Replaced by 1615094

Temperature Control System

Customer Product Manual
Part 1075456–05

Issued 5/17

For parts and technical support, call the Finishing Customer Support Center at (800) 433-9319.

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CE

Nordson

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Table of Contents

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.

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Change Record

Revision	Date	Change
02	6/15	Updated manual to latest configuration.
03	1/16	Added sound level specifications.
04	5/16	Added kits.
05	5/17	Added static mixer kits.

Temperature Control Unit

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. 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

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 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.

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.
- 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.
- Relieve (bleed off) hydraulic and pneumatic pressure before adjusting or servicing pressurized systems or components. Disconnect, lock out, and tag switches before servicing electrical equipment.
- While operating manual spray guns, make sure you are grounded. Wear electrically conductive gloves or a grounding strap connected to the gun handle or other true earth ground. Do not wear or carry metallic objects such as jewelry or tools.
- If you receive even a slight electrical shock, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.
- Obtain and read Safety Data Sheets (SDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials, and use recommended personal protection devices.
- Make sure the spray area is adequately ventilated.
- 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.

High-Pressure Fluids

High-pressure fluids, unless they are safely contained, are extremely hazardous. Always relieve fluid pressure before adjusting or servicing high pressure equipment. A jet of high-pressure fluid can cut like a knife and cause serious bodily injury, amputation, or death. Fluids penetrating the skin can also cause toxic poisoning.

If you suffer a fluid injection injury, seek medical care immediately. If possible, provide a copy of the SDS for the injected fluid to the health care provider.

The National Spray Equipment Manufacturers Association has created a wallet card that you should carry when you are operating high-pressure spray equipment. These cards are supplied with your equipment. The following is the text of this card:

WARNING: Any injury caused by high-pressure liquid can be serious. If you are injured or even suspect an injury:

- Go to an emergency room immediately.
- Tell the doctor that you suspect an injection injury.
- Show him this card
- Tell him what kind of material you were spraying

MEDICAL ALERT—AIRLESS SPRAY WOUNDS: NOTE TO PHYSICIAN

Injection in the skin is a serious traumatic injury. It is important to treat the injury surgically as soon as possible. Do not delay treatment to research toxicity. Toxicity is a concern with some exotic coatings injected directly into the bloodstream.

Consultation with a plastic surgeon or a reconstructive hand surgeon may be advisable.

The seriousness of the wound depends on where the injury is on the body, whether the substance hit something on its way in and deflected causing more damage, and many other variables including skin microflora residing in the paint or gun which are blasted into the wound. If the injected paint contains acrylic latex and titanium dioxide that damage the tissue's resistance to infection, bacterial growth will flourish. The treatment that doctors recommend for an injection injury to the hand includes immediate decompression of the closed vascular compartments of the hand to release the underlying tissue distended by the injected paint, judicious wound debridement, and immediate antibiotic treatment.

Fire Safety

To avoid a fire or explosion, follow these instructions.

- Ground all conductive equipment. Use only grounded air and fluid hoses. Check equipment and workpiece grounding devices regularly. Resistance to ground must not exceed one megohm.
- Shut down all equipment immediately if you notice static sparking or arcing. Do not restart the equipment until the cause has been identified and corrected.
- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Do not heat materials to temperatures above those recommended by the manufacturer. Make sure heat monitoring and limiting devices are working properly.

Fire Safety *(contd)*

- Provide adequate ventilation to prevent dangerous concentrations of volatile particles or vapors. Refer to local codes or your SDS for guidance.
- Do not disconnect live electrical circuits when 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. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.
- Shut off electrostatic power and ground the charging system before adjusting, cleaning, or repairing electrostatic equipment.
- 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.

Halogenated Hydrocarbon Solvent Hazards

Do not use halogenated hydrocarbon solvents in a pressurized system that contains aluminum components. Under pressure, these solvents can react with aluminum and explode, causing injury, death, or property damage. Halogenated hydrocarbon solvents contain one or more of the following elements:

Element	Symbol	Prefix
Fluorine	F	“Fluoro-”
Chlorine	Cl	“Chloro-”
Bromine	Br	“Bromo-”
Iodine	I	“Iodo-”

Check your SDS or contact your material supplier for more information. If you must use halogenated hydrocarbon solvents, contact your Nordson representative for information about compatible Nordson components.

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 system electrical power. Close hydraulic and pneumatic shutoff valves and relieve pressures.
- Identify the reason for the malfunction and correct it before restarting the system.

Disposal

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

System Overview

The Nordson Temperature Control Unit (TCU) maintains coating material at the desired application temperature.

The temperature control unit heats or cools process water, which then circulates through an external counter-flow water-jacketed heat exchanger. The coating material passes through the heat exchanger and is heated or cooled to the desired temperature.

The temperature controller contains a process water loop and a chilled water loop.

See Figure 1.

In the process water loop, water is pumped through an immersion heater (7), out to the heat exchanger (1), and back to the pump (10). The water flow is regulated by the flowsetter (5) in the return line.

NOTE: Some systems may have two pumps connected in series in the process water loop.

The chilled water loop consists of an evaporator (19), 98-l (26-gal) chilled water reservoir (14), and pump (12). The pump continuously circulates the water through the evaporator and back into the reservoir. The sealed refrigeration system removes heat from the water flowing through the evaporator.

An RTD (22) at the heat exchanger material exit senses the coating material temperature.

- If the coating material is too cool, the temperature controller (23) proportionally energizes the immersion heater to warm the water flowing through the process loop and heat exchanger, warming the coating material.
- If the coating material is too warm, the temperature controller (23) proportionally opens a solenoid valve (4) on the return line to the chilled water loop. This allows chilled water to flow into the process loop, cooling the water flowing through the heat exchanger and cooling the coating material. Water from the process loop returns to the chilled water loop through the solenoid valve and a flowsetter (6), which regulates the return flow.

If the coating material temperature deviates from the process temperature setpoint by ±2.8 °C (±5 °F), the *temperature range fault* indicator on the electrical panel will light.

An adjustable thermostat in the heater assembly acts as a high water temperature safety switch. If the water temperature exceeds 60°C (140°F), the thermostat opens and power to the heater is disabled. In addition, the *heater high temp* fault indicator on the electrical panel will light.

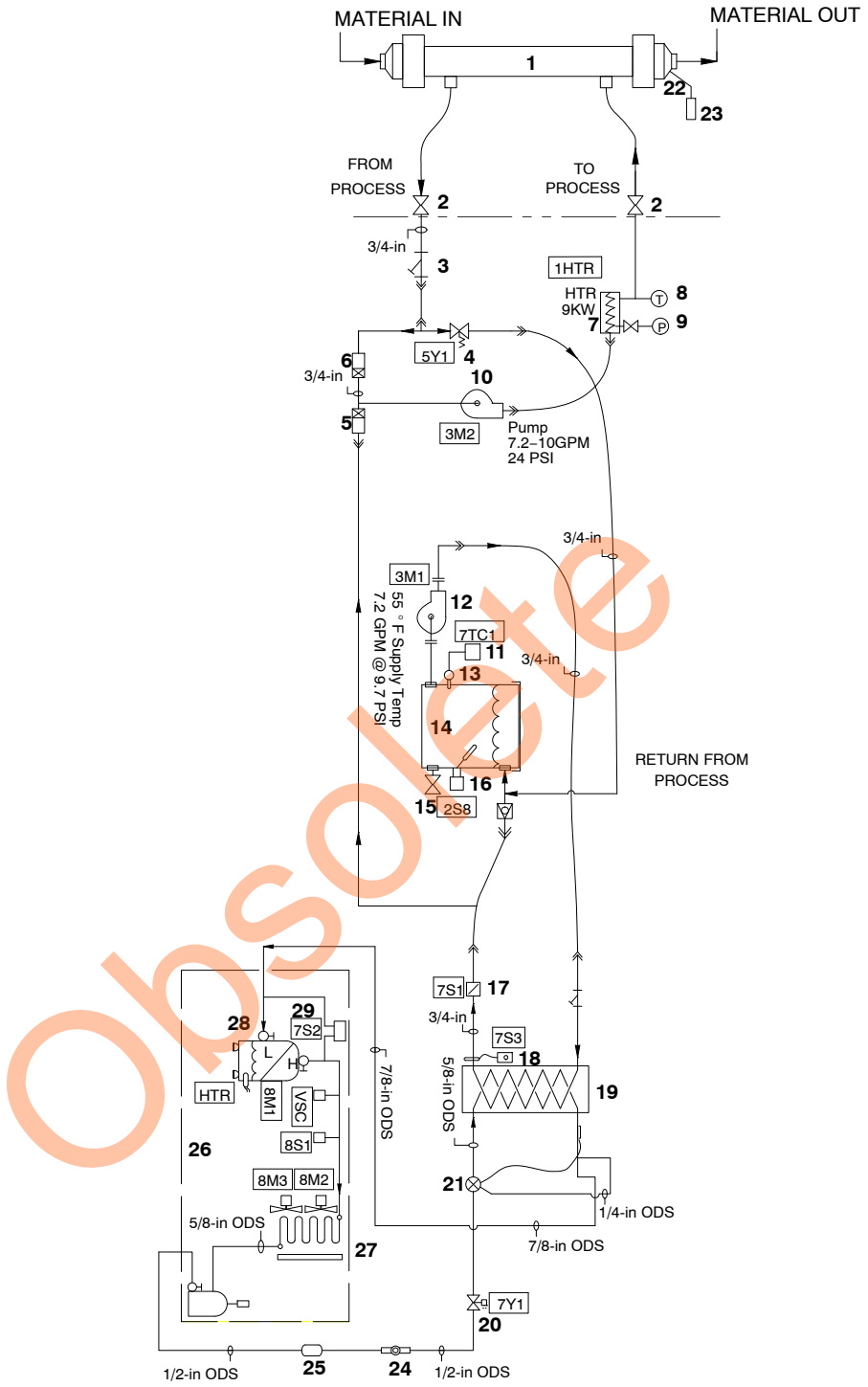

Figure 1 Temperature Control Unit Diagram

1. Heat exchanger
2. Service valves – 3.4 in.
3. Strainer – 3.4 in.
4. Solenoid Valve
5. Flowsetter 1–5 gpm
6. Flowsetter 1–4 gpm
7. Immersion heater 9KW
8. Thermometer 0–200 °F
9. Pressure gauge 0–60 PSI
10. Pump – main circulation
11. Chilled water controller
12. Pump – chilled water loop
13. RTD – chilled water
14. Chilled water reservoir
15. Drain valve
16. Float switch
17. Flow switch
18. Low temperature thermostat
19. Evaporator
20. Solenoid coil
21. Expansion valve
22. RTD
23. Temperature controller
24. Sight glass
25. Filter drier
26. Condensing unit
27. Condenser coil/fan
28. Hermetic compressor
29. Pressure refrigerant switch

Chilled Water Loop Operation

See Figure 1.

The chilled water pump runs continuously. An RTD temperature sensor (13) senses the reservoir (14) water temperature and sends a temperature signal to the chiller controller (11). The water temperature is displayed as the Process Value (PV). The setpoint is preset to 10 °C (50 °F) and is displayed as the Setpoint Value (SV).

If the water temperature rises 2.8 °C (5 °F) above the setpoint, the controller energizes the compressor contactor. Power is provided to the compressor and condenser fan motors.

If the ambient temperature is low, a fan control switch de-energizes one condenser fan motor to maintain proper head pressure. It is normal for the fan to cycle on and off while the compressor is running.

As the water temperate decreases to 1 °F below the setpoint, the compressor, fan motors, and liquid line solenoid are de-energized while the crankcase heater is still energized, completing the cycle.

Refrigerant Cycle

The refrigerant in the hermetic compressor (28) is compressed to a high-pressure/high-temperature gas, which flows to the condenser (27). In the condenser, the refrigerant is changed into a high-pressure liquid as it is cooled by the air flowing through the condenser fins. The liquid refrigerant then passes through a shut-off valve, through the liquid receiver, and into the filter drier (25), which removes any moisture or other contaminants.

