Multi-Channel Temperature Conditioning System

Part 104 377A

NORDSON CORPORATION • AMHERST, OHIO • USA
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SECTION 1
SAFETY SUMMARY

INTRODUCTION

This section of the manual contains safety guidelines for the use of Nordson® equipment. They are repeated throughout the manual where they apply, along with some specific warnings and cautions which are not included here. The guidelines cover installation, operation, and servicing. The safety information contained in this section applies to anyone working with Nordson equipment, including operations and service personnel.

**WARNING:** Failure to follow these recommendations may result in personal injury from burns or electrocution and/or equipment and property damage.

EXPLANATION OF TERMS AND SYMBOLS

The following safety symbols and signal words are used throughout this publication to alert the reader to personal safety hazards, or to identify conditions that may result in equipment or property damage.

**WARNING:** General warning. Failure to observe may result in personal injury or death.

**WARNING:** Risk of electrical shock. Failure to observe may result in personal injury or death.

**CAUTION:** General caution. Failure to observe may result in minor personal injury or damage to property.

**NOTE:** Important information. Failure to observe may result in equipment damage.
SAFETY DURING INSTALLATION

Electrical

1. A protective electrical ground connection to a reliable earth ground is essential for safe operation. Without one, all accessible conductive components (including knobs and controls that appear insulated) can render an electric shock.

2. A disconnect switch with lockout capability must be provided between the power source and the equipment.

3. The power supply wire gauge and insulation must be sufficient to meet the temperature and power requirements.

4. Only fuses of the correct type voltage rating and current rating should be used. Refer to the Nordson equipment parts list for fuse recommendations. Using incorrect or nonrecommended fuses can present a fire hazard.

SAFETY DURING OPERATION

DO NOT operate Nordson equipment under the following conditions:

1. At a pressure higher than the rated maximum working pressure of any component in the system.

2. Near volatile or otherwise explosive gases or materials.

3. Without the covers, panel and safety guards properly installed.

4. At atmospheric temperatures below 20°F (-6°C) or above 120°F (50°C).

5. With hoses enclosed in any material that interferes with heat dissipation. This includes electrical conduit, insulation of any type or tight metal covers.

6. With large areas of hose in contact with a cold floor, cold supports or other such surfaces. Cold points along the hose restrict the flow of adhesive inside the hose and can create potential problems during operations.
7. In drafty areas with the applicator guns unshielded from the draft. Rapid heat dissipation due to air movement across the guns may cause operational problems.

8. (If a handgun is used) with the handgun trigger left unlocked while the gun is unattended.

in addition:

1. Use only the metal base when attempting to lift or move an applicator. **DO NOT** use equipment covers, doors, panels or hose connectors as braces or grips.

2. **NEVER** use Nordson equipment as a ladder or stepping stool.

3. Route all hoses to prevent damage from kinking, abrasion and other physical damage. **DO NOT** allow a hose to be installed with a bend radius of less than 6 inches (150 mm).

4. **NEVER** point an applicator handgun at yourself or anyone else.

**SAFETY DURING SERVICING**

1. **DO NOT** perform internal service or adjustment on any equipment unless another person capable of rendering first aid and resuscitation is present.

2. Only qualified personnel should service Nordson equipment.

3. To avoid personal injury, never touch exposed connections and components while power is ON. Dangerous voltages exist at several points in the equipment.

4. Disconnect, lock out and tag external electrical power before removing protective panels or replacing electrical components.

5. Remove all jewelry (rings, watches, etc.) before servicing equipment.

6. If possible, stand on a rubber mat when servicing Nordson equipment. **DO NOT** work on equipment if standing water is present. Avoid working in a high-humidity atmosphere. Cover exposed terminals and work areas with rubber sheeting to avoid accidental contact while the power is ON.
7. Always wear safety glasses, protective gloves (Nordson P/N 902 514) or equivalent and long-sleeved protective clothing to prevent injury from hot applicator parts, splashed hot melt adhesive and hot gun surfaces.

8. To prevent serious injury from molten adhesive under pressure, always relieve system hydraulic pressure (by triggering the gun, for example) before opening any hydraulic fitting or connection.

9. **NEVER** use an open torch, drill or broach when cleaning a nozzle.

