Mountaingate ICD Series Induction Dryers

Customer Product Manual Part 1018438B Issued 7/03

For parts and technical support, call the Industrial Coating Systems Customer Support Center at (800) 433-9319 or contact your local Nordson representative.

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





NORDSON CORPORATION • AMHERST, OHIO • USA

Contact Us

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

Address all correspondence to:

Nordson Corporation Attn: Customer Service 555 Jackson Street Amherst, OH 44001

Notice

This is a Nordson Corporation publication which is protected by copyright. Original copyright date 2002. No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of Nordson Corporation. The information contained in this publication is subject to change without notice.

Trademarks

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

Pyrex is a registered trademark of Corning Incorporated.

i

Table of Contents

Safety	1
Qualified Personnel	1
Intended Use	1
Regulations and Approvals	2
Personal Safety	2
Fire Safety	3
Action in the Event of a Malfunction	3
Disposal	3
Description	4
Factures	-
	4
Theory of Operation	4
	0
Installation	8
Inspection	8
System Layout and Mounting	8
	8
Coll Iray	8
Fower Generator	o q
System Wiring	9
Wiring Guidelines	9
Conduit Guidelines	9
Conduit List and Interconnect Diagrams	10
Power Input	10
Interlocks	10
Temperature Sensor	11
Sotting Operating Decemptors	40
	12
Startup	12
Changing Operating Parameters	12
End (Temperature) Setpoint	12
	13
Dwell Time	10
Proportional Band	10
	14
Derivative	14
Temperature Offset/Alarms	14
Temperature Offset	14
Temperature Alarms	15
Motion Sensor Time Delay	15

Daily Operation	16
ControlsStartup	16 16
Warning Messages Emergency Stop	17 17
Shutdown Power Generator LED Test Panel Display	17 17
Power Generator LED Indicators	18 18
Maintenance	19
MonthlyQuarterly	19 19
Troubleshooting	20
Spare Parts	22
Service and Parts Ordering Information	22
Field Service Call Procedure Parts Ordering Information	22 22
Warranty Information	23
Declaration of Conformity	

Mountaingate[®] ICD Series Induction Dryers

Safety

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 persons operating or servicing equipment.

Qualified Personnel

Equipment owners are responsible for making sure that Nordson equipment is installed, operated, and serviced by qualified personnel.



WARNING: The control panel, power generator, and coil tray contain high voltages and high power levels that can be fatal. Allow only qualified personnel to access these enclosures.

Qualified personnel are those employees or contractors that

- have experience operating and maintaining high-power and high-voltage electrical equipment.
- can safely perform their assigned tasks.
- are familiar with all relevant safety rules and regulations and are physically capable of performing their assigned tasks.

Intended Use

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 and atmospheres
- making unauthorized modifications
- removing or bypassing safety guards or interlocks
- using incompatible or damaged parts
- using unapproved auxiliary equipment
- operating equipment in excess of maximum ratings

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.

This equipment meets the following European Community Standards:

- EN60204 Electrical Safety of Machinery
- EN292 Safety Machinery
- EN55011 Emissions of ITE Equipment
- EN50082-2 Immunity of Heavy Industrial Equipment

These standards comprise all relevant standards for CE Approvals, and the equipment is so approved and certified.

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, doors, or covers are intact and automatic interlocks are operating properly. Do not bypass or disarm any safety devices.
- Make sure that the ventilation system is operating properly to prevent dangerous concentrations of volatile particles or vapors.
- Keep clear of moving equipment. Before adjusting or servicing 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.
- Disconnect, lock out, and tag switches before servicing electrical equipment.
- Keep parts of your body and metal implements away from the induction heating zone while the system is energized. Metal objects will heat up very quickly. Remove all jewelry, watches, and rings.
- Obtain and read Material Safety Data Sheets (MSDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials, and use recommended personal protection devices.
- 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.

Fire Safety	
٦	To avoid a fire or explosion, follow these instructions:
•	All equipment must be grounded and bonded to the building ground.
•	Do not heat materials to temperatures above those recommended. Make sure heat monitoring and limiting devices are working properly.
	 Provide adequate ventilation to prevent dangerous concentrations of volatile particles or vapors. Refer to local codes or your material MSDS for guidance.
	Do not disconnect live electrical circuits while working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.
•	 Know where emergency stop buttons, shutoff valves, and fire extinguishers are located.
•	 Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.
·	 Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.
Action in the Event of	a Malfunction
l	f a system or any equipment in a system malfunctions, shut off the system mmediately and perform the following steps:
•	Disconnect and lock out system electrical power.