The high-pressure liquid then flows through the sight glass (24) to an automatic expansion valve (21) where it is reduced to a low-pressure liquid before it flows into the evaporator (19). The low-pressure liquid refrigerant absorbs the heat from the water flowing through the evaporator and is transformed into a low-pressure gas. The low-pressure gas is then drawn into the compressor to complete the cycle.

Fault Indicators

The water flow switch (17), high- and low-pressure refrigerant switch (29), and low temperature thermostat (18) will disable the refrigeration system if a low water flow, high or low refrigerant pressure, or low water temperature condition occurs. These conditions will turn off the *chiller on* indicator on the electrical panel and turn on the *chiller fault* indicator.

In addition, the float switch (16) located in the reservoir will disable the TCU and turn on the *low water level fault* indicator on the electrical panel if the water in the reservoir falls below the switch level.

Flowsetter Valves

The flowsetter valves are small throttling ball valves. They are used to control the flow of water through the system. The valves have a slotted screw head. When the screw head slot is parallel to the direction of flow, the valve is completely open. When the slot is perpendicular to the direction of flow, the valve is completely closed.

See Figure 2. The flowsetter valves are set at the factory. The settings are:

- Process water flowsetter: $^1/_2$ gpm less than total flow capacity. If the valve capacity is 0–5.5 gpm valve, then set it to 5 gpm. The capacity is marked on the valve.
- Return water flowsetter: 0–5.5 gpm wide open
- Heat exchanger flowsetter (not shown): wide open

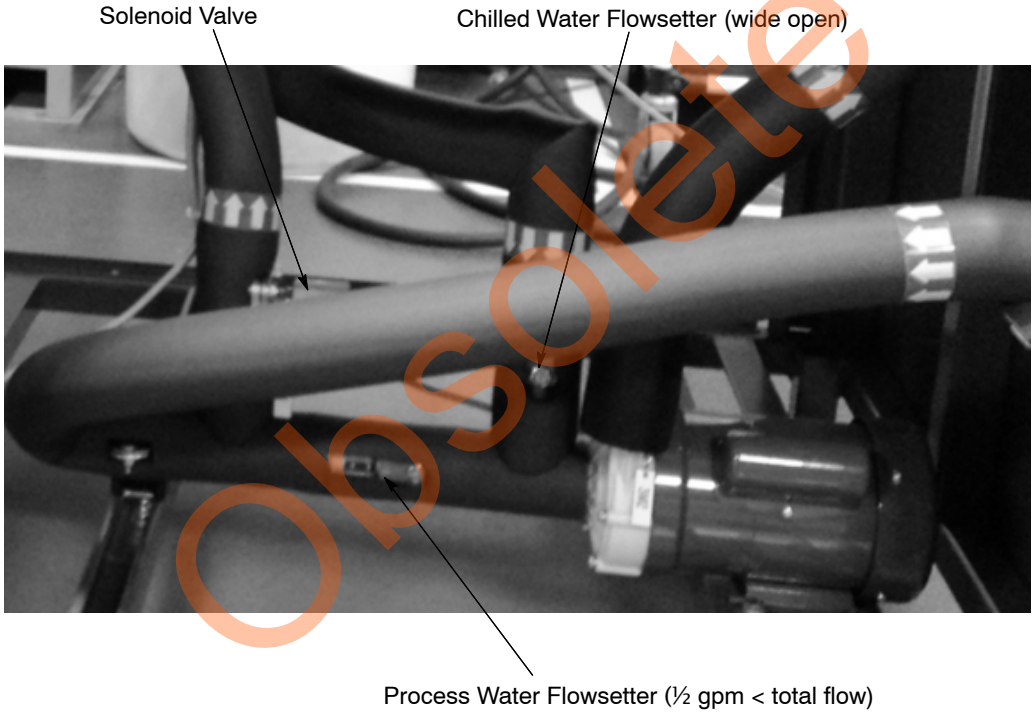

Figure 2 Flowsetters

Control Panel Front

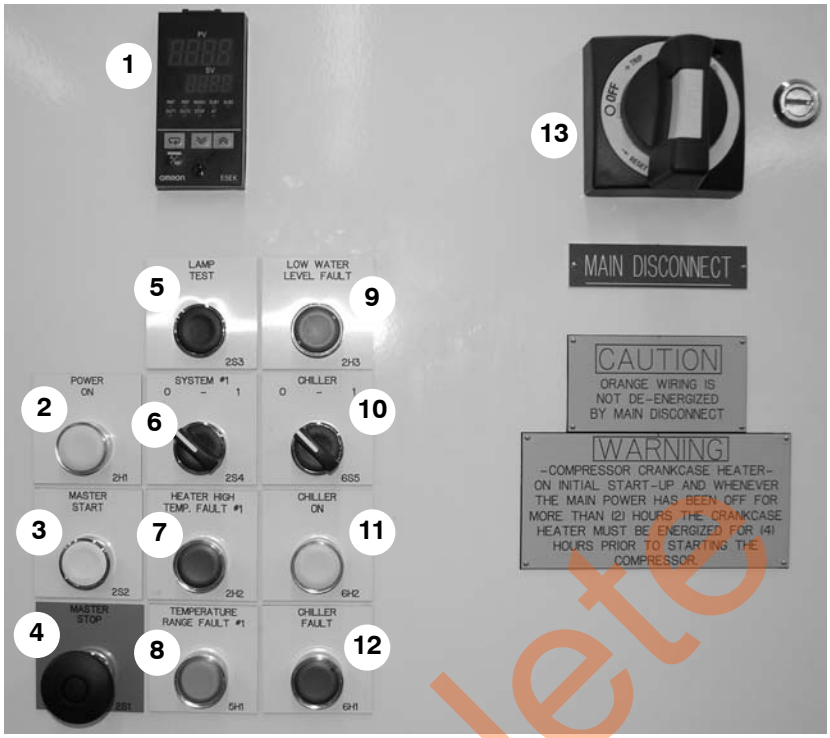

Figure 3 Control Panel

Item	Control	Function
1	Temperature Controller	Controls coating material temperature.
2	Power On	Lights when system power is on.
3	Master Start	Starts chiller pump and provides power to rest of system.
4	Master Stop	Stops all system functions except compressor crankcase heater.
5	Lamp Test	Press to turn on all indicator lights to ensure they are working.
6	System #1	Starts/stops process water pump.
7	Heater High Temperature Fault	Lights if water temperature exceeds 60 °C (140 °F).
8	Temperature Range Fault	Lights if the coating material temperature deviates from the process temperature setpoint by ±2.8 °C (±5 °F).
9	Low Water Level Fault	Lights if the water level in the chiller reservoir falls below the float switch.
10	Chiller #1	Enables/disables the refrigeration system.
11	Chiller On	Lights when the refrigeration system is enabled.
12	Chiller Fault	Lights if the water flow switch senses no water flow in the chilled water loop, if the high- or low-pressure refrigerant switch is tripped, or if the low-temperature thermostat senses that the water temperature in the reservoir falls to 4.4 °C (40 °F).
13	Main Disconnect	Turns on and off power to unit. Leave on except when making electrical repairs or for long shutdowns. Refer to Warning placard on panel.

Control Panel Interior

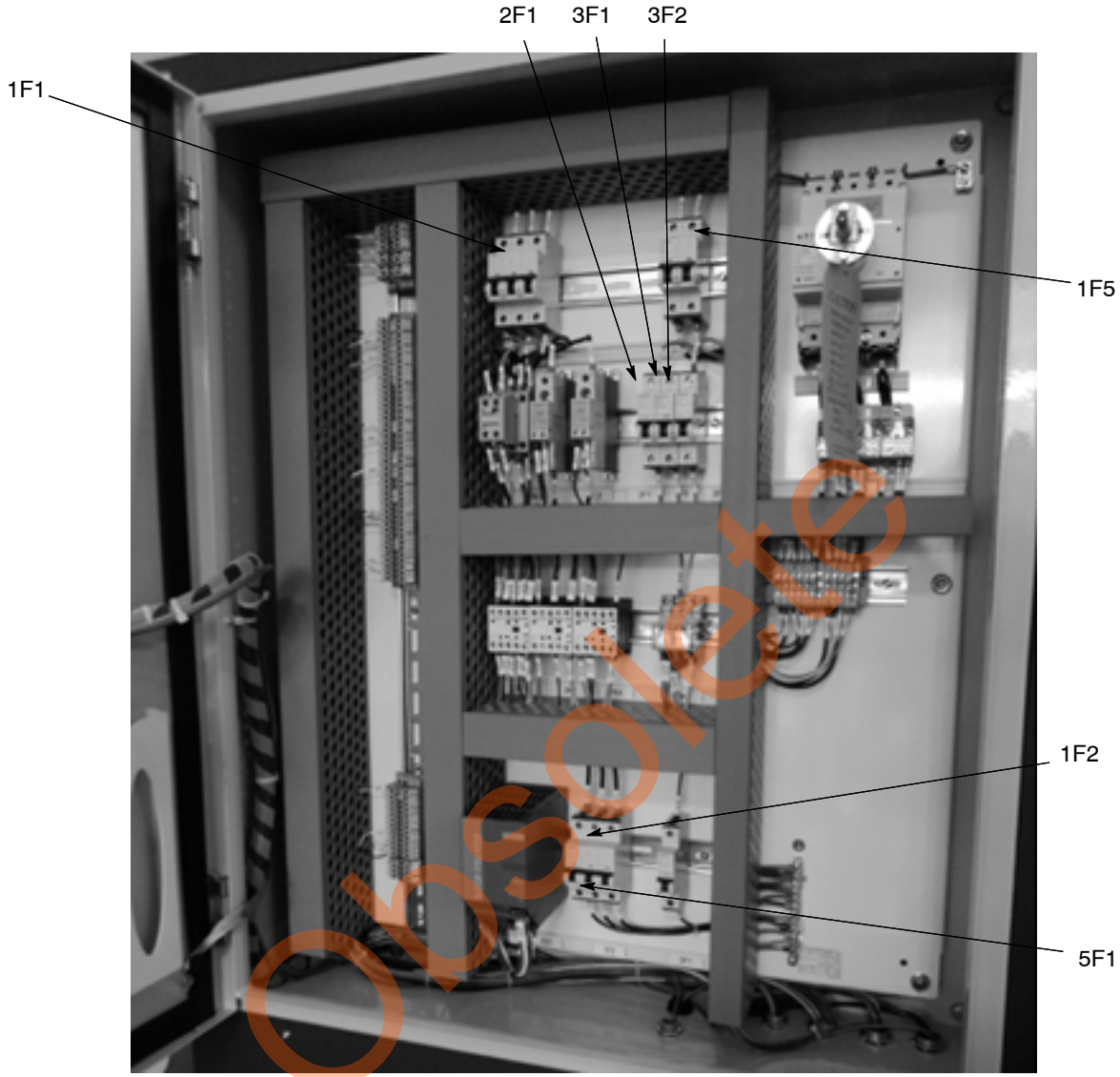

Figure 4 Control Panel Interior Fuses, Disconnects, and Controls

Component	Function
1F1	Immersion heater
1F2	Compressor and fan motor #1
1F5	Transformer
2F1	24 Vdc power supply
3F1	Chilled water pump
3F2	Process water pump
5F1	System cooling solenoid
24Vdc Power Supply	Provides power to 24 volt components: system indicators, switches, and push buttons

