## Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Author</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>1/2012</td>
<td>K. Livingston</td>
<td>Initial release</td>
</tr>
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<td>6/2013</td>
<td>K. Livingston</td>
<td>Minor edits</td>
</tr>
</tbody>
</table>

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1. About This Manual

1.1. Important User Information

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Printed and bound in the United States of America.

The information in this manual is subject to change without notice and does not represent a commitment on the part of Despatch Industries. Despatch Industries does not assume any responsibility for any errors that may appear in this manual.

In no event will Despatch Industries be liable for technical or editorial omissions made herein, nor for direct, indirect, special, incidental, or consequential damages resulting from the use or defect of this manual.

Values displayed on screens are examples only. Though those values may be typical, contact Despatch Industries for the final value.

Users of this equipment must comply with operating procedures and training of operation personnel as required by the Occupational Safety and Health Act (OSHA) of 1970, Section 6 and relevant safety standards, as well as other safety rules and regulations of state and local governments. Refer to the relevant safety standards in OSHA and National Fire Protection Association (NFPA), section 86 of 1990.
Danger!

Only fully-trained and qualified personnel should setup and maintain this equipment. Improper setup and operation of this equipment could cause an explosion that may result in equipment damage, personal injury or possible death.

The information in this document is not intended to cover all possible conditions and situations that might occur. The end user must exercise caution and common sense when installing or maintaining Despatch Industries products. If any questions or problems arise, call Despatch Industries at 1-888-DESPATCH or 1-952-469-5424.

Modbus communication protocols require the Protocol 3 controller be updated to version 2.3 or higher.

1.2. Manufacturer & Service

Despatch has specialized in thermal processing for over 100 years. Technical expertise gained over those years helps provide innovative solutions to critical applications in vertical markets and cutting edge technology worldwide. Despatch products are backed by a drive for long-term customer satisfaction and a strong sense of responsibility. The worldwide network of factory-trained Service Professionals is available to support your Despatch equipment. From full service preventive maintenance to routine repair and certified calibration and uniformity, the Despatch service network is positioned to respond to your business needs. Our service programs are customized to meet your specific needs using our Advantage Service Assurance Program (ASAP). For more information on ASAP, visit www.despatch.com.

<table>
<thead>
<tr>
<th>Global Headquarters</th>
<th>Contact</th>
<th>Service &amp; Technical Support</th>
</tr>
</thead>
</table>
| Despatch Industries | International/Main: 1-952-469-5424  
8860 207th Street  
Lakeville, MN 55044  
USA  
US toll free: 1-888-337-7282  
Fax: 1-952-469-4513  
info@despatch.com  
US toll free: 1-800-473-7373  
Service @despatch.com |
1.3. Organization of this Manual

This owner’s manual contains the most comprehensive set of information for the Despatch Protocol 3™ controller, including installation instructions, theory of operation, operating instructions, among other things.

---

**Danger!**

*Failure to heed warnings in this instruction manual and on the oven could result in personal injury, property damage or death.*

---

1.4. Conventions

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="exclamation.png" alt="Exclamation Mark" /></td>
<td>This icon signifies information that describes an unsafe condition that may result in death, serious injury, or damage to the equipment.</td>
</tr>
<tr>
<td><strong>Danger!</strong></td>
<td>Danger is the signal word used to indicate a hazardous situation that, if not avoided, will result in death or severe injury.</td>
</tr>
<tr>
<td><strong>Warning!</strong></td>
<td>Warning is the signal word used to indicate a hazardous situation that, if not avoided, could result in death or severe injury.</td>
</tr>
<tr>
<td><strong>Caution!</strong></td>
<td>Caution is the signal word used to indicate a hazardous situation that, if not avoided, could result in moderate or minor injury.</td>
</tr>
<tr>
<td><strong>Notice</strong></td>
<td>Notice is the signal word used to indicate a hazardous situation that, if not avoided, could result in property damage.</td>
</tr>
<tr>
<td><img src="notebook.png" alt="Notebook" /></td>
<td>This icon signifies supplemental important information.</td>
</tr>
<tr>
<td><strong>LOG OUT</strong></td>
<td>Bold, 10 point sans-serif typeface indicates a specific key or button on screen to click.</td>
</tr>
</tbody>
</table>
1.5. **Specifications**

Specifications for the Protocol 3 controller include six sets of information:

- Process Input (Table 1)
- Outputs (Table 2)
- Operating Conditions (Table 3)
- Conformance Norms (Table 4)
- Display (Table 5)
- Data Recorder (Table 6)

### Table 1. Process Input.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling Rate:</td>
<td>4 per second</td>
</tr>
<tr>
<td>Resolution:</td>
<td>16 bits. Always four times better than display resolution.</td>
</tr>
<tr>
<td>Impedance:</td>
<td>&gt;10MΩresistive, except DC mA (5Ω) and V (47kΩ)</td>
</tr>
<tr>
<td>Temp Stability:</td>
<td>Error &lt;0.01% of span per °C change in ambient temperature</td>
</tr>
<tr>
<td>Supply Variation:</td>
<td>Supply voltage influence negligible within supply limits</td>
</tr>
<tr>
<td>Humidity Influence:</td>
<td>Negligible if non-condensing</td>
</tr>
<tr>
<td>Process Display:</td>
<td>Displays up to 5% over and 5% under span limits</td>
</tr>
<tr>
<td>Sensor Break Detection:</td>
<td>- Thermocouple &amp; RTD—SSR output goes to 0</td>
</tr>
<tr>
<td></td>
<td>- High Limit Sensor Break alarms activate</td>
</tr>
<tr>
<td></td>
<td>- Linear (4 to 20mA, 2 to 10V and 1 to 5V only)—SSR output goes to 0</td>
</tr>
<tr>
<td>Isolation:</td>
<td>Isolated from all outputs (except SSR driver) at 240V AC</td>
</tr>
</tbody>
</table>

### Supported Thermocouple Types & Ranges:

<table>
<thead>
<tr>
<th>Type</th>
<th>Range °C</th>
<th>Range °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>+100 to 1824°C</td>
<td>+211 to 3315°F</td>
</tr>
<tr>
<td>C</td>
<td>0 to 2320°C</td>
<td>32 to 4209°F</td>
</tr>
<tr>
<td>D</td>
<td>0 to 2315°C</td>
<td>32 to 4199°F</td>
</tr>
<tr>
<td>E</td>
<td>-240 to 1000°C</td>
<td>-400 to 1832°F</td>
</tr>
<tr>
<td>J</td>
<td>-200 to 1200°C</td>
<td>-328 to 2192°F *</td>
</tr>
<tr>
<td>K</td>
<td>-200 to 1200°C</td>
<td>-328 to 2192°F *</td>
</tr>
<tr>
<td>L</td>
<td>0 to 762°C</td>
<td>32 to 1402°F *</td>
</tr>
<tr>
<td>N</td>
<td>0 to 1399°C</td>
<td>32 to 2551°F *</td>
</tr>
<tr>
<td>PtRh</td>
<td>0 to 1850°C</td>
<td>32 to 3362°F</td>
</tr>
<tr>
<td>20%: 40%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>0 to 1759°C</td>
<td>32 to 3198°F</td>
</tr>
</tbody>
</table>
### Table 1. Input Ranges

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>0 to 1762°C</td>
</tr>
<tr>
<td>T</td>
<td>-240 to 400°C</td>
</tr>
</tbody>
</table>

Optional decimal place can be displayed up to 999.9°C/F

### Thermocouple Calibration:

±0.1% of full range, ±1LSD (±1°C for internal CJC if enabled). Linearization better than better ±0.2°C (±0.05 typical) on ranges marked * in the table above. Linearization for other ranges is better than ±0.5°C. BS4937, NBS125 & IEC584.

### Supported RTD Types & Ranges:

<table>
<thead>
<tr>
<th>Type</th>
<th>Range °C</th>
<th>Range °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Wire</td>
<td>-199 to 800°C</td>
<td>-328 to 1472°F</td>
</tr>
<tr>
<td>NI120</td>
<td>-80 to 240°C</td>
<td>-112 to 464°F</td>
</tr>
</tbody>
</table>

Optional decimal place can be displayed up to 999.9°C/F

### RTD Calibration:

0.1% of full range, ±1LSD

### Linearization:

Linearization better than ±0.2°C (±0.05 typical).

PT100 input to BS1904 & DIN43760 (0.00385Ω/Ω/°C).

### RTD Excitation:

Sensor current 150μA ±10%

### Lead Resistance:

<0.5% of span error for max 50Ω per lead, balanced

### Supported Linear Types & Ranges:

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
<th>Offset Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>mA DC</td>
<td>0 to 20mA DC</td>
<td>4 to 20mA DC</td>
</tr>
<tr>
<td>mV DC</td>
<td>0 to 50mV DC</td>
<td>10 to 50mV DC</td>
</tr>
<tr>
<td>V DC</td>
<td>0 to 5V DC</td>
<td>1 to 5V DC</td>
</tr>
<tr>
<td>V DC</td>
<td>0 to 10V DC</td>
<td>2 to 10V DC</td>
</tr>
</tbody>
</table>

Scalable from -9999 to 10000. Decimal point selectable from 0 to 3 places, but limited to 5 display digits (e.g. 9999.9)

### Maximum Overload:

1A on mA input terminals, 30V on voltage input terminals

### DC Calibration:

±0.1% of full range, ±1LSD

### DC Input Multi-Point: Linearization:

Up to 15 scaling values can be defined anywhere between 0.1 and 100% of input

---

### Table 2. Outputs

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relays</td>
<td></td>
</tr>
<tr>
<td>Type &amp; Rating:</td>
<td>Single pole single throw (SPST); 2A resistive at 120/240VAC</td>
</tr>
<tr>
<td>Lifetime:</td>
<td>&gt;200,000 operations at rated voltage/current</td>
</tr>
<tr>
<td>Isolation:</td>
<td>Basic Isolation</td>
</tr>
</tbody>
</table>

---

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<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear DC</td>
<td></td>
</tr>
<tr>
<td>Resolution:</td>
<td>8 bits in 250mS (10 bits in 1s typical, &gt;10 bits in &gt;1s typical)</td>
</tr>
<tr>
<td>Accuracy:</td>
<td>±0.25% of range, (mA @ 250W, V @ 2kW). Degrades linearly to ±0.5% for increasing burden (to specification limits)</td>
</tr>
<tr>
<td>Isolation:</td>
<td>Basic Isolation</td>
</tr>
</tbody>
</table>

Table 3. Operating Conditions (For indoor use).

