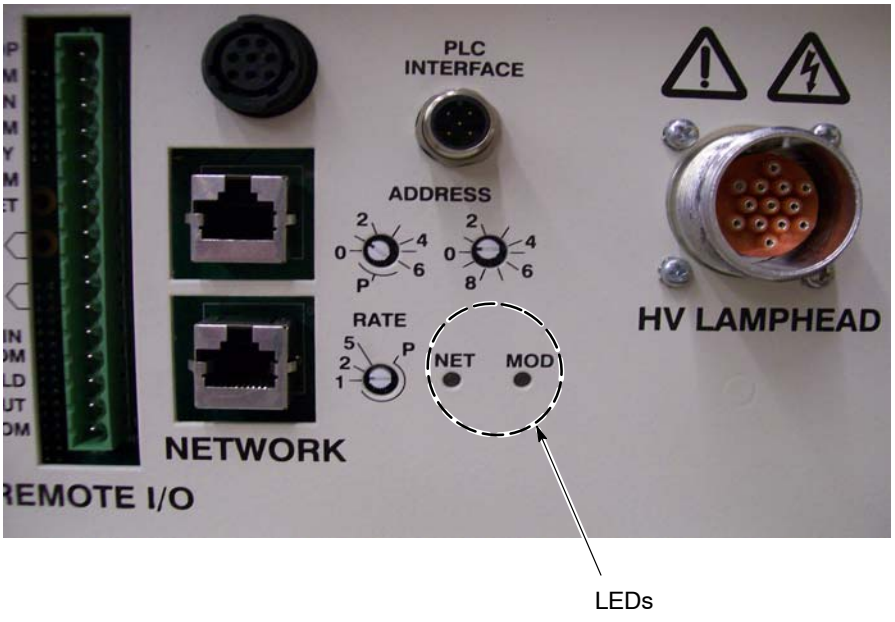


Figure 10-3 DeviceNet Status LEDs

DeviceNet Interface

Overview

DeviceNet is a low cost and open industrial network which links industrial devices (such as limit switches, photoelectric sensors and motor starters) to machine controllers over the Controller Area Network (CAN). DeviceNet eliminates expensive hardwiring and provides improved communication between devices as well as important device level diagnostics.

The following sections describe the network Object Model (the interface from the DeviceNet point-of-view).

Configuration

The unit supports the standard DeviceNet MAC ID and Baud Rate selections. MAC ID and Baud Rates can be selected from user accessible rotary switches or through DeviceNet configuration software.

See page 10-2 for more details. All configuration data is stored in non-volatile memory.

Initialization

The unit provides standard duplicate MAC ID detection processing during power-on initialization.

Group 2 Only Slave Operation

The unit supports allocation of the DeviceNet Group 2 Master/Slave connection set through the Group 2 Unconnected message port.

Certification

The unit must be certified as a compliant DeviceNet device through an ODVA certified testing facility. This device is not required to pass SEMI-SIG optional conformance testing.

Identity Object (01_{HEX} – 1 Instance)

The Identity Object provides descriptive information.

Class Attributes (Instance 0)

Attribute ID	Name	DeviceNet Data Type	Data Value	Access Rule
1	Revision	UINT	1	Get

Instance Attributes (Instance 1)

Attribute ID	Name	DeviceNet Data Type	Data Value	Access Rule
1	Vendor Number	UINT	416_{DEC}	Get
2	Device Type	UINT	64_{HEX}	Get
3	Product Code Number	UINT	100_{DEC}	Get
4	Product Major Revision Product Minor Revision	USINT USINT	1 1	Get
5	Status Word	WORD	0	Get
6	Serial Number	UDINT	Unique 32 Bit Value	Get
7	Product Name	String of USINT	“CoolWave2”	Get

Common Services

Service Code	Implemented for		Service Name
	Class Level	Instance Level	
$0E_{HEX}$	Yes	Yes	Get_Attribute_Single
05_{HEX}	No	Yes	Reset –– no attribute data –– Normal: Class 1, Instance 1, 1 byte data = 0 Out of Box: Class 1, Instance 1, 1 byte data = 1

Message Router Object (02_{HEX} – 1 Instance)

No supported attributes or services.