Chiller Junction Box

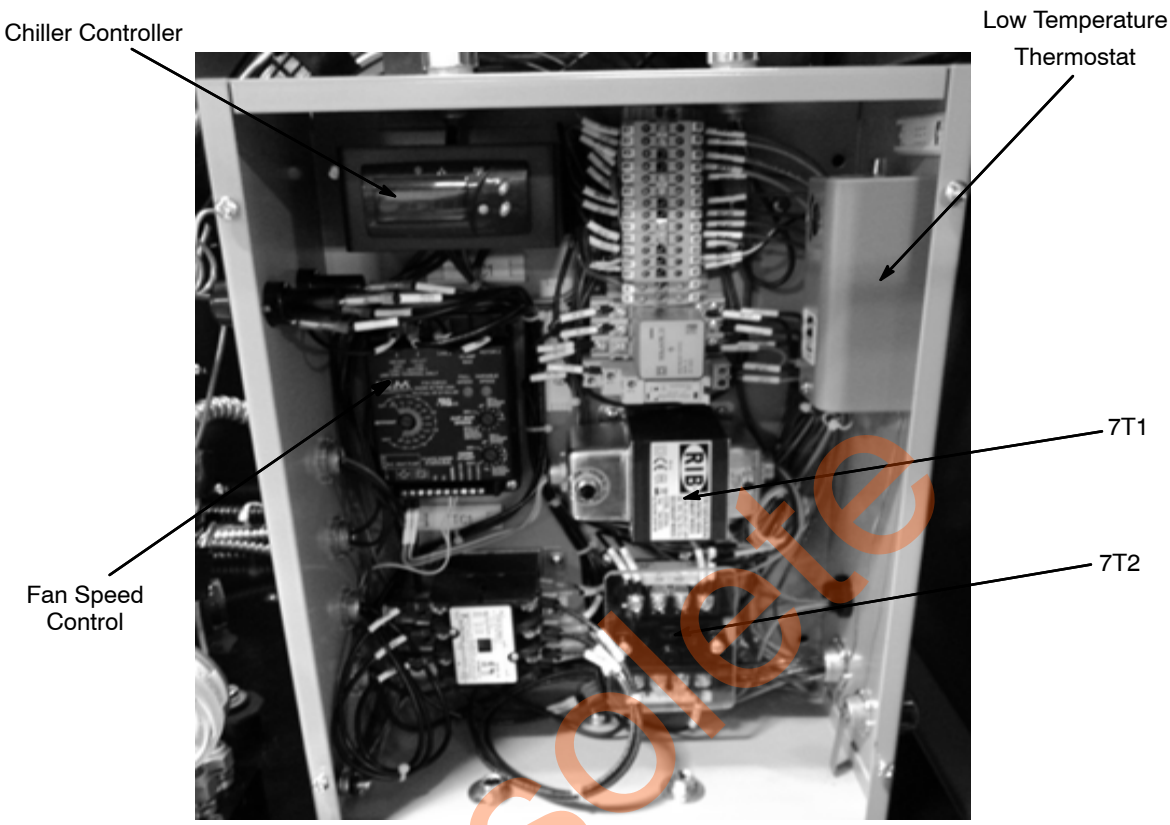

Figure 5 Chiller Junction Box

Table 1 Chiller Junction Descriptions

Component	Function
7T1	480/24 Vdc Transformer
7T2	480/240 Vac Transformer
Chiller Controller	Uses RTD to sense chilled water temperature Turns refrigeration system on to keep water at 10 °C (50 F°)
Low Temperature Thermostat	Shuts off refrigeration system if water temperature falls below 4.4°C (40°F) Reset switch is on top of case
Fan Speed Control	Controls main fan speed to maintain constant head pressure

Specifications

General Specifications

US 60 amps minimum, 480 VAC 3 phase 60 Hz
CE: 40 amps minimum, 400 VAC 3 phase 50 Hz
Electrical panel rating: NEMA 12, IP rating: 66

Ambient Temperature Range: 7.2–35 °C (45–95 °F)

Maximum Material Flow:	11.3 l/min. (3 gal/min.) maximum flow
Conditioning Capacity:	20 °F Δ at 3 gpm
	50 °F Δ at 1.5 gpm

Heat Exchanger Ratings
Shell: 6.89 bar (100 psi) max, 7.2–82 °C (45–180 °F)
Tube: 344 bar (5000 psi) max, 7.2–82 °C (45–180 °F)

Dimensions: Refer to Figure 6
Operating Weight: 1315 lb
Process Heat Exchanger Weight: 300 lb

Operating Sound Level: Full Load Operation – 78.5 dBA

Refrigeration System Specifications

Capacity:	36,000 BTU/hour
Refrigerant:	R134A, 20 lb (20 lb pump down capacity)
Saturated Discharge Temp:	112 F (150 psig)
Saturated Suction Temp:	40 F (35 psig)
High Pressure Control:	Cut out: 265 psig
	Cut in: Manual reset
Low Pressure Control:	Cut out: 26 psig
	Cut in: 55 psig
Low Temp Thermostat:	Cut out: 40 F
	Cut in: Manual reset
Fan Control #2:	Cut in: 180 psig
	Cut out: 140 psig

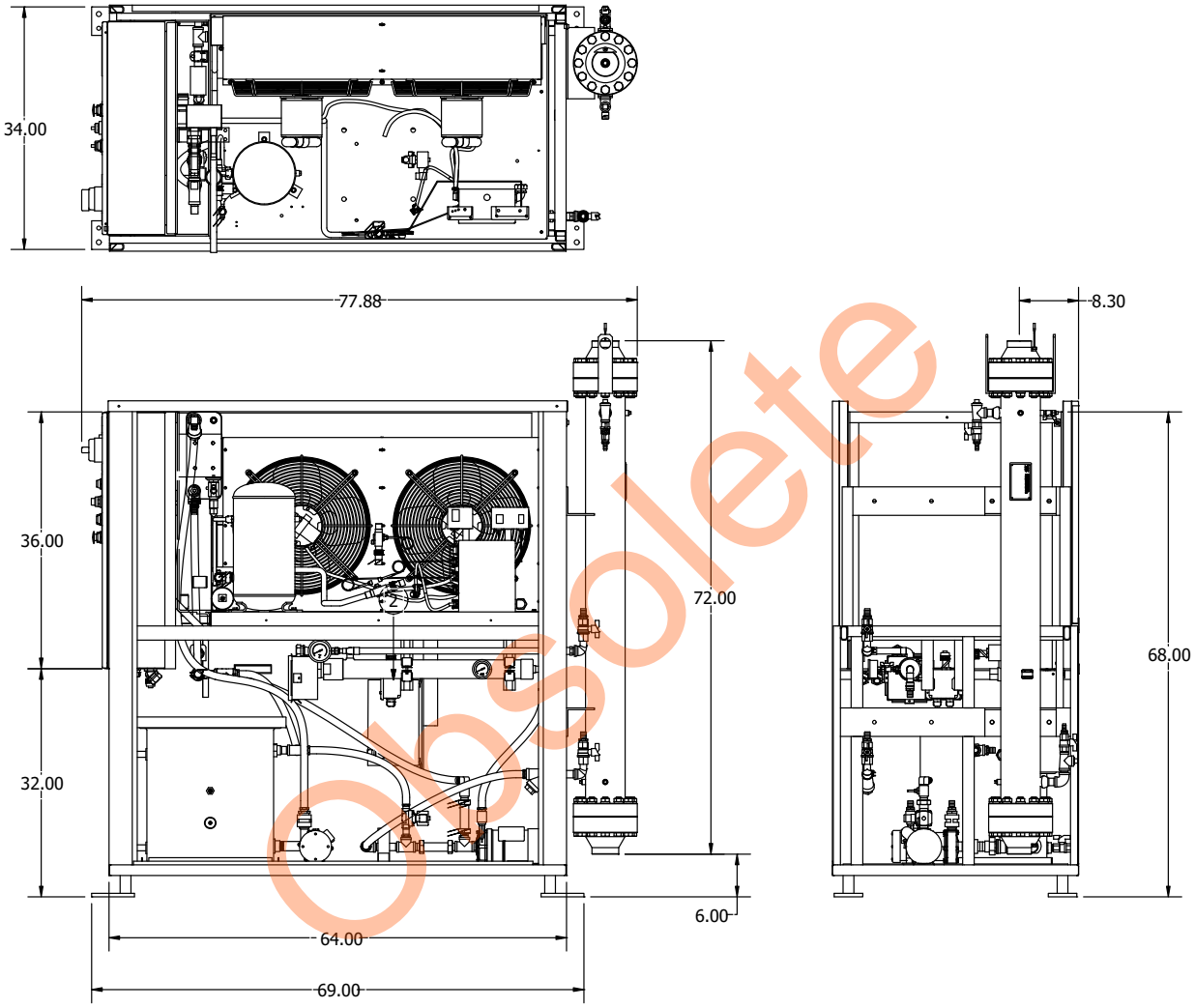

Figure 6 Dimensions

Installation

WARNING: Allow only qualified personnel to install this equipment. All connections must conform to the applicable codes. Follow the safety instructions in this document and all related documentation.

Location and Clearances

The heat exchanger can be mounted remotely, up to 15.2 m (50 ft) away from the temperature control unit cabinet, or can be mounted directly to the end of the cabinet, in a vertical position.

Adequate airflow through the cabinet is necessary to insure proper, trouble-free operation. In addition, the cabinet should be located where adequate make-up air is available to prevent heat build-up.

- A minimum of 91.4 cm (36 in.) clearance should be provided on all four sides of the cabinet to provide for proper airflow and servicing.
- A minimum of 121.9 cm (48 in.) clearance should be provided above the cabinet.

Mounting

Mounting pads are provided to rigidly fasten the chiller to a suitable level mounting surface. The unit must be firmly anchored to the mounting surface.

Ambient Temperature

The temperature control unit is designed to operate at an ambient temperature range of 7.2–35 °C (45–95 °F). For conditions above or below this temperature range, consult your Nordson representative.

Electrical Connections

Connect main power to the L1, L2, and L3 terminals at the top of the unit disconnect.

Optional connections are available on the interlock terminal block for the following:

- Remote control of temperature setpoint (requires changing controller setting as well as providing 4–20 mA signal)
- Chiller fault/interlock
- Heater high temperature fault/interlock
- Material high temperature fault/interlock
- Low water level fault/interlock

Refer to the wiring diagrams for information on these connections. All wiring should be shielded multi-core, and must not run parallel to high voltage or frequency drive power cables.

Heat Exchanger Installation

See Figure 7. The unit is shipped with the heat exchanger secured to the shipping pallet. The heat exchanger can be mounted to the cabinet or remote-mounted up to 15.2 meters (50 ft) away from the cabinet.

The heat exchanger weighs approximately 181.5 kg (400 lb). A lifting bracket is attached to the flange at the outlet end of the heat exchanger. Use the appropriate lifting equipment to move the heat exchanger and avoid damaging the foam insulation jacket.

Cabinet Mounting

The heat exchanger is mounted on the end of the cabinet opposite the controls in a vertical position with the material outlet on top (end with RTD). Use the supplied fasteners to secure the brackets to the tapped holes in the cabinet braces.

If cabinet mounting is specified when the unit is ordered, then the required lengths of insulated process water hose will be connected to the process water inlet and outlets at the factory.

Connect the hoses as shown to the heat exchanger process water inlets and outlets.

Remote Mounting

Mount the heat exchanger with the bleed valve up, using the brackets and appropriate fasteners. Do not mount the heat exchanger more than 15.2 m (50 ft) away from the cabinet.

A 30 m (100 ft) length of process water hose is furnished with the unit. Cut the hose to the lengths required to reach the heat exchanger and connect the hoses to the barbed fittings at the inlets and outlets as shown.

Use the provided hose clamps to secure the hoses. Insulate the hoses to prevent heat/cooling losses.

Heat Exchanger RTD Connections

Pull the desired length of cable out of the cabinet and connect it to the RTD cable. The cables are terminated in plugs for easy connection/disconnection.

Process Material Connections

NOTE: This is a counter-flow heat exchanger. The coating material must flow in the opposite direction as the process water.

Connect the coating material lines to the heat exchanger. The heat exchanger threads are 1 in. NPT.

To eliminate condensation and heat/cooling losses from the coating material lines, they should be insulated with a minimum 12.7 mm (0.5 in.) thick closed-cell foam insulation or equivalent.

Make sure all coating material pipe hangers and brackets are insulated or isolated so they do not function as heat sinks.

Kits

See Figure 7.

The following service kits are available for the Temperature Control Unit.