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature:</td>
<td>• Operating: 0°C to 55°C (32°F to 131°F)</td>
</tr>
<tr>
<td></td>
<td>• Storage: –20°C to 80°C (-4°F to 176°F)</td>
</tr>
<tr>
<td>Relative Humidity:</td>
<td>20% to 95% non-condensing</td>
</tr>
<tr>
<td>Supply Voltage and Power:</td>
<td>100 to 240VAC ±10%, 50/60Hz, 20VA</td>
</tr>
</tbody>
</table>

Table 4. Conformance Norms.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMI:</td>
<td>CE: Complies with EN61326</td>
</tr>
<tr>
<td>Safety Considerations:</td>
<td>CE: Complies with EN61010-1. UL, cUL to UL61010C-1. Pollution Degree 2, Installation Category II</td>
</tr>
<tr>
<td>Front Panel Sealing:</td>
<td>IP65 rating. IP20 behind the panel. (IP rating not recognized / approved by UL)</td>
</tr>
<tr>
<td>Front Panel Cleaning:</td>
<td>Wash with warm soapy water and dry immediately. Close the USB cover (if fitted) before cleaning.</td>
</tr>
</tbody>
</table>

Table 5. Display.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display Type:</td>
<td>160 x 80 pixel, monochrome graphic LCD with a dual color (red/green) backlight</td>
</tr>
<tr>
<td>Display Area:</td>
<td>66.54mm (W) x 37.42mm (H)</td>
</tr>
<tr>
<td>Display Characters:</td>
<td>0 to 9, a to z, A to Z, plus ( ) - and _</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Recording Memory:</td>
<td>1Mb non-volatile flash memory. Data retained when power is turned off</td>
</tr>
<tr>
<td>Recording Interval:</td>
<td>1; 2; 5; 10; 15; 30 seconds or 1; 2; 5; 10; 15; 30 minutes</td>
</tr>
<tr>
<td>Recording Capacity:</td>
<td>Dependent on sample rate and number of values recorded. Two values can be recorded for up to 7 days at 10s intervals. More values or faster sample rates deduce the maximum duration.</td>
</tr>
<tr>
<td>RTC Battery Type:</td>
<td>VARTA CR 1616 3V Lithium. Clock runs for &gt;1 year without power (Part # 274030)</td>
</tr>
<tr>
<td>RTC accuracy:</td>
<td>Real Time Clock error &lt;1 second per day</td>
</tr>
</tbody>
</table>
2. Safety

2.1. Safety Information

Do not work on the Protocol 3 controller without reading and understanding this section which contains important information and warnings. Ignoring these warnings can result in death, serious injury or damage to the machine and product.

2.1.1. Lockout

Machine lockout places the Protocol 3 controller into a zero energy state and prevents accidental machine start up. Always follow the Lockout Procedure described in this Section before cleaning, maintaining or repairing the Protocol 3 controller. An accidental start-up, while working on the Protocol 3 controller, can result in serious injury or death.

2.1.1.1. Lockout Requirements

1. Every power source that can energize any element of the Protocol 3 controller must be shut off at the closest possible power source. This includes air, water, nitrogen and electricity, including the Disconnect Switch.
2. After energy sources are locked out, test to ensure circuits are de-energized.

2.1.1.2. Lockout Procedure with Despatch Products

Personnel authorized to lockout equipment must have the necessary locks to perform the lockout.
1. Physically disconnect all electrical power to the machine or lockout (with a padlock) the appropriate breaker or disconnects.
2. Close all valves and bleed off any pressure.
3. Test for power by attempting a start with the machine controls.
4. Identify the Lockout Condition with a tag on the electrical disconnect and pneumatic shut off valves.
5. When work is complete, remove all tags and restore the machine to its working state.

2.2. Maintenance

Only qualified and trained personnel should perform maintenance or repair.

Danger!

Electrical panels contain high voltage. Disconnect and lock out the power supply before working inside any electrical panels. Failure to lock out the power supply will result in death or injury.
2.3. **Electrical Power**
Only qualified and trained personnel should perform electrical maintenance or electrical repair.

**Danger!**

Contact with energized electrical sources will result in serious injury or death.

- Before performing maintenance, disconnect all electrical power from the machine. Use a padlock and lockout all disconnects feeding power to the machine.
- Never clean or repair the controller when in operation.
- Unauthorized alterations or modifications to Protocol 3 controller are strictly forbidden. Never modify any electrical circuits. Unauthorized modifications can impair the function and safety of the Protocol 3 controller.

2.4. **Fire**
Keep the Protocol 3 controller clean and free of scrap materials, oil or solvents to prevent the possibility of fire. In the event of fire, use a fire extinguisher as follows.
1. De-energize the machine immediately by pushing an Emergency Stop push button (if supplied).
2. Turn off the remote main disconnect (customer supplied disconnect).
3. If the fire is in the workspace, keep the door closed.
4. Extinguish the fire.

**Danger!**

Always disconnect all power before extinguishing a fire. Attempting to extinguish a fire in a machine connected to electrical power will result in serious injury or death.

2.5. **Equipment Lockout Requirements**
To prevent injury or equipment damage during inspection or repair, the Protocol 3 controller must be locked out.
3. **Theory of Operation**

The Protocol 3 is a microprocessor based digital temperature controller designed for simple and flexible oven operation (Figure 1). The Protocol 3 controller operates as a dual-functioning controller/high limit instrument. The control portion utilizes a time-proportioning voltage signal to control heating devices with minimal temperature fluctuations.

The high limit portion protects the product and/or the oven from overheating. If the product being processed has a critical high temperature limit, the high limit setpoint should be set to a temperature somewhat below the temperature at which the product could be damaged. If the product does not have a critical high temperature limit, the high limit setpoint should be set 5 to 15 degrees higher than the maximum programmed setpoint at which the oven will operate.

The Protocol 3 controller provides three primary operating modes:

- **Manual:** Oven operates continuously at a fixed temperature until turned off.
- **Timer:** Oven operates at a fixed temperature for a user-selected time period, and then automatically turns off.
- **Profile:** Temperatures increase or decrease as defined by 255 segments that can be allocated to 64 ramp and soak profiles. The profiles can be linked to provide additional temperature combinations.

The Protocol 3 controlled is equipped to allow a ramp/soak temperature control, which maintains oven temperature with either a fixed setpoint or a ramp/soak profile.

3.1. **System Control—In General**

- The Protocol 3 controller provides outputs for the cooling fan, door lock switch/door release pushbutton, and optional beacon light
- A number of profiles for oven heating cycles are stored in the Protocol 3 controller. Access profiles using the Protocol 3 keypad
- The Protocol 3 controls the solenoid valves in an inert atmosphere oven for purge, maintain and water cooling operation
- The Protocol 3 can also be operated remotely with a PC running Protocol Manager software.

3.1.1. **High-Limit Function**

The Protocol 3 controller has an integrated high limit function which disables the heater output when tripped. The High-Limit temperature is displayed as HLPV (Manual Mode only).

If the high limit trips, the Hi-Limit indicator will light and the relay must be manually reset. Allow the oven to cool several degrees below the setpoint (or increase the high limit setpoint) and then press [ ] . The indicator will turn off.
3.1.2. Outputs

The Protocol 3 controller comes standard with an output signal that can transmit temperature data, setpoint data or control power to a user-supplied recording device. Output relays (five) can also signal user-specified events or alarm to external devices (Figure 2 and Figure 3).

- **Heating output**: The control output is a DC voltage open-collector output which is time-proportioned and designed to control a heat control device such as a solid state relay.
- **High limit**: The high limit output is a SPDT relay which is energized under normal operating conditions. If the control senses a temperature higher than the high limit setpoint, or if there is a sensor error, the high limit relay will de-energize until the condition is cleared and **Reset** is pressed. When the high limit relay is de-energized, the heater is disabled.
- **Retransmission**: The retransmission output is a signal that is proportional to the process temperature, setpoint or control power:
  - 0-5V
  - 0-10V
  - 2-10V
  - 4-20 mA
  - 0-10VDC Power Supply
  The signal can be an input to other devices such as a chart recorder.
- **Relays**: The five SPST dry contact relay outputs can be configured to function as alarms, events, or end of cycle. These outputs can be utilized in Manual, Timer or Profile Modes.

3.2. Remote Communication

When used with a PC running Protocol Manager™ software, the Protocol 3 controller allows an operator to remotely control the oven, download recipes and log data.
Figure 2. Typical Controller Output Sticker.

Figure 3. Protocol Plus to Protocol 3 Connection Conversions.
4. Assembly & Setup

**Danger!**

All grounding and safety equipment must be in compliance with applicable codes, ordinances and accepted safe practices.

**Warning!**

Disconnect the main power switch or power cord before attempting any repair or adjustment.

4.1. **Install the Protocol 3 Controller**

When replacing a Protocol 3 controller, follow the steps below. Tools required for installation include ¼” socket set with #1 bit, #2 Philips screwdriver.

1. Disconnect the power.
2. Unplug all terminals on the rear of the control, noting the proper connections (Figure 3).
3. Remove the retaining clips for the controller.
4. Remove the controller.
5. Insert the new controller into the panel.
6. Fasten the retaining clips.
7. Re-plug all terminals.
8. Secure the control panel.

4.2. **Protocol 3 Controller Conversion with NO Options**

To replace the older model Protocol Plus controller with the newer Protocol 3 controller, connect terminal blocks as indicated in Table 7 and Figure 3.