DeviceNet Object (03_{HEX} – 1 Instance)

Class Attributes (Instance 0)

Attribute ID	Name	DeviceNet Data Type	Data Value	Access Rule
1	Revision	UINT	2	Get

Instance Attributes (Instance 1)

Attribute ID	Name	DeviceNet Data Type	Data Value	Access Rule
1	Mac ID	USINT	63	Get / Set
2	Baud Rate	USINT	0	Get / Set
5	Structure of: Allocation Choice Byte Master Mac ID	 BYTE USINT	 0xFF 0	 Get Get
6	MAC ID Switch Changed (since last power up)	BOOL	0	Get
7	Baud Rate Switch Changed (since last power up)	BOOL	0	Get
8	Actual MAC ID Switch Value (0–99)	USINT	63	Get
9	Actual Baud Rate Switch Value (0–9)	USINT	0	Get

Common Services

Service Code	Implemented for		Service Name
	Class Level	Instance Level	
$0E_{HEX}$	Yes	Yes	Get_Attribute_Single
10_{HEX}	No	Yes	Set_Attribute_Single

Assembly Object (04_{HEX} – 2 Instances)

Class Attributes (Instance 0)

Attribute ID	Name	DeviceNet Data Type	Data Value	Access Rule
1	Revision	UINT	2	Get
2	Max Instance	UINT	112	Get
100	Polled Input Assembly Instance (valid values are 100)	UINT	100	Get / Set
101	Polled Input Size	UINT	14	Get
102	Polled Output Assembly Instance (valid values are 112)	UINT	112	Get / Set
103	Polled Output Size	UINT	4	Get

Instance Attributes (Instances 100 and 112)

Attribute ID	Name	DeviceNet Data Type	Data Value	Access Rule
3	Data	USINT	0	Get / Set

Instance 100 – Input Assembly 1 (Common)					
Byte Index	**Description**	**DeviceNet Data Type**	**Class ID**	**Instance ID**	**Attribute ID**
0	Exception Status: Defined in S–Device Supervisor Object	USINT	0x30	1	12
1	System Ready: 0 – Not Ready; 1 – Ready	USINT	0x64	0	100
2 – 3	Units Present Bitmap: Bit 0 – Master Bit 1 – Slave 1 Bit 15 – Slave 15 0 – Not present; 1 – Present	UINT	0x64	0	102
4 – 5	Fault Bitmap: Bit 0 – Master; Bit 1 – Slave 1 Bit 15 – Slave 15 0 – OK; 1 – Fault	UINT	0x64	0	101
6 – 7	Lamp Number 0: Master 1–15: Slaves	UINT	N/A	N/A	N/A
8	Lamp State: 1 – Off 2 – Filament On Time Delay 3 – Standby 4 – Lamp Start 5 – Lamp On 6 – Fault 7 – Reset 8 – Cool Off 9 – Lamp Cool 10 – Test 11 – Start Power Delay	USINT	0x64	varies	103
9	Lamp Power Level: 0 –100%	USINT	0x64	varies	106
10 – 13	Lamp Fault: 32–bits Defined in S–Device Supervisor Object	UDINT	0x64	varies	104

Instance 101 – Input Assembly 2 (Master/Slave 1–2)					
Byte Index	**Description**	**DeviceNet Data Type**	**Class ID**	**Instance ID**	**Attribute ID**
0	Exception Status Defined in S–Device Supervisor Object	USINT	0x30	1	12
1	Status Bitmap See Below	USINT	0x64	0	100, 101, 102
2	Master Lamp State 1 – Off 2 – Filament On Time Delay 3 – Standby 4 – Lamp Start 5 – Lamp On 6 – Fault 7 – Reset 8 – Cool Off 9 – Lamp Cool 10 – Test 11 – Start Power Delay	USINT	0x64	0	101
3	Master Lamp Power Level: 0 –100%	USINT	0x64	0	102
4	Slave 1 Lamp State: 1 – Off 2 – Filament On Time Delay 3 – Standby 4 – Lamp Start 5 – Lamp On 6 – Fault 7 – Reset 8 – Cool Off 9 – Lamp Cool 10 – Test 11 – Start Power Delay	USINT	0x64	1	103
5	Slave 1 Lamp Power Level: 0 –100%	USINT	0x64	1	104
6	Slave 2 Lamp State: 1 – Off 2 – Filament On Time Delay 3 – Standby 4 – Lamp Start 5 – Lamp On 6 – Fault 7 – Reset 8 – Cool Off 9 – Lamp Cool 10 – Test 11 – Start Power Delay	USINT	0x64	2	103
7	Slave 2 Lamp Power Level: 0 –100%	USINT	0x64	2	104