• Identify the reason for the malfunction and correct it before restarting the system.

Disposal

Dispose of equipment and materials used in operation and servicing in accordance with applicable laws, regulations, or codes.

Description

The Mountaingate ICD Series Induction Dryer is designed to provide simple, efficient and uniform drying of water-based end sealing compounds. The unit is available in single- or dual-channel models and can be configured to mate to almost any line height. ICD models are available to dry ends at speeds up to 2200 ends per minute and diameters from 112 to 610 mm.

Features

Feature	Description
Instant On/Off	When the line starts, heating within the can ends instantly starts. Since heat is created directly within the ends, there is no thermal inertia. When the line stops, heating instantly stops. This produces a very uniform product.
No Jams	The short length of the system and straight-through design minimizes jams.
Energy Savings	When running, solid state induction heating is extremely efficient. Greater than 80% of the power consumed is directly realized as heat in the can ends. When the line stops, almost no power is consumed.
Reliability	The solid-state design of the dryers minimizes downtime. There are few moving parts to wear out.
Small Footprint	Because induction drying is so fast, the dryer is much smaller than conventional ovens.
Temperature Control	The dryer continuously monitors the temperature of the ends as they exit and adjusts power to maintain the desired setpoint, providing uniform control of product quality.

Components

See Figure 1.

ltem	Description
1	Motion Sensor—Contains an optical encoder driven by a wheel in contact with the moving stick of can ends at the entrance of the system. This sends signals to the controller when the line starts or stops. Power is only applied when the line is moving.
2	Coil Tray—Contains the induction coil. During operation, the coil generates an alternating magnetic field which induces heat in the ends. The coil tray attaches to the customer infeed and outfeed system.
3	Temperature Sensor—As the can ends exit the coil tray they pass by a low-mass type K thermocouple. The temperature of the can ends is sensed and sent to the microcontroller. Power applied to the induction coil is regulated to produce the desired can end exit temperature.

ltem	Description
4	Power Generator—Contains the inverter that drives the induction coil. The amount of output power generated is varied by a time-proportional duty cycle algorithm. The microcontroller calculates, based on the end temperature and its programmed PID parameters, a duty cycle which will result in the correct end temperature. The coil tray and the power generator can either be bolted together as one unit, or can be mounted separately per customer requirement.
5	Controller—Contains the control components for the entire system, including the microcontroller, control interface panel, fuses, circuit breakers, relays, contactors, and safety related components.
	The microcontroller interfaces with the operator by way of the control interface panel. The panel is used to set desired temperature, PID parameters, temperature alarm limits, initial start power percentage (ramp %) and ramp % time (dwell time). The panel is simple and user-friendly. Control keys and an LCD display screen are used to program all operating characteristics.



1200004A

Figure 1 Typical ICD Series Dryer (Dual Channel Unit Shown)

Theory of Operation

See Figures 2 and 3.

The controller receives 3 phase power from the plant. The motion sensor signals the controller when the line starts or stops to ensure that power is only on when can ends are actively being fed into the coil tray. The coil tray receives power from the power generator.



1200001A

Figure 2 Theory of Operation

The can ends pass through a Pyrex tube surrounded by the coil windings. As the can ends pass through the tube, the power generator applies alternating current to the coil windings. The coil windings generate an alternating magnetic field that passes through the can ends, creating large eddy currents. The resistance to the eddy currents generates heat, which dries the sealing compound.



Figure 3 Coil Operation

A fan in the power generator directs cooling air over the electrical components. The air then flows over the coil to cool it. A top- or side-mounted heater further heats the air and directs it through the coil tube to carry off moisture vaporizing out of the end sealing compound. The air flows out of the exit end of the coil tray. If an optional magnetic separator is installed, heated air is also ducted directly into the separator.