Item	Part	Part	Description
—	1609035		KIT, TCU, ¾ hydraulic hose
—		1609034	KIT, flushing, heat exchanger
1	972110	972110	• CONNECTOR, male, 37, 1 1/16–12 x ¾, stainless steel
2	829072	829072	• HOSE, siphon, ¾ inside diameter, 6 feet
3	------	------	• FITTING, connector, male, 37-degree, 3/4x34
4	972603	972603	• ELBOW, male, 37, , 1–1/16–12 x ¾, stainless steel
5	N/A	------	• NIPPLE, 1 NPT x ¾ NPT, stainless steel
6	N/A	------	• VALVE, ball, 2-way, ¾ NPT, lock, stainless steel
7	N/A	------	• ELBOW, 37-degree, ¾–14 x ½ NPT, stainless steel
8	N/A	1084958	• HOSE, nylon, stainless steel insert
9	------	------	• BUSHING, pipe, hydraulic, 1x3/4, stainless steel
10	N/A		• ADAPTER, male run tee, 1 NPT
11	N/A	------	• PLUG, pipe, socket, standard, 1 NPT, stainless steel

Item	Part	Description
—	1611020	KIT, TCU, static mixer, 6 ft
—	1611021	KIT, TCU, static mixer, 7 ft
—	1611022	KIT, TCU, static mixer, 8 ft

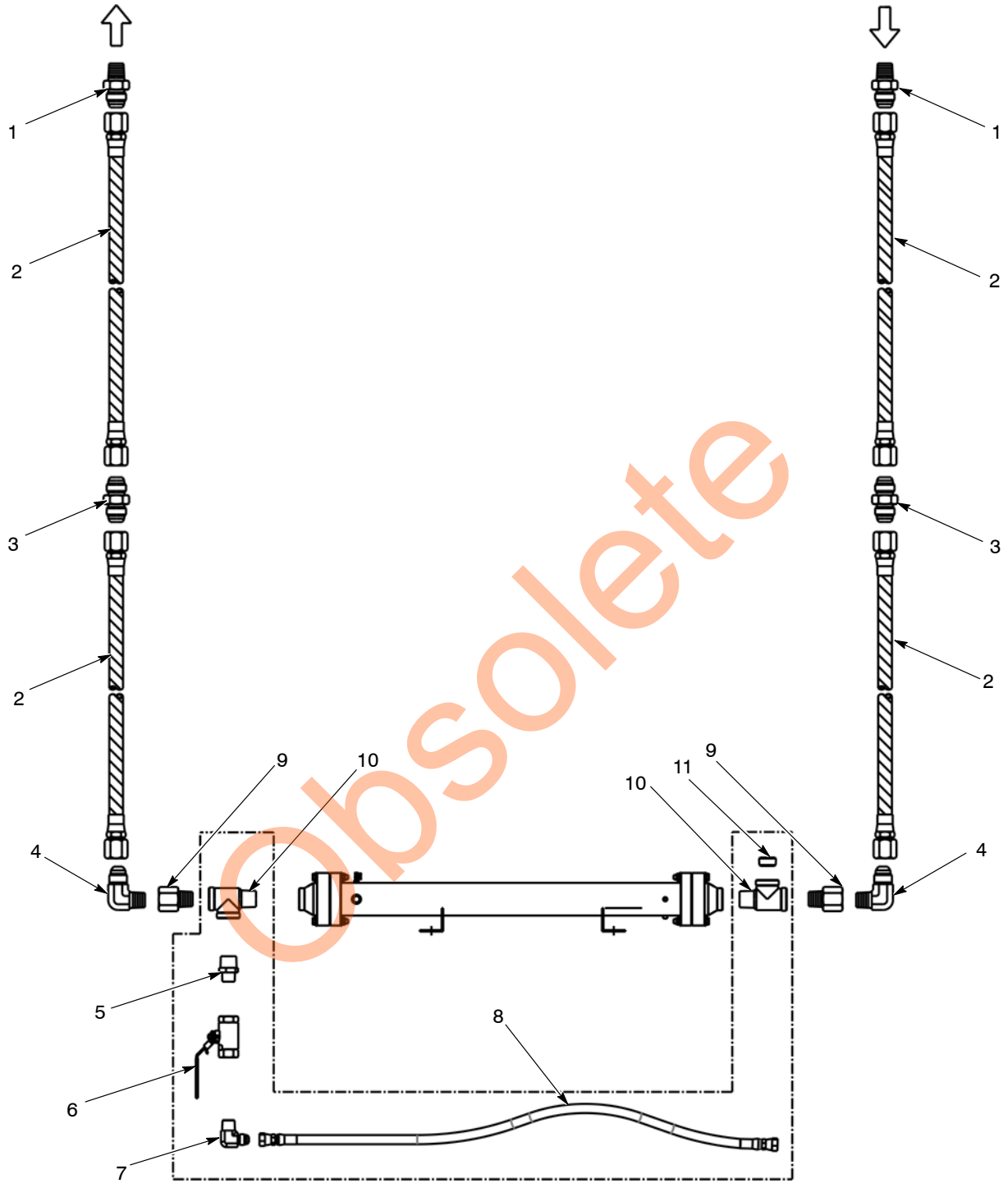

Figure 7 Typical Process Water and RTD Connections to the Heat Exchanger (Shown without Insulation)

Additional Temperature Control Loop

If required, an additional water loop can be connected to the system to provide temperature conditioning to water jackets on day tanks or other components of the coating system. The total combined load should not exceed the capacity of the temperature control unit. Contact your Nordson representative for more information.

Plugs are provided at the heat exchange outlet and inlet connections for 3/4 in. NPT barbed hose fittings. Connect insulated hoses to the fittings and clamp the hoses securely.

The flowsetter at the heat exchanger outlet must be used to restrict the flow of water through the heat exchanger and force water through the added loop. If the external loop requires 1 gpm, then set the flowsetter to 1 gpm less than total flow. For example, if flowsetter has a capacity of 0–5.5 gpm, then set it to 4.5 gpm.

Water Treatment

CAUTION: Use only distilled water or clean tap water. Do not use de-ionized water or well water. De-ionized water will corrode the system components. Well water is typically high mineralized and will shorten system component life.

To maintain proper performance of the system over its design life, corrosion must be minimized. Water should be distilled or clean tap water. De-ionized (DI) water must not be used as it is corrosive to the metals in the system.

Corrosion inhibitor must be added to the water on initial fill and each time it is changed. An original fill supply of Corrshield MD405 corrosion inhibitor is included with each unit shipped. This is a molybdate-based corrosion inhibitor with an additive to protect copper. It is used in a concentration of 1.5 oz per gal of water (44.3 ml per 3.785 l). A one quart (0.95 liter) bottle of Corrshield MD405 is enough to treat 21 gal (79.5 l).

To ensure that the system is protected, a Molybdate Test Kit is also included. Each time water is added to the system it should be tested to ensure that the water contains the proper concentration of corrosion inhibitor.

Biocides prevent algae and other biologicals from contaminating the water. The recommended biocides for use with Corrshield MD405 is Spectrus NX114. The recommended concentration of Spectrus NX114 is 150–PPM which is 0.017 oz/gal (0.5 ml/gal).

Biocides that should not be used in the water are:

- oxidizers, such as chlorine, bromine, hydrogen peroxide, iodine, ozone
- catonic, or positively-charged biocides

The following is a list of materials used in the construction of the temperature control unit. Use this list if you are going to use a different biocide or corrosion inhibitor.

Galvanized steel pipe	Brass
Iron	Aluminum
Buna rubber	EPDM rubber
Stainless steel	PTFE
Copper	Nylon

Operation

Preparation for First Time Startup

CAUTION: The temperature control unit main disconnect must be turned on 4 hours before starting the system to provide power to the compressor crankcase heater, which heats the compressor oil and forces the refrigerant out of saturation. Starting the system cold will cause unnecessary wear or damage to the compressor. The main disconnect should always be left on unless the unit is removed from service for repairs or movement.

1. Remove the panels from the right side of the cabinet.
2. Open the chiller panel and reset the low temperature thermostat next to the chiller controller. The reset switch is on top of the thermostat. Check the thermostat setting. It should be set to 4.5 °C (40 °F). Close the panel door when done.
3. Turn the system disconnect switch to the ON position. Do not start the system until the end of the 4-hour warm-up period required for the refrigeration system.
4. On the inside of the cabinet, open the compressor and receiver isolation valves if they are tagged closed for shipping. Close the drain valves.
5. Remove the cover from the reservoir and remove the wire tie from the float switch in the reservoir.
6. Open the process water inlet and outlet valves at the cabinet and heat exchanger.
7. Make sure the flowsetter at the heat exchanger outlet is set to wide open.

Filling System

CAUTION: Perform the following procedure to fill the system with water and bleed air out of the system before starting production. Starting the pumps without water in the system could damage them.

1. **For new systems only:** Make sure the float level switch shipping restraint is removed before filling the tank.
2. Fill the chiller reservoir with distilled or clean tap water to about 101 mm (4 in.) from the top. Add corrosion inhibitor to the water at the recommended concentration.
3. Press the MASTER START button. This starts the chilled water pump.
4. At the heat exchanger, open the bleed valve to allow water from the chilled water loop into the process water loop and to bleed off the air in the system. When water starts flowing from the valve, turn it off.
5. Turn the CHILLER#1 switch to the ON position.
6. Turn the SYSTEM switch to the ON position. The process water pump will start and pump process water through the heat exchanger.
7. See Figure 3. Press the A/M button on the system controller to change to manual operation. The red MANU LED on the controller should light.

8. Press the DOWN key to lower the Setpoint Value (green display) to −100. This prevents the heater contactor from energizing while opening the chilled water solenoid valve and allowing chilled water to flow into the process water loop.
9. Open the purge valve on the side of the heat exchanger, near the top, to purge the remaining air from the system. Close the valve when all air is purged from the system.
10. Check the reservoir and add water to make up for the water injected into the process water loop.
11. Check the pressure gauge at the immersion heater. Normal operating pressure is 0.55−1.38 bar (8−20 psi).
    - If the pressure is below 0.55 bar (8 psi), make sure all air is purged from the system.
    - If the pressure is above 2 bar (30 psi), check for a restriction in the process loop (closed or partially closed valve, pinched water line).
12. Once the system is fully charged with water and all air has been purged from the system, press the A/M key on the system controller to return it to automatic operation. The red AUTO LED on the controller should light.

The system is now ready for normal operation.

Temperature Controller Settings

Two digital temperature controllers are used to run the temperature control unit: a process controller and a chiller controller.

NOTE: For information on the controller factory settings, refer to the Appendix at the back of this manual.

Chiller Controller

The chiller controller is mounted inside the chiller electrical panel. It controls the operation of the refrigeration system.

This controller is pre-set at the factory to maintain the water in the reservoir at 10 °C (50 °F). The controller turns on the refrigeration system when the water temperature rises 2.8 °C (5 °F) above the setpoint. The controller settings should not need to be changed.

NOTE: If not using the chiller to cool the material temperature, shut it off. Allowing the chiller to run without using its cooling capacity could cause the compressor to overheat.

Process Controller

The process controller is located on the system electrical panel and labeled TEMPERATURE CONTROLLER. It controls the heating and cooling of the water in the main circulation loop.

Use the process controller to set the material temperature setpoint and monitor the system operation. See Figure 8 and the following table for a description of the controller displays and keys.

Changing Material Temperature Setpoint

The coating material temperature is displayed on the red Process Value (PV) display. The temperature setpoint is displayed on the green Setpoint Value (SV) display.

For normal operations, the controller should be set to Automatic mode. The only value that should be changed is the Setpoint Value.

To increase the Setpoint Value, press the UP key.
To decrease the Setpoint Value, press the DOWN key.