System Bitmap (default in bold)								
Bit Value	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
1 (ON)	Master Faulted	Slave 1 Faulted	Slave 2 Faulted	n/a	**Master Present**	**Slave 1 Present**	**Slave 2 Present**	**System Ready**
0 (OFF)	**Master OK**	**Slave 1 OK**	**Slave 2 OK**	**n/a**	Not Present	Not Present	Not Present	Not Ready

Instance 112 – Output Assembly 1 (Common)					
Byte Index	**Description**	**DeviceNet Data Type**	**Class ID**	**Instance ID**	**Attribute ID**
0	Master Lamp Command (See Notes): 1 – Off / Stop 2 – On / Start 3 – Standby 5 – Reset	USINT	0x64	0	110
1	Light Intensity Command: 20 – 100%	USINT	0x64	0	111
2 – 3	Lamp Status Select: 0: Master 1–15: Slaves	UINT	N/A	N/A	N/A

NOTE: Receive_Idle condition (0 byte length message) is treated as a DeviceNet fault condition by the CoolWave2 unit.

NOTE: Commands other than those listed are not implemented, and will be ignored by the CoolWave2 unit.

Common Services

Service Code	Implemented for		Service Name
	Class Level	Instance Level	
$0E_{HEX}$	Yes	Yes	Get_Attribute_Single
10_{HEX}	No	Yes	Set_Attribute_Single

Connection Object (05_{HEX} – 2 Instances)

Class Attributes (Instance 0)

Attribute ID	Name	DeviceNet Data Type	Data Value	Access Rule
1	Revision	UINT	1	Get

Instance Attributes (Instances 1 – 2)

Attribute ID	Name	DeviceNet Data Type	Data Value		Access Rule
			Instance 1 (EM)	Instance 2 (Poll)	
1	State	USINT	0 = NonExistent 3 = Established 5 = Deferred Delete	0 = NonExistent 1 = Configuring 3 = Established 4 = Timed Out	Get
2	Instance Type	USINT	0	1	Get
3	Transport Trigger	usint	83_{HEX}	82_{HEX}	Get
4	Produced Connection ID	uint	$10xxxxxx011_{BIN}$ xxxxxx = Node Address	$01111xxxxxx_{BIN}$ xxxxxx = Node Address	Get
5	Consumed Connection ID	uint	$10xxxxxx100_{BIN}$ xxxxxx = Node Address	$10xxxxxx100_{BIN}$ xxxxxx = Node Address	Get
6	Initial Comm. Character	USINT	21_{HEX}	01_{HEX}	Get
7	Produced Connection Size	uint	0 – 30	14 / 8	Get
8	Consumed Connection Size	uint	0 – 30	4	Get
9	Expected Packet Rate	uint	2000 msec	0	Get / Set
12	Watchdog Timeout Action	USINT	3 = Deferred Delete	0 = Timeout	Get
13	Produced Connection Path Length	UINT	0	6	Get
14	Produced Connection Path	USINT Array	NULL	20h 04h 24h 65h 30h 03h	Get
15	Consumed Connection Path Length	UINT	0	6	Get
16	Consumed Connection Path	USINT Array	NULL	20h 04h 24h 70h 30h 03h	Get

Common Services

Service Code	Implemented for		Service Name
	Class Level	Instance Level	
$0E_{HEX}$	Yes	Yes	Get_Attribute_Single
10_{HEX}	No	Yes	Set_Attribute_Single