The temperature sensor senses the temperature of the can ends as they exit the coil tray and sends this data to the controller. To maintain the desired exit temperature, the controller uses a PID loop that automatically adjusts the amount of power supplied to the coil from the power generator. This process eliminates temperature variations due to line voltage fluctuations, applied compound weight, can end start temperature, and line starts and stops.

Safety interlocks include door safety interlock switches, which operate independently of the microprocessor to shut the system down if a system door is opened during operation. In addition, input and output interlocks are provided. Interlock status is indicated on the interface panel.

1200002A

Installation



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

Inspection

Carefully inspect the system for obvious shipping damage and shortages. If any damage or shortages are noted, notify the shipper and the Nordson Container Systems group immediately.

System Layout and Mounting

Layout the system with each component in its final position on the production floor.

Controller

NOTE: Do not mount the controller directly on the coil tray or power generator.

Mount the controller within 3-3.7 m (10-12 ft) of the power generator in an area free of vibration, dust, and high ambient temperatures, on either a wall or panel.

Optional extra length cables are available to mount the controller up to 15 m (50 ft) from the power generator and coil tray.

Coil Tray



CAUTION: Do not move the coil tray after the Pyrex tube(s) is installed.

Bolt the coil tray base to the floor through the bolt holes. Coil tray legs are factory-made to the height listed in the purchase order. Nominal adjustment is possible.

Power Generator

The power generator mounting location is dependent upon the system type. It can be mounted above, below, or to the side of the coil tray, as configured when shipped. Make sure that the doors of the power generator can be opened freely.

Exhaust

Exhaust ducting is not required, but an exhaust hood may be installed over the exit end of the dryer. Small amounts of water vapor, hot air and in some cases solvents are released at this point.

System Wiring

NOTE: System wiring must conform to the National Electric Code (NEC), if installed in the USA, and all applicable local codes.

Wiring Guidelines

Review the following guidelines before wiring the dryer:

- 1. Always refer to the wiring schematics provided with the system when making electrical connections.
- 2. The thermocouple cable is a chromel/alumel wire cable that mates with the type K thermocouple. Do not use substitute cables. A 7.5-m (25-ft) cable is provided. Cables up to 15 m (50 ft) in length are available as an option.
- 3. The motion sensor cable supplied is long enough to accommodate any mounting configuration possible. If a longer cable is needed, cables up to 50-ft (15-meters) long are available from your Nordson representative. The cable shield is grounded at the controller end only for maximum noise immunity.
- 4. It is desirable, though not necessary, to route the motion sensor cable and the thermocouple cable through their own conduits to provide additional noise shielding. These cables are low-level signal cables. Do not run high-power wires in the same conduits as these cables.
- 5. Interconnect wiring between the controller and the power generator, and the power generator and the coil tray, are customer-supplied per the system schematics. Wiring length is limited. Consult Mountaingate engineering personnel.

NOTE: Wire gauges are calculated on a maximum of 15 meters between enclosures. Longer runs such as overhead, underground, may be permissible but should use larger wire gauges in accordance with applicable codes. Consult Mountaingate engineering personnel.

Conduit Guidelines

Five $\frac{3}{4}$ -in. (1.9-cm) conduits are specified:

- three between the controller and power generator
- two between the power generator and the coil tray.

Larger conduit may be used if desired. Spare wires may be routed through the conduits if desired. You may also install small diameter conduit to shield and protect the motion sensor and temperature sensor cables.

Conduit Guidelines (contd)

Ground wires are specified for each conduit. The ground wires should be connected to specified ground points at each end. All wires should be THHN equivalent or other agency approved nomenclature.

Install conduits and wiring as described in the conduit list and interconnect diagrams.

NOTE: Terminations on both ends of interconnect wires are made to interconnect terminal blocks with like-numbered wires attached. Interconnect terminal blocks are provided near conduit entry holes.

Conduit List and Interconnect Diagrams

Refer to the Addendum to this manual for the conduit list and interconnect diagrams.

Power Input

Line power is supplied to the system through a $3/_4$ -in. (1.9-cm) conduit at the top right of the controller.

- 1. Route three 10 AWG (5.3 mm²) wires to the disconnect switch.
- 2. Route one 10 AWG (5.3 mm²) ground wire to the panel grounding stud.