10. **NEVER** operate equipment with a known leak in the system.

**SAFETY WHEN USING HOT MELT ADHESIVES AND SOLVENTS**

**Hot Melt Adhesives**

1. Use extreme care when working with molten material. They solidify rapidly at high temperatures and present a hazard. Severe burns can occur if the molten materials come in contact with the skin. Even when first solidified, they are still hot.

2. Always wear protective clothing and eye protection when handling molten material or working near equipment containing hot melt adhesives under pressure.

3. **IF MOLTEN MATERIAL COMES IN CONTACT WITH THE SKIN.**
   - **DO NOT** try to remove molten material from the skin.
   - Immediately immerse the affected area in cold, clean water. Keep the affected areas immersed until the material has cooled. **DO NOT** try to remove the cooled material from the skin.
   - Cover the affected area with a clean, wet compress.
   - In cases of severe burns, look for signs of shock. If shock is suspected, have patient lie down, use a blanket to preserve body heat and elevate the feet several inches.
   - Call a physician immediately.
Heating Solvents

1. **DO NOT** use an open flame or uncontrolled heating device to heat solvents (for example, a small pan on an unregulated hot plate).

2. Avoid fire hazard by using a controlled heating device to heat solvents (for example, a small deep fat fryer or thermostatically controlled hot plate).

3. **DO NOT** USE PAINT-TYPE SOLVENTS UNDER ANY CIRCUMSTANCES! These solvents are volatile and may be a fire and/or toxic-vapor hazard even at room temperature.

4. Always be sure the work area is adequately ventilated. Avoid prolonged or repeated breathing of solvent vapors.

5. Halogenated Hydrocarbon Solvents are dangerous when used to clean aluminum components in a pressurized fluid system. No available stabilizers prevent halogenated hydrocarbon solvents from reacting under all conditions with aluminum components in a pressurized fluid pumping system.

6. **NEVER** clean any aluminum component or flush any system using halogenated hydrocarbon solvents. Use Type R (P/N 270 755) solvents or contact your solvent or hot melt supplier for a non-halogenated hydrocarbon solvent for cleaning and flushing. Halogenated fluids include the following solvents:

Fluorinated Solvents:
- Dichlorofluoromethane
- Trichlorofluoromethane

Chlorinated Solvents:
- Carbon Tetrachloride
- Chloroform
- Dichloromethane
- Ethylene Dichloride
- Methylene Chloride
- Monochlorobenzene
- Monochlorotoluene
- Orthodichlorobenzene
- Perchloroethylene
- Trichloroethylene

Brominated Solvents:
- Ethylene Dibromide
- Methyl Bromide
- Methylene Chlorobromide

Iodinated Solvents:
- Ethyl Iodide
- Methyl Iodide
- N-butyl Iodide
- Propyl Iodide
SECTION 2
EQUIPMENT FAMILIARIZATION

HEATING AND TEMPERATURE CONTROL

The Nordson Temperature Conditioning System is used to monitor and control from three to six hose and gun channels (also called "zones") in a room temperature adhesive/sealant application system. These types of materials may require only slight elevation of temperature in order to obtain maximum adhesive application characteristics. This System provides a temperature range suited to the needs of these materials.

Separate modules, each equipped with a dial-type potentiometer, are physically mounted to the Temperature Conditioning System logic and control unit (LCU) on the inside panel of the System's controller assembly door. Each module is used to set the application temperature of each channel.

Temperature control is performed by resistance temperature detectors (RTD) connected electrically to the LCU circuitry. The RTDs are physically located in the hoses and guns.

![Diagram of the Logic and Control Unit (LCU) Indicator Panel](image)

Figure 2.1 - Logic and Control Unit (LCU) Indicator Panel (Six-Channel Version Shown).
When an RTD senses that the actual channel temperature is below the operating setpoint, the Temperature Conditioning System LCU energizes the heater in that channel until the setpoint is reached. Once the setpoint is reached, the heater is cycled on and off, as needed, in order to maintain the desired operating temperature.

The LCU Indicator Panel on the exterior of the enclosure door is equipped with a digital temperature display, a red sensor fault light emitting diode (LED), amber channel indicator LEDs and a channel selector switch.