S–Device Supervisor Object (30_{HEX} – 1 Instance)

Class Attributes (Instance 0)

Attribute ID	Name	DeviceNet Data Type	Data Value	Access Rule
1	Revision	UINT	1	Get

Instance Attributes (Instance 1)

Attribute ID	Name	DeviceNet Data Type	Data Value	NV?	Access Rule
3	Device Type	SHORT STRING8	“Generic”	NV	Get
4	SEMI Standard Revision Level	SHORT STRING8	“E54–0997”	NV	Get
5	Manufacturer’s Name	SHORT STRING20	“Nordson Inc.”	NV	Get
6	Manufacturer’s Model Number	SHORT STRING20	“CoolWave2 “	NV	Get
7	Software Revision Level	SHORT STRING6	“1.01“	NV	Get
8	Hardware Revision Level	SHORT STRING6	“Rev A“	NV	Get
11	Device Status	USINT	0	V	Get
12	Exception Status	BYTE	0	V	Get
13	Exception Detail Alarm	STRUCT	0…0	V	Get
14	Exception Detail Warning	STRUCT	0…0	V	Get
15	Alarm Enable	BOOL	1	NV	Get / Set
16	Warning Enable	BOOL	1	NV	Get / Set

Common Services

Service Code	Implemented for		Service Name
	Class Level	Instance Level	
$0E_{HEX}$	Yes	Yes	Get Attribute Single
10_{HEX}	No	Yes	Set Attribute Single
05_{HEX}	No	Yes	Reset
06_{HEX}	No	Yes	Start
07_{HEX}	No	Yes	Stop
$4B_{HEX}$	No	Yes	Abort
$4C_{HEX}$	No	Yes	Recover
$4E_{HEX}$	No	Yes	Perform_Diagnostics

- The Coolwave2 enters the “Nordson Off State” as a result of S−Device Supervisor commands “Reset”, “Stop” or “Abort”.
- The S−Device Supervisor “Start” command transitions to the S−Device “Executing” state which allows the Nordson commands: “On, Ready, Standby and Stop” via the I/O data.
- The S−Device Supervisor command “Perform_Diagnostics” has no supported behavior.

Exception Detail Alarm / Warning

Both the Exception Detail Alarm and the Exception Detail Warning use the same 9 byte array.

Table 10-3 Exception Detail Structure Definition

Bytes 1–8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Common Exception Detail Size	= 2 (2 bytes to follow)							
Common Exception Detail Byte 0	0	0	0	0	EEPROM Exception	0	0	0
Common Exception Detail Byte 1	0	0	0	0	0	0	0	0
Device Exception Detail Size	= 0 (0 bytes to follow)							
Manufacturer's Exception Detail Size	= 4 (4 bytes to follow)							
Manufacturer's Exception Detail Byte 0	Lamp Out	Magnetron Fault Current	Slave unit fault	Current Imbalance	Magnetron over current	Filament Fuse	Magnetron Fault	Local Net config error
Manufacturer's Exception Detail Byte 1	Power Regulation Fault	unassigned	Slave Unit not present	Magnetron Voltage Fault	DeviceNet Bus OFF	Duplicate MAC ID	PC Board hardware fail	Unassigned
Manufacturer's Exception Detail Byte 2	HV Cable unplugged	Lamphead over temp	MSTOP open	RF Detector Fault	RF Detector missing	Power Unit over temp	External Interlock	Low Lamphead Pressure
Manufacturer's Exception Detail Byte 3	Unassigned	Unassigned	Unassigned	Mag Filament Open	Phase Controller Fault	RF Detector Failed	Phase Control at Limit	Low magnetron current

Lamp Object (64_{HEX} – 16 Instances)

Class Attributes (Instance 0)