**Table 7. Protocol Plus to Protocol 3 Controller Conversion.**

<table>
<thead>
<tr>
<th>Terminal Block</th>
<th>Former Protocol Plus Connections</th>
<th>New Protocol 3 Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three pin terminal block for power leads</td>
<td>Terminals 30, 31, 32</td>
<td>Terminals 1, 2, 3</td>
</tr>
<tr>
<td>Five pin terminal block for SSR and Hi-limit</td>
<td>Terminals 17, 18, 19, 20, 21</td>
<td>Terminals 26, 27, 28, 29, 30</td>
</tr>
<tr>
<td>Remove the four-pin terminal block from thermocouples and rewire with two three-pin blocks.</td>
<td>Control Thermocouple Terminals 13, 14</td>
<td>Control Thermocouple Terminals 17, 18</td>
</tr>
<tr>
<td></td>
<td>Hi-limit Thermocouple Terminals 15, 16</td>
<td>Hi-limit Thermocouple Terminals 32, 33</td>
</tr>
</tbody>
</table>

Warning! Disconnect the main power switch or power cord before attempting any repair or adjustment.
4.3. **Setting Up Remote Communication**

Remote communication between the Protocol 3 controller and a PC running the Despatch Protocol Manager software involves providing each controller with a unique address and following the communication protocol procedures. Up to 32 separate controllers can be run from a PC running the Despatch Protocol Manager software. See the Protocol Manager Instruction Manual for the complete set-up procedure.
5. Working with Operating Modes

Users and operators of this controller must comply with operating procedures and training of operating personnel as required by the Occupational Safety and Health Act (OSHA) of 1970, Section 5 and relevant safety standards, and other safety rules and regulations of state and local governments. Refer to the relevant safety standards in OSHA and National Fire Protection Association (NFPA), Section 86 of 1990.

5.1. User Controls

Each Protocol 3 Controller has six keypad switches (Table 8). Use the buttons to navigate user menus, adjust parameter values and control outputs. In configuration screens, a context sensitive scrolling help-text displays user-guides about the function of the keys across the bottom of the screen.

The Protocol 3 Controller has nine LEDs which indicate a variety of instrument functions (Table 9).

When the Protocol 3 Controller is first powered ON, the screen displays Select a Mode (Figure 4). Use ▲ and ▼ to navigate and ▼ to select the highlighted mode.

Table 8. Keypad Buttons and Functions.

<table>
<thead>
<tr>
<th>Keypad Button</th>
<th>Function</th>
</tr>
</thead>
</table>

Figure 4. Select a Mode Display.
### Keypad Button Function

<table>
<thead>
<tr>
<th>Keypad Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Navigate to previous screen</strong>&lt;br&gt;Press to move back to the previous parameter or screen in the current mode.</td>
<td>![Arrow Left]</td>
</tr>
<tr>
<td><strong>Navigate down through menu/parameter lists</strong>&lt;br&gt;- Menus and configuration choice screens: Press to move to the next item on the list.&lt;br&gt;- Editable values: Press to decrease. Press and hold to speed the change.&lt;br&gt;- Trend View: press to move the Cursor Line back through stored data points.</td>
<td>![Down Arrow]</td>
</tr>
<tr>
<td><strong>Navigate up through menu/parameter lists</strong>&lt;br&gt;- Menus and configuration choice screens: Press to move to the previous item on the list.&lt;br&gt;- Editable values: Press to increase. Press and hold to speed the change.&lt;br&gt;- Trend View: press to move the Cursor Line forward through stored data points.</td>
<td>![Up Arrow]</td>
</tr>
<tr>
<td><strong>Navigate to next item on a screen or to next screen</strong>&lt;br&gt;- Press to move forward to the next parameter or screen in the current mode.&lt;br&gt;- Enables Edit on parameters in the Main Mode selections.</td>
<td>![Arrow Right]</td>
</tr>
<tr>
<td><strong>Manual, Timer and Profile Mode: press to stop current process</strong>&lt;br&gt;- In Manual Mode, pressing switch disables the controlling output&lt;br&gt;- In Timer Mode, pressing switch stops timer and disables controlling output&lt;br&gt;- In Profile Mode, pressing switch stops current profile and disables controlling output</td>
<td>![Stop Clock]</td>
</tr>
<tr>
<td><strong>Reset Latched High Limit relay if below alarm condition</strong>&lt;br&gt;If High Limit alarm is active, press to release the High Limit relay.</td>
<td>![Reset Clock]</td>
</tr>
</tbody>
</table>

**NOTE:**
- Pressing this switch updates the instrument to the value displayed. If editing a parameter, ensure the current (highlighted) parameter value is correct before pressing.
- This switch releases the High Limit relay only if the controller is.
Keypad Button | Function
--- | ---

*not in the High Alarm State (LED indicator turned OFF).*

Simultaneously press † and ‡ to move up one menu level:
- From Select a Mode, pressing both moves to the main menu.
- From Sub-menus, press both several times to reach the main menu.

**NOTE:** Simultaneously pressing these switches updates the instrument to the value displayed. If editing a parameter, ensure the current (highlighted) parameter value is correct before pressing.

---

**Table 9. LEDs and Functions.**

<table>
<thead>
<tr>
<th>LED</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Power LED" /></td>
<td><strong>Power LED:</strong> When lit, indicates power to the device.</td>
</tr>
<tr>
<td><img src="image" alt="Heater LED" /></td>
<td><strong>Heater LED:</strong> When lit, indicates primary heating output is active.</td>
</tr>
<tr>
<td><img src="image" alt="Profile LED" /></td>
<td><strong>Profile LED:</strong> When lit, indicates a profile is currently running.</td>
</tr>
<tr>
<td><img src="image" alt="Timer LED" /></td>
<td><strong>Timer LED:</strong> When lit, indicates a timer is currently running.</td>
</tr>
<tr>
<td><img src="image" alt="Manual LED" /></td>
<td><strong>Manual LED:</strong> When lit, indicates the controller is in Manual Mode.</td>
</tr>
</tbody>
</table>
### 5.2. First Screens

<table>
<thead>
<tr>
<th>LED</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Cycle Complete LED" /></td>
<td><strong>Cycle Complete LED</strong>: When lit, indicates the controller is currently stopped.</td>
</tr>
<tr>
<td><img src="image" alt="DEV HOLD" /></td>
<td>When lit during a profile or Timer Mode, indicates process value has deviated from the soak value indicated by the controller. Set Soak Deviation value in the Profile Configuration mode or in the Timer Mode from the Main Menu. See Troubleshooting Section 7 for more information.</td>
</tr>
<tr>
<td><img src="image" alt="Hi Limit" /></td>
<td>When lit indicates the controller has exceeded the High Limit Value. Set High Limit Alarm Value and Hysteresis in the Alarm Configuration menu.</td>
</tr>
<tr>
<td><img src="image" alt="Relay LED" /></td>
<td>When lit, indicates relays 1-4 are active. Relay can be assigned as an Event, Alarm or Cycle. (Four LEDs located above LCD display)</td>
</tr>
</tbody>
</table>

**Change configuration controls depending on the mode used.** Refer to the specific operating instructions below, for more information.

At initial power-up, control is in **Select a Mode**. This screen allows the choice of manual mode, timer mode or profile mode.

**Regularly backup critical system data according to your company policies. Be sure to back up configuration and profiles to a removable memory device.** Refer to Section 5.5.1 for more information.
5.2.1. **Manual Mode**

**Manual Mode** allows the oven to operate continuously at a fixed temperature until turned off. Use Manual Mode (Figure 5) to control Set Point, High Limit Value and four relays.

![Manual Mode Display Screen](image)

**Figure 5. Manual Mode Display Screen.**

5.2.1.1. **Display Manual Mode**

From the Select a Mode screen, press ▲ or ▼ to navigate to Manual Mode. Press ▶ to select the highlighted option. Press ◀ to exit from Manual Mode and ◀ to stop all outputs.

5.2.1.2. **Start Manual Mode**

1. Navigate to and highlight Manual Mode.
2. Press ▼ to display the Manual Mode screen.
3. Manual Mode allows you to set the setpoint (SP), and the High Limit set point (HLSP).
   a. Press ▼ or ▲ to navigate through the menu.
   b. Select and highlight the menu item.
   c. Press ▶
   d. Press ▼ or ▲ to change values.
   e. Press ▶ to select the value.
4. Manual Mode allows you to set event relay status
   a. Press ▼ or ▲ to navigate to and select the appropriate relay (Figure 5).
   b. Press ▶ to toggle the relay on and off.
5. Once all parameters are set, press ▼ or ▲ to navigate to and highlight Start.
6. Press ▶ to start the process.
   a. Press ◀ to abort the process.
b. After pressing \( \) press \( \) to return to Select a Mode screen

7. Adjust the temperature setpoint while running in Manual or Timer Mode by:

a. Press \( \)

b. Press \( \) or \( \) to select mode of operation.

c. Press \( \)

d. Press \( \) or \( \) to change the SP value.

e. Press \( \)

f. Press \( \) to return to normal display.

8. Return to Stopped Mode at any time, press \( \) and the Cycle Complete LED will illuminate

Press \( \) to select a mode screen.

5.2.2. **Timer Mode**

Use Timer Mode to control Time Set Point: when the time expires, the control output is turned OFF (Figure 6).

1. Navigate to and highlight Timer Mode.

2. Press \( \) or \( \) to navigate to the desired time or temperature units.

3. Press \( \) to select the value to change.

4. Press \( \) or \( \) to change value.

5. Press \( \) to enter the desired value.

6. **Timer Mode** allows you to set event relay status:

   a. Press \( \) or \( \) to navigate to and select the appropriate relay (Figure 5).

   b. Press \( \) to toggle the relay ON and OFF.

7. Set all parameters then press \( \) or \( \) to navigate to and highlight Start.

8. Press \( \) to start the process.

   a. Press \( \) to abort the process

   b. Press \( \) to return to Select a Mode screen.

9. Adjust the temperature setpoint while running in **Manual Mode** or **Timer Mode** by:

   a. Press \( \).
b. Press ▲ or ▼ to navigate to the desired time or temperature units.
c. Press ▲.
d. Press ▲ or ▼ to change the SP value.
e. Press ▲.
f. Press ▲ to return to normal display.
10. To return to Stopped Mode at any time, press ☐ and the Cycle Complete LED will illuminate.
11. Press ◄ to return to Select A Mode screen.