Each amber channel indicator LED (Figure 2.1) provides a visual signal whether the operating temperature for that channel has been reached. A continuously lit channel LED indicates that the setpoint has NOT yet been reached and that the heater in that channel is energized. A blinking LED indicates that the setpoint HAS been reached and that the heater in that channel is being intermittently energized in order to maintain the operating temperature.

A lit SENSOR FAULT red LED (Figure 2.1) indicates that a channel RTD is electrically shorted or open. Following approximately a 40-second time delay, the Temperature Conditioning System K1 contact opens, de-energizing the master power contactor (KM). De-energizing KM disconnects power to the temperature control circuitry and to all heating elements.

NOTE: The LCU remains active even if KM is de-energized. The digital temperature display and the channel selector switch (Figure 2.1) can be used to isolate the location of the sensor fault.

NOTE: Refer to Section 5 of this publication for electrical schematics and wiring diagrams.

OVERTEMPERATURE PROTECTION AND CONTROL

This feature continuously monitors each channel and compares the existing channel temperature to the operator-adjustable over-temperature setting. An overtemperature condition in any channel will cause the red OVER-TEMP indicator lamp on the controller assembly enclosure door to illuminate.
NOTE: If the overtemperature condition lasts for over approximately 40 seconds, the K1 contact will open, the master power contactor (KM) will de-energize and power will be disconnected from the temperature control circuitry and heating elements. The digital temperature display and the selector switch can be used to isolate the over-temperature condition.

NOTE: The LCU remains active even if KM is de-energized. The digital temperature display and the channel selector switch (Figure 2.1) can be used to isolate the location of the sensor fault.

NOTE: Refer to Section 5 of this publication for electrical schematics and wiring diagrams.

OPERATING CONTROLS AND INDICATORS

Figure 2.2 illustrates some of the Temperature Conditioning System controls and indicators.

Setpoint Temperature Potentiometers

Located on the LCU inside the controller assembly door, these dials are used to set the desired operating temperature for each hose and gun channel.

Main Disconnect Switch

This control enables the operator to disconnect input electrical power from the controller assembly and lock it out for maintenance purposes.

START Pushbutton

When pressed, this control energizes the main power contactor (KM) and supplies power to the temperature control circuitry and heating elements.
Figure 2.2 - Controller Assembly Controls and Indicators.

POWER ON Indicator Lamp (White)

This indicator is lit when the START button is pressed, indicating that power is being applied to the controller assembly.

STOP Pushbutton

When pressed, this control removes electrical power from the control circuitry and heating elements by de-energizing the main power contactor (KM).

OVER-TEMP Indicator (Red)

This indicator lights when the existing channel temperature exceeds the overtemperature limit.

SENSOR FAULT Indicator (Red LED)

This indicator lights when one or more of the channel RTDs is shorted or open.

Digital Temperature Display

This display indicates the selected channel temperature in °F.
Channel Display Selector Switch

Used to select a channel to display the actual temperature for that channel. Placing the switch in the TEMP LIMIT position will display the factory-set overtemperature limit.

Channel Indicators (Amber LEDs)

The amber indicator for each channel will light as the heater for that channel is energized. Constant ON means constant energy to that channel's heater. Intermittent ON means that setpoint temperature has been reached and the heater is being energized only enough to maintain the setpoint temperature.
SECTION 3
INSTALLATION

INTRODUCTION

Installation of the Temperature Conditioning System covers the following topics:

- Unpacking
- Inspection
- Installation

UNPACKING

No special instructions are required to unpack the Temperature Conditioning System, which is shipped preassembled. Hoses and guns are shipped separately, also preassembled. Normal care should be exercised not to damage the equipment during unpacking.

INSPECTION

After unpacking, make the following inspections:

1. Inspect surfaces for evidence of dents, scratches, corrosion and other physical damage.

2. Open the controller assembly door and ensure that all electrical connections are tight.

3. Inspect the hoses for broken connectors, rips in the outer cover, evidence of kinks or other damage.

4. Inspect all fasteners and mechanical connections for tightness.

5. If any problems are found please contact your Nordson service representative before installing the Temperature Conditioning System.
INSTALLATION

1. Complete bulk unloader or applicator installation as detailed in the manual for your equipment.

2. Complete hose and gun hydraulic connections as detailed in the bulk unloader or applicator manual.

   **NOTE:** Hoses must be routed to prevent damage from kinking and abrasion. **DO NOT** allow a hose to be installed with a bend radius of less than 6.50 in. (165 mm).