Attribute ID	Name	DeviceNet Data Type	Data Value	Access Rule
1	Revision	UINT	1	Get
100	System Ready: 0 – Not Ready 1 – Ready 255 – DeviceNet Disabled (not reported over DeviceNetJ)	USINT	0	Get
101	Faulted Node Bitmap: Bit 0 – Master Bit 1 – Slave 1.....Bit 15 – Slave 15	UINT	0	Get
102	Units Present Bitmap: Bit 0 – Master Bit 1 – Slave 1.....Bit 15 – Slave 15	UINT	1	Get
103	Master Lamp State 1 – Off 2 – Filament On Time Delay 3 – Standby 4 – Lamp Start 5 – Lamp On 6 – Fault 7 – Reset 8 – Cool Off 9 – Lamp Cool 10 – Test 11 – Start Power Delay	USINT	0	Get
104	Master Lamp Fault See S–Device Supervisor for bit definitions	UDINT	0	Get
105	Master Light Intensity Level Set (0–100%)	USINT	0	Get
106	Master Magnetron Power Level Actual (0–100%)	USINT	0	Get
110	Master Lamp Command: 1 – Off 2 – On 3 – Standby 5 – Reset	USINT	0	Get / Set
111	Light Intensity Command 20–100% (0–255% accepted)	USINT	0	Get / Set

Instance Attributes (Instances 1–15)

Attribute ID	Name	DeviceNet Data Type	Data Value	Access Rule
103	Slave Lamp State See “Master Lamp State” definition above	USINT	0	Get
104	Slave Lamp Fault See S–Device Supervisor for bit definitions	UDINT	0	Get
105	Slave Light Intensity Level Set (0–100%)	USINT	0	Get
106	Slave Magnetron Power Level Actual (0–100%)	USINT	0	Get

Common Services

Service Code	Implemented for		Service Name
	Class Level	Instance Level	
$0E_{HEX}$	Yes	Yes	Get Attribute Single
10_{HEX}	Yes	No	Set Attribute Single

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.
Contact: Operations Manager
Industrial Coating Systems
Nordson Deutschland GmbH
Heinrich-Hertz-StraBe 42-44
D-40699 Erkrath

Nordson

Nordson Corporation • Westlake, Ohio

DOC15007

ODVA
Networks Built on a Common Industrial Protocol

Declaration of Conformity to the DeviceNet™ Specification

ODVA hereby issues this Declaration of Conformity to the DeviceNet™ Specification for the product(s) described below. The Vendor listed below (the "Vendor") has holds a valid the Terms of Usage Agreement for the DeviceNet Technology from ODVA, which is incorporated herein by reference, thereby agreeing that it is the Vendor's ultimate responsibility to assure that its DeviceNet Compliant Products conform to the DeviceNet Specifications and that the DeviceNet Specifications are provided by ODVA to the vendor on an AS IS basis without warranty. NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE BEING PROVIDED BY ODVA.

In recognition of the below DeviceNet Compliant Product(s) having been DeviceNet Conformance Tested at ODVA-authorized Test Service Provider and having received a passing result from ODVA at the Composite Test Revision Level specified below, this Declaration of Conformity authorizes the Vendor to use the DeviceNet Certification Marks in conjunction with the specific DeviceNet Compliant Product(s) described below, for so long as the Vendor's Terms of Usage Agreement for the DeviceNet Technology remains valid.

DeviceNet CONFORMANCE TESTED

Certification Logo Mark

DeviceNet CONFORMANCE TESTED ™

Certification Word Mark

This Declaration of Conformity is issued on **18 August 2008** on behalf of ODVA by:

Katherine Voss
Executive Director

Vendor Information	
Vendor Name	**Nordson Corporation**
Vendor Address	**300 Nordson Drive** **Amherst, Ohio 44001** **USA**

Test Information	
Test Date	**13-14 March 2008**
Composite Test Revision	**20**
ODVA File Number	**10617**

Product Information

Identity Object Instance 1

Device(s) Under Test	Value
Vendor ID (Identity Object Attribute 1)	**416**
Network Category	**Node**
Device Type (Identity Object Attribute 2)	**0**
Device Profile Name	**Generic Device**
Product Revision (Identity Object Attribute 4)	**3.005**

Products Covered Under This Declaration of Conformity

No.	Product Code (Identity Object Attribute 3)	Product Name (Identity Object Attribute 7)	SOC File Name
1	100	CoolWave2	COOLWAVE2.stc.