Interlocks

Input and output interlocks are provided for controlling and monitoring system operation from a remote area. Review the following guidelines:

Input Interlock

The input interlock, if activated, requires an external signal to indicate to the system that the shell press and liner are running. The motion sensor and the external signal must indicate line motion before the controller will apply power.



CAUTION: It is recommended that the input interlock be connected and operational for safety requirements. Without the interlock connection, random line motion can move the motion sensor, causing the controller to continue applying power when the line is stopped. The stationary ends inside the induction coil will then overheat and possibly be damaged.

- Connect a dry contact on a relay or a 120 Vac solid state switching module to wires #6 and #58 to indicate line operation. The input interlock is enabled by applying 120 Vac across the coil of the high voltage contactor K13.
- 2. Remove the jumper installed between wires #6 and #58. This jumper is installed before shipping to allow immediate operation.

Output Interlock

An output Interlock is provided for monitoring system status. The high voltage contactor (K3) is activated when the start switch is pressed. A dry (NO) contact on K3 is accessible through wires #85 and #59.

The contact will open if any of the internal safety interlocks are triggered, an over- or under-temperature condition occurs, or the emergency stop or stop buttons are pressed.

In addition, a dry contact that monitors power into the load can be supplied. Contact your Nordson representative for details.

Motion Sensor

1. Mount the motion sensor bracket assembly to the matching holes at the input side of the coil tray.

NOTE: You may install a conduit to shield and protect the motion sensor. Do not run any high-power wires through this conduit.

- 2. Route the cable away from any moving or hot items.
- 3. Make sure that the motion sensing wheel makes good contact with the moving stick of can ends.
- 4. Make sure that the wheel turns as the ends move.

Temperature Sensor

NOTE: Only one temperature sensor is provided for single and dual channel units. An optional second sensor can be provided. The controller will use one sensor, depending on which line is moving, to control power into the coil and end heating. Contact your Nordson representative for options.

- 1. Mount the temperature sensor bracket assembly to the output side of the coil tray.
- 2. Route the cable away from any moving or hot items.

NOTE: You may install a conduit to shield and protect the temperature sensor cable. Do not run high power wires through this conduit.

3. Make sure the temperature sensor head makes good contact with the moving stick of can ends.

Setting Operating Parameters



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

Startup

- 1. Turn on the main power to the ICD at the controller.
- 2. Press and hold the white START push button for three seconds. The controller will display:

MOUNTAING	ATE
ICD	
INDUCTION DE	RYER

The controller runs a self test of the Induction Dryer. If the screen displays SELF TEST FAILED, refer to problem 3 in the troubleshooting guide. If the test was successful, the screen will display SELF TEST PASSED.

The next screen that appears is the Main Operating - Line Stopped screen. The second line displays the actual end temperature (XX). The third line displays the temperature setpoint (YY).

From the Main Operating - Line Stopped screen, press the STOP button on the controller to change any parameters.

Changing Operating Parameters

Use this procedure to change operating parameters on any of the setup screens.

- 1. Press the STOP button to move the underscore to the digit you are adjusting.
- 2. Use the up and down arrow buttons to increase or decrease the digit. Press the STOP button to accept the digit.
- 3. Adjust each digit as needed in the same manner. When you are done, press the ENTER button to accept the screen.

All operating parameters are stored in battery backed-up memory.

End (Temperature) Setpoint

 From the Run or Line Stopped screen, press STOP. The Main Change screen will appear with the asterisk next to End Setpoints. Press ENTER to access the End Setpoint, Ramp Percent, and Dwell Time Change screens. 2. The End Setpoint will display on Line #1. A good starting point is 65-70 °C.

NOTE: Contact the sealing compound manufacturer for recommended drying temperatures and temperature limits.

3. Press ENTER to accept the End Setpoint parameter. The Ramp % screen appears.

Ramp%

Ramp% is the percentage of total power needed to reach the setpoint on a steady run. This value is used for a fixed period of time (Dwell Time) upon line re-starts.

Perform the following to find the optimal setting:

- 1. Set the Ramp % to 50%.
- 2. Press ENTER to accept the Ramp % parameter and display the Dwell Time screen.
- 3. Set the Dwell Time to 900 seconds.
- 4. Start the dryer.
- 5. Check the temperature after stabilization (3 minutes).
- 6. If the temperature is too high, lower Ramp%; if too low, raise it.