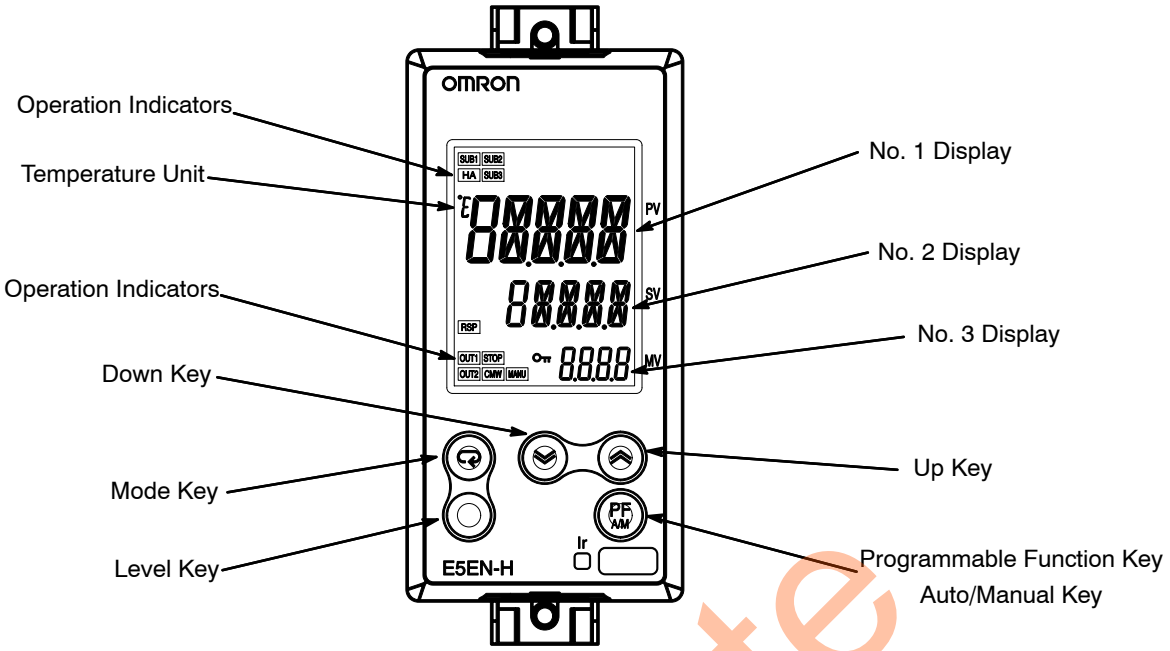

Figure 8 Temperature Controller Displays and Keys

Indicators	Description
No. 1 Display	Displays the process value or parameter name
No. 2 Display	Displays the set point, parameter operation read value, or variable input value
No. 3 Display	Displays MV (valve opening), soak time remain, or bank number
Programmable Function Key	Function key
Up and Down Keys	Changes values or settings on the Setpoint Display
Mode Key	Changes parameters within a setting level
Level Key	Switches between setting levels
Operation Indicators	SUB1: Auxiliary Output 1 on SUB2: Auxiliary Output 2 on SUB3: Auxiliary Output 3 on HA: Heater burnout, heater short alarm, or heater over-current occurs RSP: Remote SP operation OUT1: Heater on OUT2: Chiller on STOP: Controller stopped CMW: Communications writing enabled MANU: Controller in manual mode RMT: Controller operated remotely AT: Auto Tune in progress

The Temperature Range Fault indicator on the control panel will light if the coating material temperature varies from the setpoint by 2.8 °C (5 °F) or more.

NOTE: The Display and Auto/Manual keys are for use in setting system parameters. They are not used for normal operation of the temperature control unit.

Controller Security

The controller has security levels from 0–6. At level 6, no changes can be made to the settings. At level 5, only the Setpoint Value can be changed. Levels 4 to 1 provide access to other settings. Access to these levels should be given only to industrial engineers or others responsible for the system settings.

Refer to the Appendix for the factory controller settings.

Auto-Tuning

Auto-tuning is a controller function that adjusts the PID settings automatically. To use auto-tuning, the system must be running normally.

Refer to the Omron E5EN–H manual to start the Auto-tune function. When complete, make the following changes:

- Double the Proportional setting (if 1, change to 2; if 5, change to 10)
- Change the Derivative setting to 0

System Shutdown

1. Turn the CHILLER and the SYSTEM switches to the OFF position. The process water pump and refrigeration system will shut off.
2. Press the MASTER STOP button. The chiller pump will shut off.

NOTE: Do not shut off the main disconnect switch unless making repairs or shutting down the system for an extended period of time or for repairs.

CAUTION: If unit power is off for more than 2 hours then when power is restored, the user must wait 4 hours before starting the unit. Failure to observe this caution could result in damage to the refrigeration compressor.

Maintenance

The system should be inspected and cleaned every 90 days.

System Pressure

Observe the system pressure gauge. Normal operating pressure is 0.55–1.38 bar (8–20 psi). Low pressure indicates a pump problem, air in the system, or a plugged strainer or filter on the return line. High pressure indicates a flow blockage or restriction in the process loop.

Process Water Temperature

Check the temperature gauge in the cabinet. It should closely track the setpoint temperature.

Check the temperature displayed on the chiller controller. It should closely track the chilled water setpoint temperature. The refrigeration unit should turn on when the water temperature rises 2.8 °C (5 °F) above the setpoint.

System Condenser

The condenser fan filters should be replaced or cleaned as needed to ensure adequate airflow. The replacement cycle on the air filters depends on the surrounding air quality, ambient air temperature, and system run time.

Check and clean the condenser coils as necessary. The condenser can be cleaned by shutting down the system and brushing the condenser fins with a soft bristle brush, followed by blowing it out with compressed air. Care must be taken not to bend or flatten the condenser fins when cleaning.

In a severely contaminated area, it may be necessary to chemically clean the condenser (consult with your Nordson service representative first).

NOTE: The green indicator should always be visible in the refrigerant sight glass. If it turns yellow, the refrigeration system has developed a leak and allowed moisture to enter.

Heat Exchanger

Over time, coating material will inevitably form deposits that restrict flow. Clean the heat exchanger tubing if any decrease in coating material flow is detected.

Before disassembling the heat exchanger, make sure you have an O-ring kit on hand.

Be careful not to damage the insulation around the heat exchanger. The insulation bonnets on either end can be removed to gain access to the inlet and outlet flange fasteners.

Water Level and Quality

Check the level of water in the reservoir. It should be no lower than 102 mm (4 in.) from the top. Add more water if necessary. Use only distilled water or clean tap water.

Test the corrosion inhibitor concentration and pH with the recommended test kit. Add more corrosion inhibitor as necessary. Refer to the following pages for the test procedure.

NOTE: Always check the corrosion inhibitor concentration after adding make-up water.

If the system water quality is poor, it may be necessary to flush the system to remove contaminated water.

See Figure 9. Remove the process water strainer and clean the screen periodically.

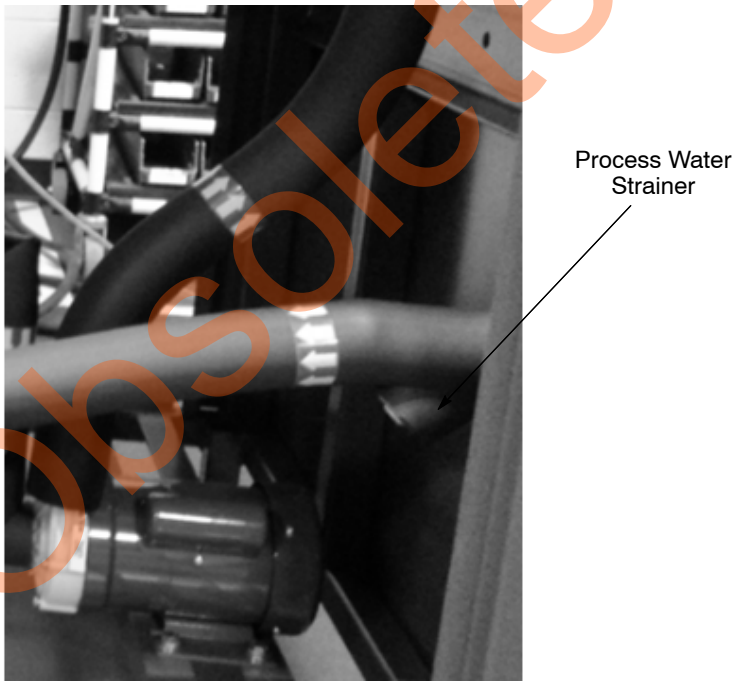

Figure 9 Process Water Strainer

Water Test Kit Instructions

Molybdate Test

The ideal molybdate level is 250–350 ppm.

1. Add 5 ml of water from the reservoir to the square mixing bottle. The sample should be clear. If it is not, filter it first.
2. Add 20 ml of distilled water to the sample water.

Molybdate Test *(contd)*

3. Add the contents of one MolyVer® 1 Molybdenum Reagent Powder Pillow to the sample. Swirl to mix.
4. Add the contents of one MolyVer 2 Molybdenum Reagent Powder Pillow to the sample. Swirl to mix.
5. Add the contents of one MolyVer 3 Molybdenum Reagent Powder Pillow to the sample. Swirl to dissolve.
6. If the Corrshield MD 405 corrosion inhibitor is present, a yellow color will develop. Wait at least 3 minutes, but no longer than 15, to proceed to the next step.
7. Fill one of the color viewing tubes to the 5 ml mark with the prepared sample.
8. Insert the tube into the right opening of the color comparator.
9. Add 1 ml of the sample to the second viewing tube. Add distilled water to the 5 ml mark, then insert the tube into the left side of the comparator.
10. Hold the comparator up to a light source such as the sky or a lamp and look through the two openings in the front while rotating the color disk until a color match is obtained.
11. Read the ppm of molybdate through the scale window of the comparator.

NOTE: Avoid exposing the color disks to direct sunlight for extended periods of time to protect them from fading caused by ultraviolet light.

pH Test

The ideal pH is between 7.5 and 8.5.

1. Dip one test strip into a water sample for 10 seconds. Keep the strip motionless while it is in the water.
2. Remove the strip from the water and match the pH color, then the total alkalinity color, within 30 seconds.

Troubleshooting

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

Problem	Possible Cause	Corrective Action
1. Unit will not operate	Power supply	Check the power supply to the temperature control unit.
	Circuit breaker tripped	Check circuit breakers (refer to page 10). Fix problem that tripped breaker before restarting.
2. Power on indicator on but unit will not operate	Chiller ON indicator off, process water pump off	Check reservoir level and add water if below float switch. A low water level will disable the compressor and chilled water pump.
		Check float switch operation. Replace if necessary.
	Chiller ON indicator off, process water pump running	Check for proper water flow in system.
		Check the low temperature thermostat, reset if necessary.
		Reset refrigeration system with reset button on pressure control.
		Check condenser fan filters, clean or replace as necessary.
		Check condenser, clean if necessary.
3. Unit operating but no temperature control	No water circulation	Make sure inlet and outlet valves at cabinet and heat exchanger are open.
		Make sure pumps are primed.
		Make sure flowsetters are adjusted correctly.
		Check for air lock in process loop.
		Check temperature controller settings.
	SErr code on temperature controller	Defective heat exchanger RTD or RTD wiring. Check wiring. Depressurize system and remove RTD. Test RTD for continuity and resistance (100 Ω across device, 5 Ω across common)
	SErr code on chiller controller	Defective reservoir RTD or RTD wiring. Check wiring. Remove RTD and test for continuity and resistance (100 Ω across device, 5 Ω across common).

Continued...

Problem	Possible Cause	Corrective Action
4. Heater High Temperature Fault	Immersion heater temperature is over 60 °C (140 °F)	Check for water flow through heater. Check temperature controller settings.
5. Material Temperature Range Fault	Coating material temperature is outside the setpoint range of ±2.8 °C (±5 °F)	This fault commonly appears at startup. If it persists, make sure the controller is adjusted properly and that the heater or chiller is functioning
6. Chiller Fault	Water temperature too low	Low temperature thermostat has disabled refrigeration unit because water temperature is below thermostat setting (4.4 °C or 40 °F). Check chiller controller setting. Check chilled water flow. Correct problem and reset thermostat.
	Low or no chilled water flow	Check chilled water pump. Check flow switch operation.
	Refrigeration pressure control: High pressure	Check fan operation. Check condenser filters. Clean or replace filters. Check for air flow across condenser. Clean condenser fins with a soft-bristle brush. Check ambient temperature. If out of unit specifications, take steps to lower ambient temperature. Reset switch after correcting problem.
	Refrigeration pressure control: Low pressure	If ambient temperature out of unit specifications, take steps to increase ambient temperature. Chilled water setpoint is too low. Check chiller controller settings. Setpoint should be 10 °C (50 °F). Loss of refrigerant. Check refrigerant charge.
	Compressor motor overload	Check overload setting, monitor compressor current draw.
7. Low Water Level Fault	Water level in reservoir below float switch (fault disables pumps, heaters, and control circuits to prevent damage)	If this fault occurs while filling the system and purging air from the water loops, add water to the reservoir. If this fault occurs during production, check the water loops for leaks.