3. Utilizing the mounting holes in the controller assembly enclosure, mount the enclosure in a location that provides easy access by the operator.

4. Plug the hose electrical connectors into their receptacles on the side of the controller assembly.

   **NOTE:** Ensure that the hose-to-connector pins are oriented correctly (pins lining up with their sockets) before completing this connection. Damage to the connectors and receptacles may result if the pins are not oriented properly.

5. If one is not already in place, install an electrical disconnect switch with a lockout in the input power supply line to the controller.

   **WARNING:** This equipment contains electrical potentials that can be fatal. Disconnect and lock out input electrical power to the controller assembly before proceeding with this procedure.

6. Remove the knock-out plug on the top of the controller enclosure and route a single-phase, 120 VAC input power line through it.

7. Open the controller assembly door and, referring to Figure 3.1, and connect the 120 VAC input power supply to terminals L1 and L2 on the main disconnect switch.
NOTE: The input voltage must be the same as specified on the controller enclosure (+10%).

8. Connect the ground wire to the ground stud (24, Figure 6.1) inside the controller enclosure.

9. Connect a reliable, non-floating earth ground to this ground stud.

Figure 3.1 - Input Electrical Power Line Connections.
SECTION 4
OPERATING INSTRUCTIONS

SETUP AND OPERATION

WARNING: This equipment contains electrical potentials that can be fatal. Disconnect and lock out input electrical power to the controller assembly before working inside the enclosure. The input terminal board and input terminals on the fused disconnect switch remain electrically energized even with the main disconnect switch in the OFF position.

1. Open the enclosure door and set each channel's operating temperature setpoint dial to the desired setting.

WARNING: The application temperature setting is dependent on the characteristics of the material being used. Consult the manufacturer of the material for the recommended application temperature setting if in doubt.

2. Close and secure the enclosure door.

3. Restore input electrical power to the controller assembly.

4. Place the main disconnect switch in the ON position.

5. Press the START pushbutton. This will illuminate the white POWER ON indicator.

6. To view a channel's existing temperature and its mode of heating, turn the selector switch to the appropriate channel. The existing temperature will be shown on the digital display (in degrees Fahrenheit) and the mode of heating will be shown by the amber LED indicator. A continuously lit channel LED indicates that the channel has not reached the operating temperature setting. A blinking LED indicates that the channel is at operating temperature.

7. Set the channel display selector switch to the TEMP LIMIT position. The overtemperature limit will be shown on the digital display. This temperature should be at least 25°F (13°C) above the channel operating temperature settings. If it is, proceed with normal operation. If the overtemperature setting is not at least 25°F (13°C) above the application temperature,
use an insulated, flatblade screwdriver to turn the recessed slothead screw below the main disconnect switch counterclockwise and open the enclosure door.

8. Referring to Figure 4.1, locate the LCU circuit board on the inside of the enclosure door.

![Figure 4.1 - Location of LCU Circuit Board.](image1)

9. Referring to Figure 4.2, locate trim potentiometer R1 on the LCU circuit board.

10. While watching the LCU digital display, use a short, insulated, flatblade screwdriver to turn trim pot R1 to increase or decrease the overtemperature setting as required.

**WARNING:** A fire hazard exists if the overtemperature setting is too high. Consult the material manufacturer to ensure that the overtemperature setting is below the flashpoint.

![Figure 4.2 - Upper Right Portion of LCU Circuit Board Showing Location of Trim Pot R1.](image2)
11. When the correct overtemperature setting has been achieved, close and latch the enclosure door.

12. To cease operation of the controller assembly, press the STOP pushbutton.
SECTION 5
TROUBLESHOOTING

WARNING: This equipment contains electrical potentials that can be fatal. Turn the main disconnect switch OFF and disconnect and lock out external power to the controller before repairing or replacing any system component. Should a procedure require working inside the controller enclosure with the POWER ON, observe all normal electrical safety precautions when working on or near energized components.

CHANNEL LED INDICATORS

The channel LED indicators will remain continuously lit while the channel is being heated, blink when the operating temperature setting is reached, and remain off when the channel temperature exceeds the setting by more than 2.7°F (1.5°C).