Dwell Time

Dwell time is the number of seconds it takes for an end to travel from the entrance to the exit of the Induction Dryer plus 10 seconds.

- 1. Measure the time that an end takes to go from the entrance to the exit of the coil tray (not the separator exit, if one is used), and add 10 seconds.
- 2. Set the Dwell Time parameter, using the time from step 1.
- 3. Press ENTER to accept the Dwell Time parameter. The Run or Line Stopped screen appears.

Proportional Band Settings

For the microcontroller to control temperature properly, three parameters must be set:

- Proportional band (P)
- Integral (I)
- Derivative (D)

These parameters make up the PID loop that controls the duty cycle used to regulate the amount of power applied to the induction coil and ends. PID settings which are factory set are optimized to provide the best possible response (fastest rise time with minimum overshoot).

Proportional Band Settings (contd)

- 1. From the Main Run or Line Stopped Screen, press STOP. The Main Change screen appears.
- 2. Press the DOWN button to move the asterisk to Line #2, PID Parameters. Press the ENTER button to access the PID screens.

NOTE: The PID parameters given below are basic starting points. They may be adjusted on startup by a Mountaingate service representative.

Proportional Band

The proportional band (P) is a temperature band in which partial power is applied. Below the band, 100% of available power is used.

The proportional band should be set to 100 as the initial start point.

NOTE: Adjust the proportional band with caution. 100 is the optimal parameter for most applications.

Integral Time

The Integral Time screen appears after accepting the Proportional Band parameter. Integral Time (I) controls the PID integrator.

Integral Time should be set to 1900 as the initial starting point. Change this parameter with caution (in increments of 10) in the same manner as the proportional band (P).

Note: If integral time is set too low, a large temperature overshoot will occur. The temperature may also oscillate above and below the setpoint and seem generally unstable. If integral time is too high, the system will be stable but sluggish and poorly regulated; it will take a long time to reach the temperature setpoint and may wander above and below the setpoint.

Derivative

The Derivative screen appears after accepting the Integral Time parameter. The derivative parameter (D) is used to compensate for sudden changes in input temperature.

Since there should not be any sudden changes in end temperature, set the derivative parameter to 50. This setting should provide good performance at any line speed.

Temperature Offset/Alarms

Temperature Offset

Temperature Offset allows calibration of the temperature reading to agree with an external calibrated temperature source. Typically, this is not used and should be set to 0.

Temperature Alarms

The Temperature Alarms activate a dryer and/or line shutdown if the end temperature deviates from the setpoint by more than the alarm amount. Normally, both under- and over-temperature alarms are set to 20 °C. For lines with frequent stops and starts or occasional flipped ends, larger under-and over-temperature alarms are preferable.

NOTE: The alarm is a fail-safe and should not be used to control the temperature of the system.

If the dryer is not heating, a low temperature alarm is activated and the system is shut down. If the alarm band is set too tight, false shutdowns such as those caused by frequent starts and stops will occur.

A line shutdown is activated if the alarm output is connected to the end line. The temperature alarm is NOT ACTIVE during the startup ramp, nor when adjusting parameters.

To set the Temperature Alarms:

- 1. From the Main Run screen, press STOP to display the Main Change screen.
- 2. Use the arrow keys to move to Temp Offset/Alarm. Press ENTER to accept screen. The Offset screen appears.
- Press ENTER to pass through the Offset screen. The Over Temp Alarm screen appears. Change the over-temperature parameter as desired. Press ENTER to accept. The Under Temp Alarm screen appears.
- 4. Change the under-temperature parameter as desired. Press ENTER to accept. The Main Run screen appears.

When the Temp Alarm activates, the red LED on the microcontroller and the red ALARM light on the controller will turn on. The Dryer will stop heating ends. The display will show an over- or under-temperature message. Press the START button on the controller to reset the alarm.

Motion Sensor Time Delay

The Motion Sensor Time Delay (Relay K14) signals the microprocessor to power the induction coil after a time delay. This delay ensures that momentary pauses or surges in line motion are not interpreted as actual line stops or starts. The time delay must be adjusted for each end line.