Troubleshooting: Material Too Warm

Possible Solutions

1. When cooling is required, output 2 on the temperature controller should be on. When output 2 energizes, the chilled water solenoid valve should open with an audible click.
2. If Output 2 does not light when cooling is required, the temperature controller may require re-configuration. Refer to the temperature controller (Omron E5EN−H) chart in the Appendix.
3. If output 2 lights but the solenoid valve does not open, check circuit breaker 5F1 (refer to page 10) and the solenoid valve. Replace the solenoid valve if necessary.
4. Check the return flowsetters for proper adjustment (refer to page 8).
5. If there is no water flow or pressure in the chilled water circulation loop check the chilled water pump circuit breaker or pump (refer to page 10).
6. If there is power to the chilled water pump and there is no flow, check the pump and water lines for restrictions or obstructions. Replace the pump if necessary.
7. If the chilled water pump is working correctly, check the refrigeration system.
8. The tubing at the water outlet from the evaporator should be cold.
9. Check the reservoir water temperature. The reservoir water temperature should be 13 °C (55 °F).
10. If the condenser fan #1 is not operating, check the variable speed control (refer to page 11).
11. If the fan is operating, check the condenser coils for dirt or dust buildup. Clean the condenser fins with a soft-bristle brush and compressed air.
12. If the fan is not operating and the circuit breaker is on, or if the fan is operating and the condenser coils are clean, then there is a problem with the refrigeration system. Refer to Chiller Fault in the Troubleshooting chart. If you cannot solve the problem, contact a Nordson representative.
13. Make sure that all air is bled from the heat exchanger on the material and the water sides.
14. Check heater amperage with a meter. It may be possible that the solid state relays are bleeding voltage by and the heaters are being energized without output 1 being on.

Troubleshooting: Material Too Cool

Possible Solutions

1. When heating is required, output 1 on the temperature controller should light. When output 1 energizes, the immersion heater should heat the water.
2. When output 1 on the temperature controller is lit, the coordinating SSR light should be energized (5K2).
3. If output 1 does not light when heating is required, the temperature controller may require re-configuration. Refer to the temperature controller (Omron E5EN-H) chart in the Appendix.
4. If output 1 lights and no heating occurs, check the heater circuit breakers 1F1 (refer to page 10). The heater is a 3-phase device. If the heater is heating but is not at full capacity, one element may have failed or one circuit breaker could be faulty.
5. If no problem is found, turn off power at the main disconnect and check the continuity and resistance of the heater elements. Replace the heater elements if necessary.
6. If output 1 lights and the heater high temperature indicator is lit, the water temperature has exceeded the thermostat setting 60 °C (140 °F), which disables the heater. Make sure there are no obstructions to water flow within the heater and that the temperature controller settings are correct.
7. Heater high temperature alarm is on. Refer to Troubleshooting Heater High temperature alarm.

Troubleshooting: Water Pressure

Pressure Too High

1. Make sure all valves in the process water loop, except for the drain valve, are completely open.
2. Make sure that the water hoses are not kinked or blocked.
3. Shut down the system and remove the strainer screen (refer to page 26). Clean the screen. If the screen is clogged, check the water quality. If necessary, drain and flush the system.

Pressure Too Low

Make sure the process water pump is fully primed with water and the pump inlet is not blocked. Check the return line to make sure there are no restrictions.

Repairs

RTD Replacement

WARNING: Depressurize the coating material system before removing the RTD. Failure to relieve all pressure could result in a high pressure fluid injection injury.

Relieve the coating material system pressure.

Use a 14 mm or $^1/_2$ in. wrench to unscrew and remove the RTD from the heat exchanger head. The RTD is 12 in. long.

Heat Exchanger Disassembly and Cleaning

If material flow through the heat exchanger becomes restricted, it can be disassembled and cleaned.

Materials required:

- O-ring kit
- $^1/_2$ in. torque wrench
- Round steel rod, 12.7 mm x 2133 mm ($^1/_2$ in. x 7 ft)
- Rags
- Paper towels
- Solvent
- Loctite 242 or 248 thread adhesive

Disassembly

1. Shut down the temperature control unit (leave disconnect switch ON).

WARNING: Relieve the coating material system pressure before disconnecting the coating material lines from the heat exchanger. Failure to relieve all pressure could result in a high pressure fluid injection injury.

2. Depressurize the coating material system and isolate the heat exchanger from the rest of the system.
3. Disconnect the coating material lines from the heat exchanger.

CAUTION: The head assemblies are heavy. Support them while removing the fasteners. The faces of the head assemblies and the tube sheet are machined surfaces. Be careful not to damage them.

4. See Figure 10. Using the loosening sequence shown, remove the bolts (4), lock washers (2), and nuts (1) from the head assembly (6). Remove the head assembly.
5. Remove and discard the O-ring (7).

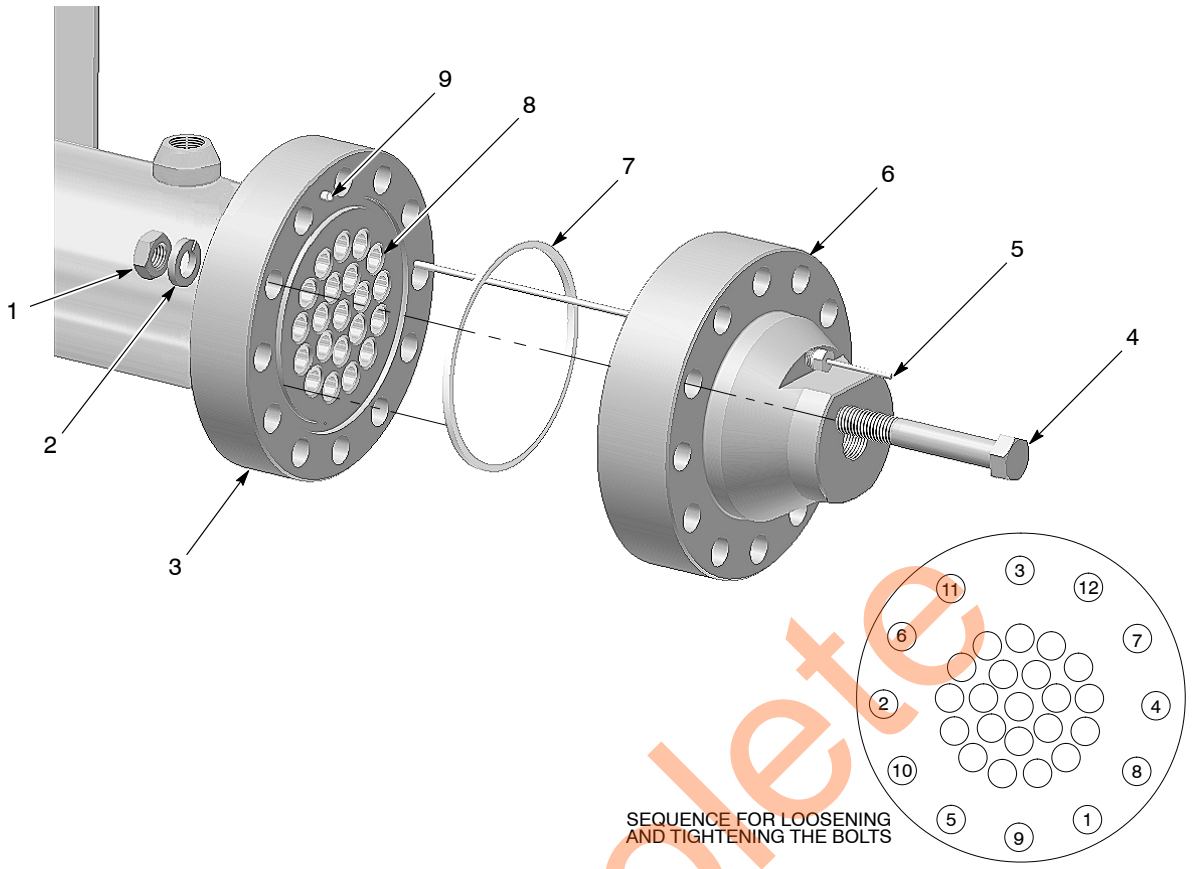

Figure 10 Heat Exchanger Disassembly

1. Nut
2. Lock washer
3. Tube sheet
4. Bolt
5. RTD
6. Head assembly
7. O-ring
8. Steel tube
9. Alignment pin

Cleaning

1. See Figure 10. Clean the head assembly (6), tube sheet head (3), and O-ring groove with a putty knife, clean rags, and a compatible solvent. Be careful not to damage the machined surfaces or O-ring grooves.
2. Push the $^{1}/_{2}$-in. steel rod into each each tube (8) to remove coating material.
3. Tear strips of paper towel, approximately 76 x 304 mm (3 x 12 in.), fold into thirds, then roll into plugs. Insert the plugs into the tubes and push them through with the steel rod.
4. Make more plugs and soak them in a compatible solvent. Push the plugs through the tubes to thoroughly clean the inside of the tubes.

NOTE: If coating material is hardened or packed into the tubes, it may be necessary to drill out the tubes. A tube drill can be made by welding a $^{1}/_{2}$- or $^{17}/_{32}$-in. drill bit to the end of a $^{1}/_{2}$-in x 7 ft steel rod. Use a $^{1}/_{2}$-in drill motor at slow speed to drill out the tubes.

Assembly

See Figure 10.

1. Install a new O-ring (7) into the groove on the tube sheet (3).
2. If removed during cleaning, install the alignment pin (9) into the tube sheet head (3).
3. Apply Loctite 242 or 248 thread adhesive to the threads of the bolts (4).
4. Align the head assembly (6) to the alignment pin (9). Install the head assembly onto the tube sheet (3) using the bolts (4), lock washers (2), and nuts (1). Only hand-tighten the nuts and bolts.
5. Using the tightening sequence shown, perform the following to tighten the bolts:
   a. Tighten the bolts to 108 N•m (80 ft-lbs).
   b. Next, tighten the bolts to 190 N•m (140 ft-lbs)
   c. Finally, tighten the bolts to 271 N•m (200 ft-lbs).
6. Connect the coating material lines. Check for leaks when the system is repressurized.

Parts

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

Refer to the system and electrical panel drawings for bills of material.

Appendix

E5EN-H Temperature Controller Settings

Go to AMoV and set adjustment level and advanced level first.

NOTE: All parameters may or may not be available. Standard parameters for adjustment are highlighted throughout the table.

Operation Level			
Display	**Definition**	**Default Settings**	**Nordson Factory Settings**
PV	Process Value (Red)		
SV	Set Value (Green)	Celcius (C)	F or C
MV	Manipulated Variable (Yellow) Heat %		
Display Key	**Set initial settings – first press menu button 3–4 seconds and go to adjustment level**		
AM	Auto Manual	oFF	oFF
RSP	Remote Setpoint		
SP-M	Local Setpoint		
R-S	Run/Stop	rUn	rUn
AL1H	Alarm 1 High	0.0	5 F/2.8 C
AL1L	Alarm 1 Low	0.0	5 F/2.8 C
AL2H	Alarm 2 High	0.0	5 F/2.8 C
AL2L	Alarm 2 Low	0.0	5 F/2.8 C
Initial Setting Level	**Press display key and level key for 1 second**		
Ladj	Level Adjust		n
AT	Auto Tune	oFF	oFF
CRdA	Infrared Communication Use	oFF	oFF
SPMd	To Turn Out Setpoint Local Remote	LSP	LSP
Ct-1	Heater Current 1 Value Monitor	0.0	0.0
Oc1	Heater Overcurrent Detection 1	50.0	50.0
Ct2	Heater Current 2 Value Monitor	0.0	0.0
Oc2	Heater Overcurrent Detection 2	50.0	50.0
CnS	Temperature Input Shift	0.0	0.0
P	Proporational Band	8.0	5.0
C	Integral Time	233.0	180.0
d	Derivative Time	40.0	0.0

Continued...