5.2.3. Profile Mode

Navigate to HLSP to set the High Limit Setpoint before running a profile. Use Profile Mode to select and run profiles that are programmed into the unit (Figure 7). Press ▲ or ▼ to navigate, ▼ to select the highlighted profile. Press ▲ to start profile. Press ☐ to stop the profile and ◄ to exit Profile Mode (profile must be stopped to exit Profile Mode).
If you are unable to select a desired profile, verify that Remote Profile Control is Disabled. When Remote Profile Control is Disabled, the Select Profile to Start reads “Digital”

5.2.4. Main Menu

The Main Menu (Figure 8) provides access to a number of useful sub menus (Table 10). Access the Main Menu from the Select a Mode screen (Figure 4) by:

1. Simultaneously press \[ \text{[ ]} \] and \[ \text{[ ]} \]
2. Press \[ \text{[ ]} \] or \[ \text{[ ]} \] to navigate, \[ \text{[ ]} \] to select the highlighted option.
3. Press \[ \text{[ ]} \] to enter that mode.
Figure 8. Main Menu.

Table 10. Sub Menu Descriptions

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode Selection</td>
<td>Return to Select a Mode screen</td>
</tr>
<tr>
<td>Timer Mode</td>
<td>See Timer Mode Option (Section 5.2.2)</td>
</tr>
<tr>
<td>Profile Setup</td>
<td>Create, edit and delete profiles</td>
</tr>
<tr>
<td>Recorder Control</td>
<td>Start, stop and delete recordings on unit.</td>
</tr>
<tr>
<td>USB Menu</td>
<td>Access all read/write options to USB device</td>
</tr>
<tr>
<td>Configuration Menu</td>
<td>Program all input and output settings</td>
</tr>
<tr>
<td>Automatic Tuning</td>
<td>Opens selection for Auto and Self Tune features</td>
</tr>
<tr>
<td>Product Information</td>
<td>Display information about unit</td>
</tr>
<tr>
<td>Service Information</td>
<td>Display name and address of service department</td>
</tr>
</tbody>
</table>
5.3. Setting up a Profile

Regularly backup critical system data according to your company policies. Be sure to back up configuration and profiles to a removable memory device. Refer to Section 5.5.1 for more information.

Use Profile Setup to create, edit and delete profiles (Figure 9). Access the Profile Setup from the Main Menu screen. The Profiler option allows storage of up to 255 profile segments, shared between a maximum of 64 Profiles. Each profile controls the value of the setpoint over time; increasing, decreasing or holding its value as required. See Table 11 for Profile Setup options. Figure 10 (Table 12) shows the Protocol 3 Controller configuration options. Table 13 shows the full list of Profile Parameter options.

Figure 9. Profile Setup.

Find General Configuration Parameters in Section 5.6. Find Profile Setup in Section 5.3

Note that other options are not visible until a profile is created.
Table 11. Profile Setup Options.

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Configuration</td>
<td>Enable remote Profile control and Profile automatic start</td>
</tr>
<tr>
<td>Create a Profile</td>
<td>Create profile</td>
</tr>
<tr>
<td>Edit a Profile Header</td>
<td>Change the name of any created profile</td>
</tr>
<tr>
<td>Edit a Profile Segment</td>
<td>Change the settings of a specific segment in a profile</td>
</tr>
<tr>
<td>Insert a Segment</td>
<td>Create a new segment in an existing profile</td>
</tr>
<tr>
<td>Delete a Segment</td>
<td>Delete a segment in an existing profile</td>
</tr>
<tr>
<td>Delete a Profile</td>
<td>Delete an existing profile</td>
</tr>
<tr>
<td>Delete all Profiles</td>
<td>Delete all profiles in the unit</td>
</tr>
</tbody>
</table>
Figure 10. Profile Setup Menu.
### Working with Operating Modes

**Protocol 3 Controller Owner’s Manual**

**Version 1.2**

---

**Table 12. Profile Setup Steps, Options and Descriptions.**

<table>
<thead>
<tr>
<th>Step #</th>
<th>Protocol 3 Descriptor</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Configuration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Remote Profile Control</td>
<td>Disabled</td>
<td>Disallow a remote source to run a profile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enabled</td>
<td>Allow a remote source to run a profile</td>
</tr>
<tr>
<td>2.</td>
<td>Automatic Start</td>
<td>Disabled</td>
<td>Disallow use of delayed start time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enabled</td>
<td>Allow controller to start at a later time with programmed delay</td>
</tr>
<tr>
<td>Create a Profile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Enter a Profile Name</td>
<td>None</td>
<td>Profile start not delayed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After Delay</td>
<td>Set hours and minutes to delay before starting the profile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Day and Time</td>
<td>Set time of day (hour and minutes) and day of week to start profile. Options include each day of the week and combinations of days.</td>
</tr>
<tr>
<td>4.</td>
<td>Profile Start Trigger</td>
<td>Control Off</td>
<td>If power-down occurs while this profile is running, specify the action for the controller to take during power-up:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restart Profile</td>
<td>Controller goes to OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintain Last Profile SP</td>
<td>Controller maintains previous profile setpoint</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Continue Profile</td>
<td>Controller continues (for specified time) the profile from where it was when power failed.</td>
</tr>
<tr>
<td>5.</td>
<td>Profile Recovery Method</td>
<td>Control Off</td>
<td>Controller goes off</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintain Last Profile SP</td>
<td>Choose the number of times to cycle the program, up to an infinite number of times.</td>
</tr>
<tr>
<td>6.</td>
<td>Profile Abort Action</td>
<td>Control Off</td>
<td>If program aborts, profile should:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintain Last Profile SP</td>
<td>Choose the number of times to cycle the program, up to an infinite number of times.</td>
</tr>
<tr>
<td>Edit a Profile Segment</td>
<td></td>
<td>Ramp Time</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td>SETPOINT SP</td>
<td>Set target setpoint (degrees centigrade)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Segment Ramp Time</td>
<td>Set the segment ramp time (hh:mm:ss)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auto-Hold Type:</td>
<td>Set the Auto-Hold Type: None, Above Setpoint, Below Setpoint, Band.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Events 1-5:</td>
<td>Press ▼ or ▲ to toggle between Active and Inactive.</td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td>Ramp Rate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SETPOINT SP</td>
<td>Set target setpoint (degrees centigrade)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Segment Ramp Rate</td>
<td>Set the segment ramp rate in units per hour</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auto-Hold Type:</td>
<td>Set the Auto-Hold Type: None, Above Setpoint, Below Setpoint, Band.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Events 1-5:</td>
<td>Press ▼ or ▲ to toggle between Active and Inactive.</td>
</tr>
<tr>
<td>9.</td>
<td>Step</td>
<td>SETPOINT SP</td>
<td>Set the target setpoint (degrees centigrade)</td>
</tr>
<tr>
<td>10.</td>
<td>Dwell</td>
<td>SETPOINT SP</td>
<td>Choose time to dwell at setpoint. Specify Auto-Hold type: None, Above setpoint, Below setpoint, Band</td>
</tr>
</tbody>
</table>

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### Protocol 3 Descriptor

<table>
<thead>
<tr>
<th>Step #</th>
<th>Protocol 3 Descriptor</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
</table>
| 11.    | Hold                  |        | • Choose when to release Hold: Operator Key Press or Time of Day  
Bay Set Events 1-5: Press or to toggle between Active and Inactive |
| 12.    | Loop                  |        | • Set the number of times to loop current segment  
Bay Specify how to move back to the host segment after specified loops: Ramp time, hold  
Bay Set Events 1-5: Press or to toggle between Active and Inactive |
| 13.    | Join                  |        | • Joins one profile to another: specified profile immediately follows first profile  
Bay Navigate to and highlight to select from among the current profiles  
Bay Set Events 1-5: Press or to toggle between Active and Inactive |
| 14.    | End                   |        | Ends the segment and creates the profile. Choose segment type from: Control Off, Maintain Last Profile SP, Control Off with Events |
| 15.    | Repeat Sequence Then End |        | Repeats sequence specified number of times and then ends the segment and creates the profile. Along with enter numbering of times to repeat sequence, choose from: Control Off, Maintain Last Profile SP, Control Off with Events |

#### 5.3.1. Prepare for Profile Setup

From the Select a Mode screen, simultaneously press and to display the Main Menu (Figure 8):

1. Navigate to and highlight **Profile Setup**.
2. Press to display **Profile Setup Enter Profiler Mode Unlock Code** screen.
3. Press to enter Unlock Code 0010.
4. Press to display the **Profile Setup** screen.
5. Press to move right and to move left. Press or navigate through numbers, uppercase letters and lower case letters.
6. After entering the profile name, press as often as necessary to move to the next screen.
Table 12 will serve as a useful guide for both general configuration and setting up a profile.

<table>
<thead>
<tr>
<th>Flag</th>
<th>Before initiating the Profile Setup, use the programming worksheet (Section 8.3) to work out all parameters. Once the Profile Setup is begun, setup must continue to the end or lose all entered values.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Flag</th>
<th>When programming an oven with a gas-fired heater, note that the burner can be started manually or by programming a profile using the Protocol 3 controller.</th>
</tr>
</thead>
</table>
5.3.2. Sample Profile

Figure 11 shows a graphic representation of the sample profile, while Figure 12 shows the parameters entered to achieve that profile. Section 5.3.3 shows how to enter the profile.

Figure 11. Sample Profile.
<table>
<thead>
<tr>
<th>Segment</th>
<th>Segment Type</th>
<th>Target Setpoint</th>
<th>Time</th>
<th>Auto Hold Type</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ramp Time</td>
<td>100</td>
<td>01:00:00</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Dwell</td>
<td></td>
<td>01:00:00</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ramp Time</td>
<td>50</td>
<td>02:00:00</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>End</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 12. Sample Profile Values.
5.3.3. **Key In the Sample Profile Setup**

To help show the process of setting up a profile, this section uses the sample profile as an example (from Figure 11 and Figure 12). Figure 10 shows the overall flowchart for working with Profile Setup. For entering sample values, we choose the default values.