To set the time delay:

- 1. Turn on the Main Disconnect with the controller door open. Press the Start button on the controller. After the microprocessor self test, start the end line.
- 2. Relay K14 has a green LED labeled V and a red LED labeled R. The green V LED should be on continuously.
- 3. If the red R LED is flickering, or off, turn the dial on K14 clockwise until the red R LED remains illuminated.
- 4. Turn the dial counter-clockwise until the red R LED starts to flicker, then turn the Time dial clockwise until the red R LED remains illuminated.

Daily Operation



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

Controls





5. RF board

Startup

Press and hold the white START button for three seconds to turn on main power.

The system will heat can ends whenever the motion sensor detects moving ends. When the line stops, the ICD will automatically stop heating ends. It will automatically resume heating when the line restarts.

Warning Messages

The system shuts down if a warning message appears on the microcontroller screen. If the output interlock is connected, the line will also be shut down.

Message	Description
Blower Failure	Indicates a lack of air flow in the power generator or coil tray. Check the operation of the blowers. Check for obstructed airflow through the air filters. When the problem is corrected, allow the system to cool down and restart.
Over Temp Alarm	Appears when a temperature above the preset Over Temp Alarm is read. This alarm also can be caused by a flipped end or many quick starts and stops in succession, depending on the status of the Motion Sensor Time Delay. If either is a continual problem, enlarge the under- and over-temperature alarm band.
Under Temp Alarm	Appears when a temperature below the preset Under Temp Alarm is read. This will occur if the system shuts down due to a component malfunction. It may also occur from many quick starts and stops in succession, depending on the status of the Motion Sensor Time Delay. If this is a continual problem, enlarge the under- and over-temperature alarm band.

Emergency Stop

While it is possible to stop the system by either pressing the EMERGENCY STOP button or by switching the MAIN POWER disconnect to the OFF position, the preferred method is to use the STOP button. This results in a controlled power down which checks all alarms and safeties and guarantees a safe condition upon turnoff.

Shutdown

Press the STOP button on the controller for at least 2 seconds. This initiates a safe shutdown sequence. The Smart Shutdown Sequence screen appears when completed.

Power Generator LED Test Panel Display

Performance of the power generator can be monitored from the LED Test Display Panel on one of the power generator doors. The Panel consists of 4 amber LED indicators, 5 green LED indicators and 4 Test Points.

Indicator	LED Color	Description
OVER CURRENT	Amber—Normally off	Lights if excessive current is being drawn by the tank circuit. This can occur if there is a short in the power generator or in the tank circuit.
OVER VOLTAGE	Amber—Normally off	Lights if the tank voltage (across the induction coil) is too high. This is typically a spike. May also be caused by incorrect input voltage. Can also light if the RF control board is incorrectly adjusted to the product load.
UNDER VOLTAGE	Amber—Normally off	Lights if the tank voltage (across the induction coil) is too low. The system will shut down if the tank voltage drops more than 50%. Typically caused by inverter or drive board fault.
OUT OF PHASE LOCK	Amber—Normally off	Lights if the phase-lock loop fails to lock phase with the resonant tank frequency. This occurs if the RF control board is incorrectly adjusted to the product load.
PHASE A	Green—Normally on	Indicates that the first of two output signals from the RF control board to the inverter board is OK. Lack of signal could indicate a problem with the current transformer or feedback transformer.
PHASE B	Green—Normally on	Indicates that the second of two output signals from the RF control board to the inverter board is OK. Lack of signal could indicate a problem with the current transformer or feedback transformer.
ENABLE	Green—Pulses on/off	Lights when the line movement is detected and power is applied to the induction coil.
+15 V	Green—Normally on	Indicates that +15 volts DC is available for the power generator.
-15V	Green—Normally on	Indicates that -15 volts is available for the power generator.

Power Generator LED Indicators

Testpoints

Use an oscilloscope to monitor the performance of the power generator.

Testpoint	Description
INVERTER CURRENT	Use to monitor current to the induction coil. Should see a bipolar square wave.
TANK VOLTAGE	Use to check tank voltage. Should see a sine wave.
FREQUENCY	Use to check the drive signal frequency to the inverter. Should see positive square wave 90° out of phase to inverter current.
COMMON	Common lead connection for oscilloscope (GND).

Maintenance

The following parts of the dryer should be checked on the indicated schedule.