Initial Setting Level	Definition	Default Settings	Nordson Factory Settings
C-SC		1.0	1.0
C-db	Cooling Dead Band	0.0	0.0
SPRt	Setpoint Ramp Time Unit	oFF	oFF
oL-H	MV Upper Limit	5.0	105.0
oL-L	My Lower Limit	0.0	–105.0
Orl	MV Change Rate Limit	0.0	0.0
Adjustment Level	**Press level key initial setting level (hold bottom button down for 3–4 seconds)**		
Set advanced level first			
To get to advanced level, press and hold level key until In-T (CN-T) comes up. Then press mode key 20 times until iNiT (CNCT) is showing. Enter "–169" again press level key. To exit, press level key.			
Cn-T	Input Type	5	1
d-U	C/F Selection	C	C or F depending
SL-H	Setpoint Upper Limit	500.0/900.0	130 F/54 C
SL-L	Setpoint Lower Point	–199.9/–199.9	60 F/15.5 C
CntL	Control On/Off or PID	Pid	Pid
S-HC	Standard or Heat/Cool	Stnd	H-C
PTRN	Program Pattern	oFF	oFF
CP	Control Period (Heat)	20.0	20.0
C-CP	Control Period (Cool)	20.0	20.0
orEu	Direct or Reverse Act	or-r	or-r
ALt1	Alarm 1 Type	2 Deviation upper limit	1 Deviation upper/ lower limit
ALH1	Alarm 1 Hysteris	0.2	0.2
ALt2	Alarm 2 Type	2 Deviation upper limit	4 Deviation upper/ lower limit
ALH2	Alarm 2 Hysteris	0.2	0.2
tRt	Transfer Output Type	oFF	oFF
Tr-H	Transfer Output High	900.0	200.0
Tr-L	Transfer Output Low	–199.0	0.0
EV-b	Bank Numbers Used	1.0	1.0
EV-2	Event Input Assignment 1	NoNE	NoNE
EV-3	Event Input Assignment 2	NoNE	NoNE
EV-4	Event Input Assignment 3	NoNE	NoNE
AMoV	Advanced Function Setting Level (see note)	0.0	Password "–169"
Note: Press mode key 20 times to get to AmoV.			

To get to advanced level, press and hold level key until In-T (CN-T) comes up. Then press mode key 20 times until iNiT (CNCT) is showing. Enter –169 again press level key. To exit, press level key.			
Advanced Level Settings	**All parameters may or may not be there. Be concerned with highlighted ones only.**	**Default Setting**	**Nordson Factory Setting**
iNiT	Parameter Initialization	oFF	oFF
SPRU	SP Ramp Time Unit	M	M
SbIN	Auxiliary Output 1 Open in Alarm	N-O	N-O
Sb2N	Auxiliary Output 2 Open in Alarm	N-O	N-O
HbU	Heater Burnout Latch	oN	oFF
ALFA	ALFA DO NOT TOUCH	0.65	0.65
At-G	At Calculated Gain Width	1.0	1.0
At-H	Auto Tune Hysteresis	1.4	1.4
CNF	Input Digital Filter	0.0	1.0
PVAD	Additional PV Display	oFF	oFF
odP	MV Display	oFF	oFF
rEt	Automatic Return of Display	0	99
A1Lt	Alarm 1 Latch	oFF	oFF
A2Lt	Alarm 2 Latch	oFF	oFF
PRLt	Move to Protect Level Time	3.0	3.0
SERo	Input Error Output	oFF	oFF
CoLo	PV Change Color	RED	G-R
PVB	PV Stable Band	5.0	5.0
A1oN	Alarm 1 ON Delay	0.0	0.0
A2oN	Alarm 2 ON Delay	0.0	0.0
A1oF	Alarm 1 OFF Delay	0.0	0.0
A2oF	Alarm 2 OFF Delay	0.0	0.0
iStP	Input Shift Type	iNSi	iNSi
MVSE	MV at Stop and Error Addition	oFF	oFF
AMAd	Auto/Manual Select Addition	oN	oN
Rt	Robust Tuning	oFF	oFF
HSU	HB ON/OFF	oN	oFF
Out1	Control Output Assignment 1	o	o
Out2	Control Output Assignment 2	Co	Co
SUB 1	Auxiliary Control 1 Assign	AL-1	AL-1
SUB 2	Auxiliary Control 2 Assign	AL-2	AL-2
CSEL	Character Select	oN	oN

Continued...

Advanced Level Settings	All parameters may or may not be there. Be concerned with highlighted ones only.	Default Setting	Nordson Factory Setting
rSPU	Remote Setpoint Enable	oFF	oFF
rSPH	Remote Setpoint High Range	130	130 F/54 C
rSPL	Remote Setpoint Low Range	60	60 F/15 C
SPtr	Setpoint Tracking	oFF	oFF
RSEo	Remote Setpoint Input Error Output	oFF	oFF
PiDi	PiD Set Automatic Selection Data	PV	PV
PIDH	PiD Set Automatic Selection Hysteresis	oFF	oN
MANL	Manual MV Limit Enable	oFF	oN
CSCA	Automatic Cooling Coefficient Adjustment	oFF	oFF
OCU	Heater Overcurrent Use	oFF	oFF
OCL	Heater Overcurrent Latch	oN	oN
OCH	Heater Overcurrent Hysteresis	0.1	0.1
PF	PF Setting	A-M	A-M
SPdP	PV/SP Display Screen Selection	4.0	4.0
odSL	MV Display Selection	o	o
PVdP	PV Decimal Point Display	oN	oN
SPSt	Process Value Status Display Function	oFF	oFF
SPVt	Setpoint Value Status Display Function	oFF	oFF
d REF	Display Refresh Period	0.25	0.25
RA1	Control Output 1 ON/OFF Count Alarm Set Value	0.0	0.0
RA2	Control Output 2 ON/OFF Count Alarm Set Value	0.0	0.0
RAC	Control Output 1 ON/OFF Reset	0.0	0.0
CMoV	Move to Calibration Level	0.0	0.0

Love Chiller Controller Settings

CAUTION: To prevent damage to the chiller unit, do not deviate from the following settings.

Display	Definition	Default Settings	Nordson Factory Settings Fahrenheit (F)	Nordson Factory Settings Celsius (C)
Operation Level				
	Process Value	0	55	12
Primary Menu – Press Set–Set. Press up or down arrow to adjust. Press set and down arrow to return display.				
SP	Setpoint Adjust		55	12
Secondary Menu – Press Set for 8 seconds. Press Set to access menu parameters				
00	Access Code	0	0	0
r0	Differential Hystersis		5	3
r1	Lower Value Setpoint	–50	53	11
r2	Higher Value Setpoint	150	90	32
d0	Heating or Cooling	Co (Cool)	Co (Cool)	Co (Cool)
d2	Time for Defrosting	30	00	00
d8	Interval Time Between Defrosts	6	0	0
c0	Minimum Stop Time for Load	00	06	06
c1	Continuous Cycle Time	00	24	24
c2	On Time of Fault Cycle	5	10	10
c3	Off Time of Fault Cycle	5	6	6
P1	Ambient Probe Adjustment	00	00	00
H5	Parameter Access Dode	00	00	00
H6	Probe Type	Ptc	Ptc	Ptc
t0	Maximum Temperature on Display	150	150	83

Honeywell UDC3200 Controller Configuration Settings

The following changes must be made to properly set up the system configuration. Perform the following:

1. Set the Input Type.
2. Change In Control from GAIN to PB.
3. Set ALGORTHM.
4. Start at TUNING and configure the unit.
5. When the system is configured and calibrated, return to TUNING as follows:

Display	Definition	Factory Setting	Nordson
LOCKOUT	LOCK STRATEGY	CALIB	MAX

START HERE:

Display	Definition	Factory Setting	Nordson
TUNING			
PROP BD	PROPORTIONAL BAND	1	5
RATE MIN	DERIVATIVE TIME	0	0
RSET MIN	INTEGRAL TIME	1	3
PROP BD 2	PROPORTIONAL BAND	1	5
RATE MIN 2	DERIVATIVE TIME	0	0
RSET MIN 2	INTEGRAL TIME	1	3
SECURITY	SECURITY SETTING	0	0
LOCKOUT	LOCK STRATEGY	CALIB	NONE CAL prior to shipping
AUTOMA	AUTOMATIC/MANUAL	ENABLE	ENABLE
RUN HOLD	RUN HOLD SELECT	ENABLE	DISABLE
SP SELECT	SETPOINT SELECT	ENABLE	ENABLE
SP RAMP			
SP RAMP	SETPOINT RAMP	DISABLE	DISABLE
SP RATE	SETPOINT RAMP RATE	DISABLE	DISABLE
ACCUTUNE			
FUZZY	FUZZY LOGIC	DISABLE	ENABLE
ACCUTUNE	AUTO TUNING	DISABLE	DISABLE
ALGORTHM			
CONT ALG	CONTROL ALGORTHM	PID A	PID A
TIMER	TIMER	DISABLE	DISABLE
IN ALG 1	TIMER	NONE	NONE
OUT ALG			
OUT ALG	OUTPUT ALGORTHM	CURRENT	TIME D
CO RANGE	CO RANGE	4-20 Ma	MECH
RLYSTATE	OUTPUT @ 0%	1OF 2OF	1OF 2ON
PLYTYPE	RELAY TYPE	MECHAN	MECHAN
IN1 TYPE	INPUT 1 TYPE	0-10mV	100 LO

Continued...

Display	Definition	Factory Setting	Nordson
INPUT 1			
IN1 HI	NOT ADJUSTABLE	300	300
IN1 LO	NOT ADJUSTABLE	-300	-300
RATIO 1	INPUT ACTION RATIO	1	1
BIAS IN1	INPUT BIAS	0	0
FILTER 1	INPUT FILTER	1	1
BURNOUT1	INPUT BURNOUT SETTING	NONE	NONE
INPUT 2			
IN2 TYP	INPUT 2 TYPE	1-5V	4-20MA
	DISABLE THE ABOVE IF NO REMOTE IS USED		
XMITR2	TRANSMITTER CHARACTERIZATION	LIN	LIN
IN2 HI	INPUT 2 HI LIMIT	2400	130 °F / 54 °C
IN2 LO	INPUT 2 LOW LIMIT	0	60 °F / 15 °C
RATIO2	INPUT ACTION RATIO	1	1
BIAS2	INPUT BIAS	0	0
FILTR2	INPUT 2 FILTER	1	1
CONTROL			
INP 1	INPUT 1	PV SOURCE	PV SOURCE
PID SETS	# OF CONTROL PID VALUES	1 ONLY	1 ONLY
LSP'S	LOCAL SETPOINT SOURCE	1 ONLY	1 ONLY
RSP SRC	REMOTE SETPOINT SOURCE	NONE	INP 2
AUTOBIAS	AUTO BIAS ADJUSTMENT	DISABLE	DISABLE
SP TRACK	SETPOINT TRACKING	NONE	NONE
PWR MODE	POWER ON MODE	MANUAL	AM SP
SP HiLIM	SETPOINT HIGH LIMIT	300	120F
SP LoLIM	SETPOINT LOW LIMIT	0	60F
ACTION	CONTROL ACTION	REVERSE	REVERSE
OUT RATE	OUTPUT RATE	DISABLE	DISABLE
OUTLoLIM	OUTPUT LOW LIMIT	0	0
OUTHiLIM	OUTPUT HIGH LIMIT	100	100
1 Lo LIM	1 LOW LIMIT	0	0
1 Hi LIM	1 HIGH LIMIT	100	100
DROPOFF	DROPOFF	0	0
FAILSAFE	FAILSAFE OUTPUT	0	50
FAILMODE	FAILURE MODE	NO LAT	NO LAT
MAN OUT	MANUAL OUTPUT START	0	50
AUTO OUT	AUTO OUTPUT START	0	50
PBorGAIN	PROPORTIONAL OR GAIN	GAIN	PB PCT
MINorRPM	MINUTES OR RPM	MIN	MIN
	DISABLE THE ABOVE IF NO REMOTE IS USED		

Continued...