**Navigate to and Enter Profile Setup**

From Select a Mode screen, simultaneously press and to display the Main Menu:

1. Navigate to and highlight **Profile Setup**.
2. Press to display **Profile Setup Enter Profiler Mode Unlock Code** screen.
4. Press to display the **Profile Setup** screen.
5. Press to select **Create a Profile**.
6. Press to enter mode.
7. Input unique Profile name: press to move right and to move left. Press or to navigate through numbers, uppercase letters and lower case letters.
8. After entering the profile name, press as often as necessary to move to the next screen.
9. For **Profile Start Trigger**, when **None** is highlighted, press to complete the entry.
10. For **Profile Recovery Method**, when **Control Off** is highlighted, press to complete the entry.
11. For **Profile Abort Action**, when **Control Off** is highlighted, press to complete the entry.
12. For **How Many Time to Cycle Program**, press and navigate to the desired number of cycles.
   a. Press to complete the entry.

**Program Segment 1 according the Sample Profile** (Figure 11 and Figure 12):

13. When **Segment Number 1** displays, press .
15. For **Target Setpoint**.
   a. Press or navigate to 100°C (212°F).
   b. Press to complete the entry.
16. For **Segment Ramp Time**.
   a. Press or navigate to 1 hour (01:00:00).
17. For **Auto-Hold Type**, when **None** is highlighted, press [E] to complete the entry.
18. For **Event 1-5**, press [E] as needed to accept **Inactive**.

**Program Segment 2 according the Sample Profile:**
19. When **Segment Number 2** displays, press [E].
20. Highlight **Dwell** and press [E].
21. For **Dwell at 100.0°C (212 °F)**,
   a. Press [E] or [E] navigate to 1 hour (01:00:00).
   b. Press [E] as needed to complete the entry.
22. For **Auto-Hold Type**, when **None** is highlighted, press [E] to complete the entry.
23. For **Event 1-5**, press [E] as needed to accept **Inactive**.

**Program Segment 3 according the Sample Profile:**
24. When **Segment Number 3** displays, press [E].
25. Highlight **Ramp Time** and press [E].
26. For **Target Setpoint**,
   b. Press [E] to complete the entry.
27. For **Segment Ramp Time**,
   a. Press [E] or [E] navigate to 2 hours (02:00:00).
   b. Press [E] as needed to complete the entry.
28. For **Auto-Hold Type**, when **None** is highlighted, press [E] to complete the entry.
29. For **Event 1-5**, press [E] as needed to accept **Inactive**.

**Finish Profile Creation:**
30. When **Segment Number 4** displays, press [E].
31. Highlight **End** and press [E].

---

**Note:** Last segment must be an End segment to exit Profile Entry Mode.

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All rights reserved. No part of the contents of this manual may be reproduced, copied or transmitted in any form or by any means including graphic, electronic, or mechanical methods or photocopying, recording, or information storage and retrieval systems without the written permission of Despatch Industries, unless for purchaser's personal use.
a. For **Segment End Type**, with **Control Off** highlighted, press ".<br>

32. For **Profile Created**, press ".<br>33. Press " and " to display the **Main Menu**. Press " or " to select Mode Selection and press ".

---

**Table 13. Profile Parameter Options.**

<table>
<thead>
<tr>
<th>Profile Parameter</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Profile Limits</strong></td>
<td>Number of profiles = 64 maximum.</td>
</tr>
<tr>
<td></td>
<td>Total number of segments (all programs) = 255 maximum.</td>
</tr>
<tr>
<td><strong>Loop Back Segments</strong></td>
<td>1 to 9999 loops back to specified segment.</td>
</tr>
<tr>
<td><strong>Profile Cycling</strong></td>
<td>1 to 9999 or Infinite repeats per profile.</td>
</tr>
<tr>
<td><strong>Sequence Repeats</strong></td>
<td>1 to 9999 or Infinite repeats of joined profile sequences.</td>
</tr>
<tr>
<td><strong>Segment Types</strong></td>
<td>Ramp Up/Down over time, Ramp Rate Up/Down, Step, Dwell, Hold,</td>
</tr>
<tr>
<td></td>
<td>Join A Profile, End or Repeat Sequence Then End.</td>
</tr>
<tr>
<td><strong>Time-base</strong></td>
<td>All times specified in hh:mm:ss (Hours, Minutes &amp; Seconds).</td>
</tr>
<tr>
<td><strong>Segment Time</strong></td>
<td>Maximum segment time 99:59:59 hh:mm:ss. Use loop-back for</td>
</tr>
<tr>
<td></td>
<td>longer segments (e.g. 24:00:00 x 100 loops = 100 days).</td>
</tr>
<tr>
<td><strong>Ramp Rate</strong></td>
<td>0.001 to 9999.9 display units per hour.</td>
</tr>
<tr>
<td><strong>Hold Segment Release</strong></td>
<td>Release With Key-press, At Time Of Day or via a Digital Input.</td>
</tr>
<tr>
<td><strong>Start From Value</strong></td>
<td>1st segment starts from current setpoint or current PV input value.</td>
</tr>
<tr>
<td><strong>Delayed Start</strong></td>
<td>After 0 to 99:59 (hh:mm) time delay, or at specified day(s) &amp; time.</td>
</tr>
<tr>
<td></td>
<td>Note: Enable <strong>Automatic Start</strong> in the <strong>Profile Setup: General</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Configuration</strong> Menu. Delayed start will not operate unless <strong>Automatic Start</strong> has been enabled.</td>
</tr>
<tr>
<td><strong>Profile End Action</strong></td>
<td>Selectable from: <strong>Control Off, Maintain Last Profile SP, Control</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Off with Events</strong>, Use Controller Setpoint or Control Outputs Off.</td>
</tr>
<tr>
<td><strong>Profile Abort Action</strong></td>
<td>Selectable from: <strong>Keep Last Profile Setpoint, Use Controller Setpoint</strong></td>
</tr>
<tr>
<td></td>
<td>or Control Outputs Off.</td>
</tr>
<tr>
<td><strong>Power/signal Loss</strong></td>
<td>Selectable from: <strong>Continue Profile, Restart Profile, Keep Last Profile</strong></td>
</tr>
<tr>
<td><strong>Recovery Action</strong></td>
<td>Setpoint, Use Controller Setpoint or Control Outputs Off.</td>
</tr>
<tr>
<td><strong>Auto-Hold</strong></td>
<td>Off or Hold if input &gt;Band above and/or below SP for each</td>
</tr>
<tr>
<td></td>
<td>segment.</td>
</tr>
<tr>
<td><strong>Profile Control</strong></td>
<td>Run, Manual Hold/Release, Abort or jump to next segment.</td>
</tr>
<tr>
<td><strong>Profile Timing</strong></td>
<td>0.02% Basic Profile Timing Accuracy.</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>± &lt;0.5 second per Loop, End or Join segment.</td>
</tr>
<tr>
<td><strong>Segment Events</strong></td>
<td>Events turn on for the duration of the segment. For End Segments,</td>
</tr>
<tr>
<td></td>
<td>the event state persists until another profile starts, the user exits</td>
</tr>
<tr>
<td></td>
<td>from profiler mode, or the unit is powered down.</td>
</tr>
</tbody>
</table>
5.4. **Recorder Control**

Use Recorder Control to start, stop and clear recordings (Figure 13). Access the Recorder Control from the Main Menu.

1. Navigate to and highlight **Recorder Control**.
2. Press \( \mathbb{R} \) to display **Recorder Control Enter Data Recorder Unlock Code** screen.
3. Press \( \mathbb{R} \) as necessary to enter Factory Unlock Code 0010.
4. Press \( \mathbb{R} \) to display the **Start/Stop Data Recording** screen.
5. Press \( \mathbb{R} \) or \( \mathbb{R} \) to highlight and press \( \mathbb{R} \) to **Stop Recording** or **Start Recording**.

The Recorder Status screen (Figure 14) displays after selecting an option.

Clear a recording while in Recorder Status screen by pressing \( \mathbb{R} \) to advance to the **Clear Recordings** screen.

---

**Figure 13. Recorder Control.**

**Figure 14. Recorder Status.**

| ![All recordings in the unit can be downloaded to a USB device using the USB port and the USB Menu.](image) |
5.5. **USB Menu**

Use **USB Menu** to perform read/write options for USB devices connected to the unit using the front USB port (Figure 15). Access the USB Menu from the **Main Menu**. See Table 14 for USB Menus options.

- Regularly backup critical system data according to your company policies. Be sure to back up configuration and profiles to a removable memory device. Refer to Section 5.5.1 for more information.

- Note that a memory stick must be in place before the USB Menu will display.

![USB Menu](image)

Figure 15. USB Menu.

1. Navigate to and highlight **USB Menu**.
2. Press \(\) to display **Mode Unlock Code** screen.
3. Press \(\) as necessary to enter Factory Unlock Code 0010.
4. Press \(\) to display the **USB Menu** screen.
Table 14. USB Menu Options.

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write Recorder Log File</td>
<td>Writes recorder Log data to USB</td>
</tr>
<tr>
<td>Read Profile File</td>
<td>Read profile from USB device to unit</td>
</tr>
<tr>
<td>Write Profile File</td>
<td>Write profile from unit to USB device</td>
</tr>
<tr>
<td>Read Configuration File</td>
<td>Read configuration file from USB device to unit</td>
</tr>
<tr>
<td>Write Configuration File</td>
<td>Write configuration file from unit to USB device</td>
</tr>
</tbody>
</table>

The Protocol 3 controller continues to control operations when initializing the USB memory stick. Allow time for initializing to complete before beginning new tasks.
5.5.1. **Working with USB Memory Stick Folders and Files**

Insert a memory stick into the port on the front panel (Figure 16). The Protocol 3 performs an initialization process that finds and/or creates folders on the memory stick (Figure 17):

- **DEVICE**: This folder must be located in the Root of the USB memory stick
- **CONFIG**: Configuration files (*.bct)
- **PROFILE**: Profile program files (*.pfl)
- **RECORER**: Recorder log folders and files. The user is asked for a new recorder subfolder name before transferring recorder data to USB. The log files (*.csv) are placed in this folder.

Files must be located in these folders to be used by the controller. When preparing to upload files from your PC, ensure that you save them to the correct folder on the memory stick.

*Note: to speed up the disk operation, keep the number of files stored in these folders to a minimum.*

If the file or folder named already exists, data will be overwritten.