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

Monthly

ltem	Procedure
Temperature Sensors	Type K Thermocouple—Check for wear and good contact with ends. Replace as needed.
Motion Sensor	Make sure that the motion sensor wheel is riding directly in the center of the can end line and rotates smoothly. If the wheel slips off the can ends, it will report a loss of line motion and stop the system. Check the wheel for wear.
Blower Screen	Inspect the blower input for dust or obstruction. If the air flow is reduced, the system electronics can overheat. If your system is equipped with a separator, end drying may also be affected by reduced air flow.
Coil Tray	Can ends pass through the coil inside a Pyrex tube. This tube should be periodically inspected for cleanliness and integrity. The tube can be cleaned by common solvents, but do not to get any solvent on the nylon hubs at the entry or exit of the tube. Some solvents may also have an adverse effect on the exterior finish of the system.
	If the Pyrex tube has any cracks, replace it with a tube supplied by Nordson only. Tubes of different sizes and wall thicknesses are used depending on the can end size and the application.

Quarterly



WARNING: Disconnect and lockout all power to the system before perfoming these procedures. Failure to observe may result in fatal injury to personnel.

ltem	Procedure
Electrical Connections	Check all wiring connections for vibration loosening in both the power generator and controller.
Power Generator	Check for excessive dust and dirt. Vacuum if needed.

Troubleshooting

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



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



WARNING: The controller and power generator contain high voltages which can be fatal. Use extreme caution when defeating safety interlocks to check components at high power.

NOTE: Use the schematics provided with your system when performing trouble shooting procedures.

Problem		Possible Cause	Corrective Action
1.	On start up temperature readings on controller are in error or zero degrees	Controller not reset at start up	Press and hold Start button for a minimum of three seconds. This resets the controller.
2.	Ends not heating Microprocessor LED is pulsing and screen displays RUN	FU10,11,12 open	 If off, check all: Connections in high power circuit. Rectifier bridge (BR1). IGBTs: Base to Emitter resistance should be > 50K ohm. Fix & replace as needed. Replace fuses.
		Loose or broken wires and terminals on interconnect wiring between power generator and controller	Repair & replace components as needed.

Problem		Possible Cause	Corrective Action
3.	Ends not heating Microprocessor LED is NOT pulsing and RUN screen does not display	Motion sensor is not turning and/or making good contact with moving stick of ends	Adjust and reposition as needed. Replace if defective.
		Motion sensor time delay relay K14 out of adjustment, motion sensor cable damaged, or relay defective	Adjust relay according to procedure in Setting Operating Parameters, Motion Sensor Time Delay adjustment.
			and controller. Repair or replace defective cable.
			Replace relay K14 if necessary.
		Fuses in optical isolator blocks K11 and K12 defective. When both LEDs on K14 are lit, LEDs on K11 and K12 should light	Check fuses on K11 and K12 and replace if defective.
4.	Unit doesn't come on when START button is pressed	E-stop is engaged	Turn E-stop $^{1}/_{4}$ turn to left to release.
	Smart shutdown or safety interlock message appears	Door safety interlocks are open	Ensure all doors are closed.
5.	Can ends heat, but not to setpoint	Motion sensor time delay is set too short.	Adjust relay according to procedure in <i>Setting Operating Parameters, Motion Sensor Time Delay</i> adjustment.
6.	Temperature reads near setpoint, but ends are over- or under-heated	Thermocouple does not contact ends	Check thermocouple. Replace if defective.
		A4 needs to calibrated	Calibrate A4.
7.	Blower Failure warning	Air flow is blocked	Clean blower intakes.
		Faulty blower	Reset K2. Replace if defective.
8.	Under temperature alarm Temperature reads 0 °C (32 °F)	Faulty thermocouple	Replace thermocouple.
9.	Under temperature alarm	Line runs intermittently and alarm band is set to 10-20 °C	Widen alarm band to 30 °C.

Spare Parts

Refer to the Addendum to this manual for spare parts.

Service and Parts Ordering Information

Field Service Call Procedure

If you need a Nordson field technician to come to your plant, call Nordson between the hours of 8 AM-5 PM, Monday-Friday at the following:

800-321-2870 or 440-988-941 1 Ask for Mountaingate Service

Supply the following information:

Customer purchase order number Serial number and model number of unit Name of person requesting service Address of plant Phone and fax number Nature of the service call

Parts Ordering Information

All parts can be ordered through Nordson Corporation. Current parts pricing will be supplied at the time of order.