Display	Definition	Factory Setting	Nordson
OPTIONS			
AUXOUT	AUXILIARY OUTPUT	DISC	PV
0 PCT	AUXILIARY OUTPUT LOW	0	0
100 PCT	AUXILIARY OUTPUT HIGH	100	200
CRANGE	AUXILIARY OUTPUT RANGE	4-20	4-20
DIGINT	DIGITAL INPUT	NONE	NONE
COM			
COM ADDR	COMMUNICATION ADDERSS	3	3
ComSTATE	COMMUNICATIONS STATE	DISABLE	DISABLE
IRENABLE	INFERED ENABLED	ENABLED	ENABLED
BAUD	BAUD RATE	19200	19201
TX DELAY	TEXT DELAY	1	— — —
ALARMS			
A1S1TYPE	ALARM 1 TYPE	NONE	DEV
A1S1 VAL	ALARM 1 VALUE	90°	5 °F / 2.8 °C
A1S1 HL	ALARM 1 HIGH or LOW	HIGH	LOW
A1S2TYPE	ALARM 1 TYPE	NONE	DEV
A1S2VAL	ALARM 1 VALUE	10°	5 °F / 2.8 °C
A1S2HL	ALARM 1-2 HIGH or LOW	LOW	HIGH
A2S1TYPE	ALARM 2 TYPE	NONE	NONE
A2S1TYPE	ALARM 2 TYPE	NONE	NONE
AL HYST	ALARM HYSTERISIS	0.1	0.2
ALM OUT1	ALARM OUTPUT TYPE	NO LAT	NO LAT
BLOCK	ALARM BLOCKING	DISABLE	DISABLE
DIAGNOST	DIAGNOSTICS	DISABLE	DISABLE
DISPLAY			
DECIMAL	DISPLAY DECIMAL	NONE	NONE
TEMPUNIT	TEMPERATURE UNITS	NONE	DEG F or DEG C
PWR FREQ	SUPPLY POWER HERTZ	60HZ	60HZ OR 50 HZ
RATIO 2	RATIO 2	DISABLE	DISABLE
LANGUAGE	DISPLAY LANGUAGE	ENGLISH	ENGLISH

Continued...

Display	Definition	Factory Setting	Nordson
CALIBRATE			
CAL IN1	INPUT 1 CALIBRATION	DISABLE	DISABLE
INPUT 1	INPUT 1	FACTORY CALIBRATED	FACTORY CALIBRATED
INPUT 2	INPUT 2	FACTORY CALIBRATED	FACTORY CALIBRATED
CAL IN2	INPUT CALIBRATION	DISABLE	DISABLE
CURRENT	CONTROL OUTPUT	**Use proper device to calibrate.**	
ZERO VAL	ZERO VALUE	**Read meter.**	SET AT 4 Ma
SPAN VAL	SPAN VALUE	**Read meter.**	SET AT 20 Ma
AUX OUT	RETRANSMIT VALUE	— — —	CALIB
ZERO VAL	ZERO VALUE	**Read meter.**	SET AT 4 Ma
SPAN VAL	SPAN VALUE	**Read meter.**	SET AT 20 Ma

Watlow EZ PM6C Controller Configuration Settings

Upper Display	Lower Display	Definition	Factory Setting	Nordson
OPERATIONS – Chapter 5				
On the controller, press both arrow buttons for 3 seconds to access the OPERATIONS screen. **NOTE:** ---- in the upper display indicates a sensor error.				
ANALOG INPUT MENU				
Ai	oPEr	Analog Input Menu	--	
1	Ai	Analog Input 1	1	1
PV	Ain	Process value (enter temperature)	##.##	
	iEr	Error status	nonE	nonE
	iCA	Calibration Offset	0.00	0.00
MONITOR MENU				
Mon	oPEr	Monitor Menu	--	
	C.MA	Control Mode Active	Auto	Auto
	h.Pr	Heat Power	0.0	0.0
	C.Pr	Cool Power	0.0	0.0
	C.SP	Closed Loop Working Set Point	75 °F	75 °F / 24 °C
	Pv.A	Process Value Active	##	##
LOOP MENU				
LooP	oPEr	Loop Menu	--	
No	r,En	Remote Enable	no	no
	r,ty	Remote Set Point Type	Auto	Auto
	C.M	Control Mode	Auto	Auto
	A.tSP	Autotune Set Point	90.0	90.0
	AUt	Autotune Request	no	no
	C.SP	Closed Loop Set Point	75 °F	75 °F / 24 °C
	id.S	Idle Set Point	75 °F	75 °F / 24 °C
	h.Pb	Heat Proportional Band	25 °F	25 °F / -4 °C
	h.hy	Heat Hysteresis	3 °F	3 °F / -16 °C
	C.Pb	Cool Proportional Band	25 °F	25 °F / -4 °C
	C.hyl	Cool Hysteresis	3 °F	3 °F / -16 °C
	ti	Time Integral	180.0	180.0
	td	Time Derivative	0.0	0.0
	db	Dead Band	0.0	0.0
	o.SP	Open Loop Set Point	0.0	0.0

Continued...

Upper Display	Lower Display	Definition	Factory Setting	Nordson
ALARM MENU				
ALM	oPEr	Alarm Menu	--	
1	ALM	Alarm #1	--	
	A.Lo	Low Set Point (-5 below SP)	32 °F	–5
	A.hi	High Set Point (+5 above SP)	300 °F	+5
CURRENT MENU				
Curr	oPEr	Current Menu	--	
	C.hi	High Set Point	50.0	50.0
	C.Lo	Low Set Point	0.0	0.0
	CU.r	Read	0.0	0.0
	C.Er	Error	nonE	nonE
	h.Er	Heater Error	nonE	nonE
SETUP – Chapter 6				
On the controller, press both arrow buttons for 6 seconds to access the SETUP screen.				
ANALOG INPUT MENU				
Ai	SEt	Analog Input Menu	--	
1	Ai	Analog Input 1	1	1
	SEn	Sensor Type	tC	r0.1H
	rt.L	RTD Leads-wire	2	3
	FiL	Filter Time	0.5	0.5
	i.Er	Error Latching	oFF	oFF
	dEC	Decimal	Whole	0.00
	S.bA	Sensor Backup Enable	oFF	oFF
2	Ai	Analog Input 2	2	2
	SEn	Sensor Type	tC	MA
	S.Lo	Scale Low	0.0	4.0
	S.hi	Scale High	20.0	20.0
	r.Lo	Range Low	0.0	0.0
	r.hi	Range High	9999.0	200 °F / 93 °C
	P.EE	Process Error Enable	oFF	oFF
	P.EL	Process Error Low	0.0	Default
		Alarm #3 and #4 leave as defaults		

Continued...

Upper Display	Lower Display	Definition	Factory Setting	Nordson
DIGITAL INPUT MENU (Not Used)				
dia	SEt	Digital Input/Output Menu	--	
5	dia	Digital Input or Output 5	5	5
--	dir	Direction	OtPt	OtPt
	Fn	Function	oFF	oFF
	o.Ct	Control	Ftb	Ftb
	o.tb	Time Base	0.1	0.1
	o.Lo	Low Power Scale	0.0%	0.0%
	o.hi	High Power Scale	100.0%	100.0%
	Fi	Function Instance	None	None
LOOP MENU				
LooP	SEt	Loop Menu	--	
	h.Ag	Heat Algorithm	PID	PID
	C.Ag	Cool Algorithm	oFF	PID
	C.Cr	Cool Output Curve	oFF	oFF
	t.tUn	Tru-Tune Enable	no	no
	t.bnd	Tru-Tune Band	0	0
	t.gn	Tru-Tune Gain	3	3
	t.Agr	Autotune Aggressiveness	Crit	Crit
	UFA	User Failure Action	oFF	oFF
	FAiL	Input Error Failure	USEr	USEr
	MAn	Manual Power	0.0	0.0
	L.dE	Open Loop Detect Enable	no	no
	L.dt	Open Loop Detect Time (secs.)	240	240
	L.dd	Open Loop Detect Deviation	10 °F	10 °F / -12 °C
	rP	Ramp Action	oFF	oFF
	r.SC	Ramp Scale	Min	Min
	r.rt	Ramp Rate	1.0 °F	1.0 °F /-17 °C
	L.SP	Low Set Point	-1,999 °F	60 °F / 15 °C
	h.SP	High Set Point	9,999 °F	130 °F / 54 °C
	SP.Lo	Set Point Low Limit Open Loop	-100	-100
	SP.hi	Set Point High Limit Open Loop	100.0	100.0

Continued...

Upper Display	Lower Display	Definition	Factory Setting	Nordson
OUTPUT MENU				
	All settings are not listed. If a setting is not listed, it is a default value.			
otPt	SEt	Output Menu	--	
1	otPt	Output #1	1	1
	Fn	Function	Heat	Heat
	o.ty	Type	volts	volts
	r.Sr	Retransmit Source	Ai	Ai
	o.tb	Time Base (sec)	20	20
	o.Lo	Low Power Scale	0.0%	0.0%
	o.hi	High Power Scale	100.0%	100.0%
2	otPt	Output #2	2	2
	Fn	Function	oFF	Cool
	o.ty	Type	volts	volts
	o.tb	Time Base (sec)	20	20
	o.Lo	Low Power Scale	0.0%	0.0%
	o.hi	High Power Scale	100.0%	100.0%
3	otPt	Output #3	3	3
	Fn	Function	oFF	rMT
	o.ty	Type	volts	MA
	r.Sr	Retransmit Source	Ai	Ai
	Fi	Function Instance	1	1
	S.Lo	Scale Low (mA)	0.0	4.0
	S.hi	Scale High (mA)	10.0	20.0
	r.Lo	Range Low	0.0 °F	0.0 °F / 18 °C
	r.hi	Range High	9,999 °F	200 °F / 93 °C
	o.Lo	Low Power Scale	0.0	0.0
	o.hi	High Power Scale	100.0	100.0
	o.CA	Calibration Offset	0.0 °F	0.0 °F
4	otPt	Output #4	4	4
	Fn	Function	oFF	ALM
	o.ty	Type	volts	MA
	r.Sr	Retransmit Source	Ai	Ai
	Fi	Function Instance	1	1

Continued...

Upper Display	Lower Display	Definition	Factory Setting	Nordson
ALARM MENU				
ALM	SEt	Alarm Menu	--	
1	ALM	Alarm #1	1	1
	R.ty	Type	oFF	dE.AL
	Sr.A	Source	Ai	Ai
	iS.A	Source Instance	1.0	1.0
	A.hy	Hysteresis	1.0 °F	0.2 °F / -18 °C
	A.dL	Delay	0.0	5
	All settings are not listed. If a setting is not listed, it is a default value.			
FUNCTION KEY MENU				
Fun	SEt	Function Key Menu	--	
	Lev	Level	high	high
	Fn	Digital Input Function	none	r.En
	Fi	Instance	0	1
GLOBAL MENU				
gLbL	SEt	Global Menu	--	
	C_F	Display Units	°F	F or C depending
	AC.LF	AC Line Frequency	60 Hz	60 Hz
	P.tyP	Profile Type	StPt	StPt
	gSE	Guaranteed Soak Enable	oFF	oFF
	gSd	Guaranteed Soak Deviation	10 °F	10 °F / -12 °C
WATLOW	Part Number: PM6C3EJ-AR-FJ-AAA			

DECLARATION of CONFORMITY

Product: Temperature Control Unit

Models: Two – Piece Inside Spray (Container) Single / Dual

Description: Temperature control unit for can lacquer to be sprayed on the inside of a can.

Applicable Directives:
2014/35/EU – Low Voltage Directive
2014/30/EU – EMC Directive

Standards Used for Compliance:
EN60204-1 (2006)

EN61000-6-4 (2007 + A1: 2011)
EN55011 (2009)

EN61000-6-2 (2005)
EN61000-4-2 (2009)
EN61000-4-3 (2006)
EN61000-4-4 (2012)
EN61000-4-6 (2014)

Marco Ciconne
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Date: 17 May 2016

Nordson Authorized Representative in the EU
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