*Do not remove the memory stick from the USB port while a data transfer operation is in progress. Data loss or corruption may result.*

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5.5.2. **File Naming Conventions**

The Protocol 3 controller names the first recorder log file **000001-1.csv**. Each time the recording parameters are changed, a new file is created. For instance, changing the recording parameters two times would produce these file names:

- 000002-1.csv
- 000003-1.csv

Note that:

- Stopping or starting a recording does not create a new file.
- For any file exceeding 65,500 data lines, the Protocol 3 controller creates a new file with the last digit incremented by 1, for instance: **000001-2.csv**, then **000001-3.csv**.

<table>
<thead>
<tr>
<th>During Data Transfer, normal operation carries on in the background but operator access to other screens is not possible.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer of full memory can take up to 12 minutes. Begin a transfer only when access (e.g. setpoint changes) will not be required.</td>
</tr>
</tbody>
</table>

5.5.3. **Create a New Name Before Writing to the USB Device**

Before writing a file (**Write Recorder Log File**, **Write Profile File**, **Write Configuration File**), to the USB device, create a new name for the file or folder.

1. Insert the memory stick into the USB port.
2. For **Enter USB Mode Unlock Code**, press to reach **0010**.
3. Press to display the **Read/Write To USB Device?** choices:
   a. **Write Recorder Log File**
   b. **Read Profile File**
   c. **Write Profile File**
   d. **Read Configuration File**
   e. **Write Configuration File**
4. For **Write Recorder Log File**, press to display Enter a Folder Name.
5. Input unique file name: press to move right and to move left. Press or navigate through numbers, uppercase letters and lower case letters.
6. For **Confirm Write?**,  
   a. Press **No** to abort the process and return to the previous menu  
   b. Press **Yes** to continue to write the file or folder.
5.6. **Configuration Menu**

Configuration provides access to menus that allow for setting up 11 different options:

1. **Input**: Input settings and calibrate for process and High Limit Inputs
2. **Control**
3. **Output**
4. **Alarm**
5. **Power Fail Recovery**
6. **Comms. (Communication)**
7. **Recorder**
8. **Clock**
9. **Display**
10. **Lock Code Configuration**
11. **Reset to Defaults**

Navigate the configuration menus options using the flowchart (Figure 18) or Table 15. Figure 18 shows the Protocol 3 Controller configuration options. Access the Configuration from the Main Menu (Section 5.2.4):

1. Simultaneously press and .
2. Navigate to **Configuration Menu** using or .
3. Press to **Enter Configuration Menu Mode Unlock Code**.
4. Press to reach 0010, the Mode Unlock Code.
5. Press to display the configuration choices.
6. Navigate to the desired option using and .
Figure 18. Configuration Menu (see also Table 15 for more information).
Table 15. Configuration Menu in Tabular Format.

<table>
<thead>
<tr>
<th>Configuration Menu</th>
<th>Description</th>
<th>Function</th>
<th>Available Settings</th>
</tr>
</thead>
</table>
| **Input**          | Provide primary control and high limit settings | Control Input Setup | • **Input Type**: Thermocouples, PtRh, PT100, NI120, amperages, voltages  
• **Engineering Units**: °C, °F, °K, bar, %, %RH, pH, psi or none  
• **Decimal Point Position**: Nearest 1/10 or 1/100 for DC inputs  
• **Scale Input Range (lower and upper limits)**: Min & Max range. Minimum range by default.  
• **Input Filter Time**: OFF-100 Sec  
• **Cold Junction Compensation**: Disable/Enable  

| **High Limit Input Setup** | High Limit Input Calibration | • **Input Type**: Thermocouples, PtRh, PT100, NI120, amperages, voltages  
• **Engineering Units**: °C, °F, °K, bar, %, %RH, pH, psi or none  
• **Decimal Point Position**: Nearest 1/10 or 1/100 for DC inputs  
• **Scale Input Range** (lower and upper limits): Min & Max range  
• **Input Filter Time**: OFF-100 Sec |

| **High Limit Input Calibration** | • **High Limit Process Variable**: -250  
• **Factory Calibration**: Resets back to factory defaults  
• **Single Point Calibration**: OFF, -400-400°  
• **Two Point Calibration**: Low Temp. Low Offset, High Temp. High Offset |

| **Control**           | Set control actions, PID control options and setpoint limits | Primary Action Control | • **Reverse Action /Direct Action**: Reverse applies primary power when below setpoint  
• **Primary Proportional Band**: From ON-Off control or set width of band from 0.1 to 999.9  
• **Integral Time (Auto-Reset)**: 1 sec to 99 min 59 sec or OFF  
• **Derivative Time (Rate)**: 1 sec to 99 min 59 sec or OFF  
• **Primary Cycle Time**: 0.5 sec to 512 sec  
• **Primary Power Upper Limit**: Minimum primary power from 1 to 99% available power. Value must be higher than the lower limit.  
• **Primary Power Lower Limit**: Maximum primary power from 10 to 100% available power. Value must be lower than the upper limit.  
• **Setpoint Upper Limit**: Maximum allowed control setpoint  
• **Setpoint Lower Limit**: Minimum allowed control setpoint |
<table>
<thead>
<tr>
<th>Configuration Menu</th>
<th>Description</th>
<th>Function</th>
<th>Available Settings</th>
</tr>
</thead>
</table>
| Output            | Set rate of change toward Segment Target Setpoint | Output Configuration | **Output [1-5] Usage:** Set Alarm, Event, Cycle Complete, Running, or combinations  
**Linear Output Usage:** Set the desired type for any Linear Outputs fitted. From: 0-5, 0-10, 1-5, 2-10V & 0-20, 4-20mA or 0-10VDC adjustable Transmitter PSU. Parameters: Unused, Retransmit PV, Retransmit SP, Control Power |
| Alarm             | Set alarm options and high limit values | Alarm Configuration | **Alarm [1-5] Usage:** Set Alarm parameters: Unused, Process High, Process Low, PV-SP Deviation, Band, Signal Change Per Min, Input Signal Break, Control Loop, % Memory Used.  
**High Limit Alarm Value:** 1-1000  
**High Limit Alarm Hysteresis:** Deadband on “safe” side of alarm, through which signal must pass before alarm deactivates. |
| Power Fail Recovery | Set Control Function on Power Failure | Restart Options | **Manual Mode Recovery:** Control Off, Restart Manual Mode  
**Timer Recovery Method:** Control Off, Restart Timer, Continue Timer |
| Communications    | Modbus Communication Settings | Set Up Communications | **Modbus Parity Bit:** None, Even, Odd  
**Modbus Data Rate:** 4800, 9600, 19200, 38400, 57600, 115200  
**Modbus Address:** 1-255 |
| Recorder          | Options for recording methods and sample time | Start and stop the Data Recorder | **Stop Recording:**  
**Start Recording:**  
**Recorder Status information:** [see configuration menu]  
**Delete Recording:** |
| Clock             | Set date and time for internal clock | Clock Configuration | **Date format:** dd/mm/yyyy or mm/dd/yyyy  
**Set Date**  
**Set Day of Week** (Choose day of week)  
**Set Time** (hh/mm/ss format) |
| Display           | Set options, language, screen color inverted display | Display Configurations | **Language:** English or [Alternate language chosen at time of order]  
**Display Color:** Green to red on alarm, Red to green on alarm, Green, Red  
**Invert Display:** Standard or negative display image  
**Display Contrast:** 0-100 |
| Lock Code         | Set lock code options | Lock Configurations | **Configuration:** Off, 1-9999  
**Tuning:** Off, 1-5000  
**USB Menu:** Off, 1-7000  
**Recorder Menu:** Off, 1-9999  
**Profile Setup:** Off, 1-9999 |
| Reset to Defaults | Factor default options | Reset to Factory Configuration | Reset All Parameters to Factory Defaults?  
All Setting Will be Lost! |
5.6.1. **Alarm Configuration**

5.6.1.1. **Access the Configuration Menu**

Access the Protocol 3 controller Configuration Menu,(and sub-menus) by first ensuring the controller is in Cycle Complete state (that is, not running), the control must be in its cycle complete state (not running), if it is in that state

1. Press to stop the control before proceeding.

2. Simultaneously press and from Select a Mode to access the Main Menu.

3. From the Main Menu, navigate to Configuration Menu using and . Highlight Configuration Menu and press .

4. At the Enter Configuration Mode Unlock Code prompt, enter the appropriate code using and .
   a. The default code is 10.
   b. Press . To enter Configuration Menu.

5.6.1.2. **Work with the Alarm Menu**

The alarm menu allows you to configure the five customizable alarms along with configuring Hi Limit settings. Table 16 describes the possible alarm settings (see Glossary of Terms for alarm and parameter descriptions).

1. From the Configuration Menu, use and to scroll to and highlight Alarm Configuration, then press to access the Alarm Configuration Menu.

2. Press to move forward through the different parameters in the menu, and to enter the setting for a parameter, to move back through the parameters.

3. Press and together (simultaneously) to return to the Configuration Menu.

<table>
<thead>
<tr>
<th>Alarm Selection</th>
<th>Parameter 1</th>
<th>Parameter 2</th>
<th>Parameter 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process High</td>
<td>Alarm Value (Degrees)</td>
<td>Alarm Hysteresis (Degrees)</td>
<td>Alarm Inhibit</td>
</tr>
</tbody>
</table>
5.6.1.3. Using Alarms to Switch Relay Outputs

The Protocol 3 controller allows alarm states to trigger any of the five relay outputs on the controller. Each output can be set to a specific alarm or multiple alarms using the Or Alarms and Alarm and Events functions. To configure an alarm state to trigger a relay output:

1. From Configuration Menu, use ▲ and ▼ to scroll to and highlight Output Configuration then press □ to access the Output Configuration Menu.

2. Press △ to move forward through the different parameters in the menu, ▲ and ▼ to enter the setting for a parameter, □ to move back through the different parameters.

3. Press ▲ and ▼ together (simultaneously) to return to the Configuration Menu.
5.6.1.4. **Alarm Application Example**

This alarm example configures the Protocol 3 controller for an application with an external alarm horn wired into Relay 1. The horn should sound if the process value temperature drops two degrees below or rises five degrees above the setpoint temperature of 200 degrees.