Nordson Customer Service 7:30 AM-6 PM EST Phone: 888-226-1697 Fax: 888-229-4580 Email: csc@nordson.com

Attn Container Customer Service Mail Station 46 300 Nordson Drive Amherst, OH 44001

When ordering, have the following information available:

- Customer purchase order number Customer phone and fax numbers Customer address Special delivery instructions
- Required delivery date Nordson part number Part description Part quantity

Warranty Information

Nordson One Year Standard Warranty

(a) The Seller warrants that the Seller-manufactured goods, when installed, operated and maintained in accordance with Seller's installation, operation, and maintenance instructions, will be free of defects in workmanship and material for a period of (a) one (1) year from initial use; (b) eighteen (18) months from date of receipt by customer, or (c) four thousand (4000) hours of use, whichever first occurs. This warranty is valid when the equipment is installed by authorized Mountaingate field service personnel.

Consumable and normal wear items are not covered under this warranty. Non-Warranty items include: lubrication grease and oils, hoses, tubing and fittings, belts, O-rings, gaskets, bearings, seals (rigid or inflatable) and packings, fuses and circuit breakers. In addition, powder contact parts, including but not limited to: gun nozzles, deflectors, pump throats, venturis, pick-up tubes, hopper/receiver/collector/vent utility fluidizing plates and level sensors, sieve screens, ultrasonic transducer probes and all filters and/or filter elements.

All replacement parts shall be Nordson approved. If non-approved parts are used in the system, this shall void the Warranty.

(b) In the event of non-compliance with the Warranty, Seller shall at its option, modify, adjust, repair or replace the goods. Return shipping charges will be absorbed by Seller at Seller's option.

(c) The Nordson warranty extends to all Nordson products and components integral to Nordson products manufactured by a third party. Components not manufactured by Nordson, but supplied through Nordson as part of a system, shall carry the warranty of the original manufacturer.

(d) Seller assumes no responsibility for the quality or performance of coatings, adhesives or other materials used with Seller's goods.

(e) The above warranty does not extend to products damaged after date of shipment from Seller's plant where the damage is not directly due to a defect in material or workmanship, nor does it apply to products altered or repaired in an unauthorized manner.

(f) The sole liability of the Seller and the exclusive remedy of the Buyer arising out of the performance of services or supply of the goods or their use, whether arising under contract, tort (including negligence), strict liability or otherwise shall be the modification, adjustment, repair or replacement of the goods, reperformance of the services or refund of the purchase price.

(g) THE SELLER AND BUYER AGREE THAT, IN CONSIDERATION OF THE ABOVE EXPRESS WARRANTY AND ANY PERFORMANCE GUARANTEE SPECIFICALLY SET FORTH IN THE PROPOSAL, ALL OTHER WARRANTIES AND GUARANTEES, OTHER THAN TITLE, EITHER EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXCLUDED FROM THE CONTRACT.

(h) Seller shall not be held liable for costs associated with loss of production or downtime due to equipment failure. Seller shall not be responsible for customer, field subcontractor or trade labor costs associated with the removal or replacement or defective or non-functioning equipment, before, during or after the Warranty period.

DECLARATION of CONFORMITY

PRODUCT:

Mountaingate[™] Induction Dryer used to cure coatings. This covers Dryer Models: ICD & ISC

APPLICABLE DIRECTIVES:

98/37/EEC	(Machinery)
89/336/EEC	(Electromagnetic Compatibility Directive)
73/23/EEC	(Low Voltage Directive)

STANDARDS USED TO VERIFY COMPLIANCE:

EN292 EN1050 EN60204 EN50082 EN55011

PRINCIPLES:

This product has been manufactured according to good engineering practice. The product specified conforms to the directive and standards described above.

Certificates: TUV / Mechanical & Electrical Safety - T2073008 TUV / EMC - V9677396

me Monauso

Date: 06 July 2000

Dave Mancuso Vice President, Container Business Group

Nordson

Nordson Corporation • Westlake, Ohio