SENSOR FAULT LED

During normal operation, the SENSOR FAULT LED remains off. The indicator can be used to isolate problems when an abnormal condition occurs. The indicator will be lit when an open or shorted channel RTD occurs.

If the SENSOR FAULT indicator LED does go on, a 40-second time delay (approximately) will elapse during which troubleshooting and the fault condition correction must occur before the master power contactor (KM) de-energizes and disconnects power from the heating elements.

If KM de-energizes, the POWER ON lamp will also go out. However, the digital display will remain active. This allows the operator to scan the heating zones and locate the fault condition.

The faulty RTD is will be located in the channel which displays an illogically high temperature (for example, 700°F). Failed gun RTDs may be replaced according to instructions in the gun manual.

If a single-RTD hose RTD fails or if both RTDs in a dual-RTD hose fail, the entire hose must be replaced because hoses are not field-repairable.
Table 1 - Logic Control Unit LED Operation

<table>
<thead>
<tr>
<th>Situation</th>
<th>Normal?</th>
<th>Amber Channel LED</th>
<th>Red Sensor Fault LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Heating</td>
<td>Yes</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>Channel Temperature At Setpoint</td>
<td>Yes</td>
<td>Blinking</td>
<td>Off</td>
</tr>
<tr>
<td>Channel Temperature Slightly Over Setpoint</td>
<td>Yes</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>Channel RTD Fails Closed (short)</td>
<td>No</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>Channel RTD Fails Open</td>
<td>No</td>
<td>Off</td>
<td>On</td>
</tr>
</tbody>
</table>

See Table 1 (above) for a summary of SENSOR FAULT and channel LED indicator operation.

**SENSOR FAULT WITH A DUAL-RTD HOSE**

Should one RTD fail within a dual-RTD hose (causing the SENSOR FAULT indicator LED to light), the hose may be kept in service by activating the remaining hose RTD as follows:

1. Press the STOP pushbutton on the controller enclosure and place the main disconnect switch in the OFF position.

2. Open the controller assembly door and locate the appropriate hose connector (Figure 6.1).

3. Referring to the wiring diagram (Figure 5.1), use a pin removal tool (P/N 274 126 or similar item) to remove Pin C from its location in the socket and place it at the location for Pin E. The remaining hose RTD is now prepared for operation.
4. Close the enclosure door and place the main disconnect switch in the ON position.

OVER-TEMP INDICATION

The red OVER-TEMP indicator lamp will be go on if the temperature in one or more channels exceeds the overtemperature limit for the channel.

As with the SENSOR FAULT indicator LED, if the OVER-TEMP lamp does go on, a 40-second time delay (approximately) will elapse during which troubleshooting and the fault condition correction must occur before the master power contactor (KM) de-energizes and disconnects power from the heating elements.

The digital temperature display remains active and can be used to locate the channel with the overtemperature condition as detailed in the Sensor Fault LED procedure of this section.
Figure 5.1  Multi Channel Temperature Conditioner
Wiring Diagram (1 of 2).
Figure 5.1 - Multi-Channel Temperature Conditioner Wiring Diagram (2 of 2).
Figure 5.2 - Multi-Channel Temperature Conditioner
Electrical Schematic.
SECTION 6
ILLUSTRATED PARTS LIST

HOW TO USE THE ILLUSTRATED PARTS LISTS

1. Refer to the appropriate page and use the component illustration for part(s) identification. Note the item number call-out for the part.

2. Locate the item number in the Item Number column.

3. The next three columns give the Part Number, Description, and Required quantity of the item in the assembly:

   a. The Part Number column contains either the six-digit part number or a dash (-). A dash in the column means that the part is a nonsaleable item and cannot be ordered.

   b. The Description column provides a verbal identification of the part/assembly, including dimensions (if necessary).

   c. The Required (Req'd) column contains the quantity of the part within the illustration. "Ref" indicates that the part is listed for reference purposes only. A dash (-) indicates that the item is utilized only as necessary within the component.
## Temperature Conditioner Controller Assembly Part List