1. Access the **Configuration Menu** by following the directions in Section 5.6.1.1 Accessing Configuration Menu.
2. From the **Configuration Menu**, navigate to and select **Alarm Configuration**.
3. Navigate and select **Process High** for **Alarm 1 Type** and press.
4. Navigate to change **Alarm 1 Value** to 205 and press.
5. Navigate to change **Alarm 1 Hysteresis** to 0 and press.
6. Navigate to select **Uninhibited** for **Power-up Inhibit Alarm 1?** and press.
7. Navigate and select **Process Low** for **Alarm 2 Type** and press.
8. Navigate to change **Alarm 2 Value** to 198 and press.
9. Navigate to change **Alarm 2 Hysteresis** to 0 and press.
10. Navigate to select **Uninhibited** for **Power-up Inhibit Alarm 2?** and press.
11. Press and together to return to the **Configuration Menu**.

13. Navigate to and select **Or Alarms** for **Output 1 Usage** and press.
14. Navigate to and select **Alarm 1 | 2** for **Output 1 Alarms** to OR and press.
15. Press and together to return to the **Configuration Menu**.
5.6.1.5. **Glossary of Alarm Terms**

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm Hysteresis</td>
<td>Alarm hysteresis is the deadband on the safe side of an alarm (that is, the side of the alarm that is below the high alarm value or above the low alarm value). The signal must pass through this deadband before the alarm deactivates.</td>
</tr>
<tr>
<td>Alarm Inhibit</td>
<td>Alarm Inhibit prevents unwanted process or deviation alarm activation at power-up or when the controller setpoint is changed. The alarm activation is inhibited until a safe condition is present. The alarm operates normally from that point on. For example, when the alarm is inhibited, a low alarm will not activate at power-up until the process value first rises above the alarm point than falls back below.</td>
</tr>
<tr>
<td>Input Signal Break Alarm</td>
<td>If the signal from the process value input is broken the process value will display OPEN and the alarm will activate.</td>
</tr>
<tr>
<td>Loop Alarm</td>
<td>A loop alarm detects faults in the control feedback loop by continuously monitoring process variable response to the control output(s). If one of the five alarms is defined to be a loop alarm, it repeatedly checks if the PID control output is at saturation. If saturation is reached (0% or 100% power for single control type), an internal timer is started. Thereafter, if the output has not caused the process variable to be corrected by a predetermined amount (V) after time (T) has elapsed, the alarm becomes active. Subsequently, the alarm repeatedly checks the process variable and the PID output. When the process variable starts to change value in the correct sense or when the PID output is no longer at the limit, the alarm is deactivated. For PID control, the loop alarm time (T) can be automatic (twice the Integral Time value) or set to a user defined value. Correct operation with the automatic loop alarm time depends upon reasonably accurate PID tuning. The user defined value is always used for On-Off control, and the timer starts as soon as an output turns on. The value of V depends on the input type. For Temperature inputs, $V = 2{\text{°C}}$ or $3{\text{°F}}$. For Linear inputs, $V = 10 \times \text{LSD}$ (Least Significant Digit—smallest incremental value that can be show at the defined display resolution).</td>
</tr>
<tr>
<td>% Memory Used Alarm</td>
<td>The Protocol 3 controller can record data at a set interval. If the percentage selected of the memory capacity of the recorded data is exceeded the alarm will activate.</td>
</tr>
<tr>
<td>Process Value Alarms</td>
<td>Three types of process alarms are implemented in the Protocol 3: High, Low, Band. If the process variable passes the boundary, the alarm activates as depicted in Figure 19</td>
</tr>
<tr>
<td>PV-SP Deviation Alarm</td>
<td>The control subtracts the process value from the setpoint. If the resulting value exceeds the alarm value setting the alarm will activate.</td>
</tr>
<tr>
<td>Signal Change Per Min Alarm</td>
<td>An alarm based on the rate of change in the measured process variable. If the PV changes at a rate greater than the alarm level per minute, the alarm will activate. The rate of change must be above the alarm threshold for longer than the Minimum Duration Of Change time, before the alarm will change state. Caution: If the duration is less than this time, the alarm will not activate no matter how fast the rate of rise.</td>
</tr>
</tbody>
</table>
Figure 19. How High, Low and Band process alarms are implemented.
5.6.2. Working with Calibration Offsets

Calibration offsets allow configuration for oven temperature variations. Enter calibration offsets through the Configuration Menu and Input Configuration.

5.6.2.1. Access the Configuration Menu

To access the Configuration Menu and all sub-menus, the controller must be in its Cycle Complete or Stopped state (that is, not running). If the controller is not in the Stopped state, press to stop the controller before proceeding.

1. Press and together from the Select a Mode screen to access the Main Menu.

2. From the Main Menu, navigate to and select (highlight) the Configuration Menu. Press .

3. A prompt will appear to enter an unlock code. Enter the correct code (the default code is 0010) with and then press to access the Configuration Menu.

5.6.2.2. Working with Input Configuration

Input Configuration allows you to configure items associated with the Control Input Setup, Control Input Cal., High Limit Input Setup and High Limit Input Cal. Control calibration offset parameters are located in the Control Input Cal.

To work with Input Configuration:

1. Navigate from the Configuration Menu to and highlight Input Configuration. Press .

2. Navigate to and select Control Input Cal. Press .

   a. Three options present: Factory Calibration, Single Point Calibration, Two Point Calibration.

   b. Only one option can be active at any given time. The highlighted choice becomes the active choice.

3. Navigate to and select the desired choice. Press to configure the settings within that choice.
5.6.2.3. Factory Calibration

Factory Calibration means there is no calibration offset. Selecting Factory Calibration disables the Single Point Calibration and Two Point Calibration options. There are no settings to configure for Factory Calibration.

5.6.2.4. Single Point Calibration

The Single Point Calibration screen shows the current value by which the process input (PV) is offset. This offset value will be the maintained throughout the controller’s input range. For example:
1. The controller displayed an oven temperature of 100 degrees with the Calibration Offset set to OFF.
2. But an independent measurement of oven temperature reveal an actual temperature of 110 degrees inside the oven.
3. Use ▲ and ▼ to enter a Calibration Offset of 10 degrees. This Calibration Offset increases the displayed temperature by 10 degrees to match the actual temperature measured in the oven.
4. Press \[button\].

5.6.2.5. Two Point Calibration

Two Point Calibration provides a way to choose two temperature points with two different offsets. The actual offset at any given temperature will be interpolated between the chosen points and extrapolated above and below the chosen points. For example:
- Given the settings of:
  - Calibration Low Temp = 100 °C
  - Calibration Low Offset = 1 °C
  - Calibration High Temp = 200 °C
  - Calibration High Offset = 2 °C
- The offset at an oven temperature of 0 °C would be 0 °C, the offset at 150 °C would be 1.5 °C, and the offset at 300 °C would be 3 °C.

To set Two Point Calibration:
1. Use ▲ and ▼ to change the value of Calibration Low Temp. Press ▶.
2. Use ▲ and ▼ to change the value of Calibration Low Offset. Press ▶.
3. Use ▲ and ▼ to change the value of Calibration High Temp. Press ▶.
4. Use ▲ and ▼ to change the value of Calibration High Offset. Press ▶.

Example of Two Point Calibration:
- With a controller set to Factory Calibration (no offset)
- The display on the control read 100 °C and the actual temperature measured 99 °C.
• If the display on the control read 200 °C and the actual temperature measured was 195°C
• Enter the following settings for Two Point Calibration:
  o Calibration Low Temp = 100, Calibration Low Offset = -1
  o Calibration High Temp = 200, Calibration High Offset = -5

Return to the Main Menu by simultaneously pressing \( \text{Δ} \) and \( \text{←} \).

5.6.3. Setting Up Remote Communication

Remote communication between the Protocol 3 controller and a PC running the Despatch Protocol Manager software involves providing each controller with a unique address and following the communication protocol procedures. Up to 32 separate controllers can be run from a PC running the Despatch Protocol Manager software. See the Protocol Manager Instruction Manual for the complete set-up procedure.

5.7. Automatic Tuning

Despatch does not recommend the use of Automatic Tuning. In most oven applications, standard configuration has been optimized.

Access Automatic Tuning through the Main Menu (Section 5.2.4). The Automatic Tuning menu displays all the auto-tuning options provided in the unit. Table 17 provides additional information of each option.

1. Simultaneously press \( \text{Δ} \) and \( \text{←} \).
2. Navigate to Automatic Tuning using \( \downarrow \).
3. Press \( \uparrow \) to Enter Automatic Tuning Mode Unlock Code.
4. Press \( \Delta \) to reach 0010, the Mode Unlock Code.
5. Press \( \leftarrow \) to step through and accept all automatic tune options.

To manually tune the controller, refer to Control Configuration in the Configuration Menu (Section 5.6).

Table 17. Automatic Tuning Options.

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Tune</td>
<td>A &quot;single-shot&quot; routine that disengages when complete.</td>
</tr>
<tr>
<td>Self-Tune</td>
<td>Continuous tuning routine that must be manually disengaged.</td>
</tr>
</tbody>
</table>
Auto Pre-Tune

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Calibration Status</td>
<td>Calibration status of mVDC, VDC, mADC, RTD and Thermocouple CJC inputs. All should display as Calibrated</td>
</tr>
<tr>
<td>Optional Features</td>
<td>USB Port; Data Recorder (includes USB Port) or Profiler.</td>
</tr>
<tr>
<td>Firmware Information</td>
<td>Type and version of firmware.</td>
</tr>
<tr>
<td>Product Revision Level</td>
<td>Software and Hardware revision levels</td>
</tr>
<tr>
<td>Serial Number Information</td>
<td>Instrument serial number.</td>
</tr>
<tr>
<td>Date of Manufacture</td>
<td>Date of manufacture</td>
</tr>
</tbody>
</table>

5.9. Service Information

Access Service Information (Figure 20) through the Main Menu (Section 5.2.4). The Service Information menu displays contact information for service, sales or technical support.
5.10. Remote Operation

The Protocol 3 controller is equipped for remote operation using the Despatch Protocol Manager software. A PC running Despatch Protocol Manager software can access, operate and log data for up to 32 Protocol 3/Protocol Plus-equipped ovens.

See the Protocol Manager Instruction Manual for complete operation instructions.
5.11. Setting Up Digital Inputs

The Protocol 3 controller can be run by external inputs wired to the controller from an external source such as a PLC or switches on a control panel (Figure 21 displays standard digital input wiring).

![Figure 21. Standard Digital Input Wiring.](image)

Enable Digital Inputs through the **Profile Menu**, then **General Configuration** and set **Remote Profile Control** to **Enable**.

**While the Remote Profile Control is enabled, profiles can be run only by digital inputs (versus running profiles from the Profile Mode).**

The external run operation can **Run**, **Hold** or **Stop** profiles indexed in positions 1-7 in the memory of the control. Table 19 shows the profile selection.

**Table 19. Input settings.**

<table>
<thead>
<tr>
<th>Input 1</th>
<th>Input 2</th>
<th>Input 3</th>
<th>Index Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>1</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>2</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>3</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>4</td>
</tr>
</tbody>
</table>

---

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### Input 4 controls the action of the selected profile in the following way:

- Switch from OFF to ON to **Start** the selected profile or continue the profile if it is currently in **Hold**.
- Switch from ON to OFF to **Hold** a profile that is running.
- Switch from ON to OFF will **Stop** a profile that is running if Input 1-3 are also OFF.

<table>
<thead>
<tr>
<th>Input 1</th>
<th>Input 2</th>
<th>Input 3</th>
<th>Index Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>5</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>6</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>7</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>none</td>
</tr>
</tbody>
</table>
6. **Maintenance**

6.1. **Replacement Parts**

To order or return parts, contact the Despatch Global Service Network. The Service Products features our Response Center for customer service. When returning parts, a Despatch representative will provide you with an RMA (Return Material Authorization) number. Attach the RMA number to the returned part for identification. When ordering parts, expedite your process by providing model number, serial number and part number.

<table>
<thead>
<tr>
<th>Global Headquarters</th>
<th>Contact</th>
<th>Service &amp; Technical Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lakeville, MN 55044</td>
<td>Fax: 1-952-469-4513</td>
<td>Service @despatch.com</td>
</tr>
<tr>
<td>USA</td>
<td><a href="mailto:info@despatch.com">info@despatch.com</a></td>
<td><a href="http://www.despatch.com">www.despatch.com</a></td>
</tr>
</tbody>
</table>
7. Troubleshooting

7.1. Error Messages and Alarm

Table 20 lists the more common error messages, the possible problems and remedies.

<table>
<thead>
<tr>
<th>Alarm Status</th>
<th>Possible Problem</th>
<th>Next Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hi-Limit LED ON</td>
<td>• Problem with thermocouple</td>
<td>Once the problem has corrected, press Reset.</td>
</tr>
<tr>
<td></td>
<td>• Hi-limit setpoint has been exceeded.</td>
<td></td>
</tr>
<tr>
<td>DEV HOLD LED</td>
<td>Oven temperature has not entered (or dropped out of) the Auto Hold band and the</td>
<td>Program a slower ramp rate or if oven is not</td>
</tr>
<tr>
<td>flashing</td>
<td>soak timer has stopped</td>
<td>heating check heater circuit.</td>
</tr>
<tr>
<td>Top PV displays</td>
<td>Control thermocouple is disconnected or broken</td>
<td>Repair or replace the thermocouple.</td>
</tr>
<tr>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HLPV displays</td>
<td>High Limit thermocouple is disconnected or broken</td>
<td>Repair or replace the thermocouple.</td>
</tr>
<tr>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7.2. Controller Firmware Revision

Refer to the Protocol 3 Controller Owner’s Manual for instructions on how to enter Product Information. Protocol Manager Software requires Version 2.3 or later firmware for the Protocol 3 controller. If the control is version 2.2 or earlier contact Despatch for a replacement.

7.3. Troubleshoot Protocol Manager/Protocol 3 Controller Communication

For problems communicating between the Protocol Manager and Protocol 3 controller, check each controller’s communication page for these settings:

- **Address**
  - Assign each controller/oven using an RS422/RS485 interface a unique address.
  - Default = 1

- **Baud Rate**
  - For problems communicating, try a lower baud rate. But start with the default baud rate.
  - Default = 19.2K

- **Parity**
  - Leave parity at the default setting
  - Default = None

In addition to checking for proper settings:

- Check cabling between the computer running the software and the oven (Figure 22)
- Review schematics for older model serial converters (Figure 23)
- Review schematics for newer model serial converters (Figure 24)
- Review schematics for USB converter (Figure 25)
Review the Protocol Manager manual for specific tips and techniques for troubleshooting communication problems.

Figure 22. Check Cabling.
Figure 23. Older model serial converter schematic.
Figure 24. Newer model serial converter schematic.
Figure 25. USB Converter Schematic.
Appendices

8.1. Standard Products Warranty

Products Covered by this Warranty

This warranty (the “Warranty”) applies to the following Despatch products: LEB, LBB, LAC, LCC, LCD, RAD, RFD, TAO, TFD, PNN, PTC, PCC.

Parts and Materials

Despatch warrants all parts and materials to be free from defects in material and workmanship for a period of:
1. five (5) years from date of shipment for laboratory oven electric heaters;
2. two (2) years from date of shipment for Protocol 3 and DES 2000 temperature controllers; and
3. one (1) year from the date of shipment, or 2,000 hours of operation, whichever occurs first, for all other components of products covered by this Warranty.

During the applicable Warranty period, Despatch will repair or replace, at Despatch’s option, parts and materials covered by this Warranty.

Labor

During the first 90 days of the Warranty period, Despatch will pay labor costs incurred to remove defective parts and materials, and to reinstall repaired or replacement parts or materials; provided, however, that Despatch’s obligation to pay such labor costs shall be subject to the limitation that the removal and/or reinstallation service must be performed by a Despatch-authorized technician from Despatch’s worldwide network of factory-trained professionals at a location within the contiguous United States.

Transportation Costs

All transportation costs to transport defective parts or materials to Despatch, and to transport repaired or replacement parts or materials to Customer, shall be the responsibility of the Customer.

Terms and Conditions

This Warranty shall be deemed valid and binding upon Despatch if and only if the Customer:
1. installs, loads, operates, and maintains the covered product supplied hereunder in accordance with the instruction manual provided upon delivery and product labeling affixed to the subject equipment;
2. if applicable, follows the Emergency Procedure set forth in this Warranty; and
3. contacts Despatch’s Helpline at 1-800-473-7373 for assistance in diagnosing and troubleshooting the problem immediately upon discovering any damage or malfunction.

Despatch shall have reasonable determination as to whether a repair, replacement, or service is covered by this Warranty shall be final and binding.

Exclusions

This Warranty DOES NOT cover:
1. damage or malfunctions, or expenses incurred in the process of diagnosing and/or repairing damage or malfunctions, resulting from any of the following: operator error, misuse, abuse, inadequate preventive maintenance, normal wear and tear, service or modifications by other than Despatch authorized technicians, use of the covered product that is inconsistent with the operation manual or labeling, acts of nature (including, without limitation, floods, fire, earthquake, or acts of war or civil emergency), internal or external corrosion, or non-conforming utilities (including, without limitation, electrical, fuel supply, environmental and intake/exhaust installations);
2. repair or replacement of parts or materials designed and intended to be expendable or consumable; refrigerants, filters, lamps;
3. routine maintenance; or
4. labor costs incurred for troubleshooting, diagnostics, or testing (except for testing required to verify that a covered defective part or material has been repaired).

Limitations of Liability

Despatch shall not, in any event, be liable for indirect, special, consequential, incidental, or punitive damages or penalties of any kind, including, without limitation loss of revenue, profits or business opportunities resulting from interruption of process or production. In no event shall Despatch be liable for damages in excess of the amounts paid by Customer to Despatch with respect to the applicable product(s). This Warranty does not cover, and Despatch shall not be liable for any losses, costs, damages or expenses resulting from delays in diagnosing or repairing the products, supplying or obtaining replacement parts or materials, strikes, labor stoppages or shortages, fires, accidents, government acts or regulations, or any other causes beyond the control of Despatch.

Non-Compliance By Customer

Despatch reserves the right to suspend and withhold service under this Warranty in the event of non-compliance by the Customer to any terms and conditions of this Warranty or the applicable purchase order or invoice. Further, Despatch shall not be liable for any loss of production, expenses, and inconveniences incurred due to such suspension.

Customer Furnished Equipment Warranty Limitation

This Warranty does not cover, and Despatch shall not be liable for any losses, costs, damages or expenses resulting from delays in diagnosing or repairing the products, supplying or obtaining replacement parts or materials, strikes, labor stoppages or shortages, fires, accidents, government acts or regulations, or any other causes beyond the control of Despatch.

Performance Commitment

Despatch provides no guarantee of process performance or fitness for purpose, unless specifically noted otherwise in Despatch written order acceptance confirmation. Despatch is providing equipment with design parameters specific to its equipment.

Procedure Upon Discovery of Defects and Emergencies

In the event Customer becomes aware of any defect in the applicable products, Customer must immediately: (a) shut off fuel or energy supply (gas and electricity), (b) call for emergency assistance, if needed, and (c) notify Despatch Service.

The representation and warranties set forth herein are exclusive and in lieu of, and customer hereby waves and disclaims reliance upon any other representations and warranties of every kind whatsoever, whether express or implied, or arising by operation of law or in equity, or by course of performance or dealing or usage of trade, including, without limitation, any implied warranties of merchantability or of fitness for a particular purpose.

This warranty is personal to the Customer and may not be transferred or assigned. All limitations hereunder, however, shall be binding on all successors and assigns of Customer.

Service

Phone 800-473-7373, International Phone 952-469-8230; Fax 952-469-8193

e-mail service@despatch.com; www.despatch.com

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8.2. **Modbus Programming**
For information on Modbus programming, refer to the Despatch web page (www.despatch.com) to search for and download the “Modbus Programming Manual” version 3 (Rev 3/13) or later.

8.3. **Programming Worksheet**
See Section 5.3 for help with completing Programming Worksheet (Table 21).

Table 21. Programming Worksheet.

<table>
<thead>
<tr>
<th>Profile Name:</th>
<th>Profile Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment Type</td>
<td>Target Setpoint</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>