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Req'd</th>
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<tr>
<td>1</td>
<td>852</td>
<td>Assembly, Controller, Conditioner, Temperature, Three-Channel</td>
<td>Ref</td>
</tr>
<tr>
<td>2</td>
<td>900</td>
<td>Assembly, Controller, Conditioner, Temperature, Four-Channel</td>
<td>Ref</td>
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<td>Block, Fuse (3-Channel)</td>
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<td>Block, Fuse (4-, 5- and 6-Channel)</td>
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<td>022</td>
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</tr>
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<td>Screw, Fillister Head, 6-32 x 0.375 in. (6-Channel)</td>
<td>24</td>
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<tr>
<td>16</td>
<td>100</td>
<td>• Washer, Lock (3-Channel)</td>
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<tr>
<td>17</td>
<td>327</td>
<td>• Mechanism, Handle, Disconnect</td>
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<tr>
<td>18</td>
<td>354</td>
<td>• Panel, Inner, Electrical Enclosure</td>
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<tr>
<td>19</td>
<td>336</td>
<td>• Block, Terminal</td>
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<tr>
<td>20</td>
<td>328</td>
<td>• Assembly, Handle, Door</td>
<td>1</td>
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<td>• Triac, Tank, Control, 25A (3-Channel)</td>
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<td>25</td>
<td>418</td>
<td>• Nameplate, Nordson Oval</td>
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## Temperature Conditioner Controller Assembly Part List (continued)

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<th>Item No.</th>
<th>Part No.</th>
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<tr>
<td>26</td>
<td>984 529</td>
<td>• Nut, Spring, Push-On, 0.13 in.</td>
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<td>27</td>
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<td>• Plate, ON/OFF, Main Breaker</td>
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<td>28</td>
<td>939 507</td>
<td>• Fuse, 15A, 600V</td>
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<td>939 019</td>
<td>• Fuse, 15A</td>
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<td>30</td>
<td>981 905</td>
<td>• Screw, Drive, 2.00 x 0.187 in.</td>
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<td>31</td>
<td>324 351</td>
<td>• Switch, Fusible, 30A</td>
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<td>32</td>
<td>272 620</td>
<td>• Suppressor, Arc w/Terminals</td>
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<td>981 064</td>
<td>• Screw, Pan Hd, 8-32 x 0.38 in.</td>
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<td>983 011</td>
<td>• Washer, Lock</td>
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<td>112 407</td>
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<td>36</td>
<td>324 442</td>
<td>• Standoff, 10-32 x 3.00 in.</td>
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<td>• Wire Group (4-Channel)</td>
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<td>• Wire Group (6-Channel)</td>
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<td>• Screw, Pan Head, 4-40</td>
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<td>984 104</td>
<td>• Nut, Hex</td>
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<td>• Nameplate, Information</td>
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<td>• Screw, Pan Head, 6-32 x .250 in. (4-Channel)</td>
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<td>• Gasket, Neoprene</td>
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<td>• Screw, Fillister Head, 10-32 x 0.625 in.</td>
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<td>48</td>
<td>271 221</td>
<td>• Lug, Terminal, Ground</td>
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<td>49</td>
<td>984 129</td>
<td>• Nut, Hex</td>
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<td>240 674</td>
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<td>981 156</td>
<td>• Screw, Pan Head, 10-32 x 1.00</td>
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<td>931 281</td>
<td>• Cable, 3-Conductor</td>
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<td>939 486</td>
<td>• Connector, Strain Relief, 90-degree</td>
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</table>
Figure 6.1 - Multi-Channel Temperature Conditioning Controller Assembly (1 of 2).
Figure 6.1 - Multi-Channel Temperature Conditioning Controller Assembly (2 of 2).
SECTION 7
TECHNICAL DATA

SPECIFICATIONS

Amperage (minimum service) .................................................... 30 amps
Voltage (nominal service) ........................................................... 120 VAC
Maximum Amperage (per hose/gun channel) ................................ xx amps
Maximum Amperage (total combined hoses and guns) ........ xx amps
Temperature Sensing Method ...................................................... RTD
Temperature Range (degrees Fahrenheit) ....................................
Heating Channels (maximum) ..................................................... 6

Figure 7.1 - Controller Assembly Dimensions.

NOTE: Due to possible technological and/or quality improvements, equipment specifications are subject to change without notice.