Counters
Frequency Meters
PID Controllers
Clock/Timers
Printers
Process Meters
On/Off
Controllers
Recorders
Relative
Humidity
Transmitters
Thermocouples
Thermistors
Wire
Rate Meters
Timers
Totalizers
Strain Gauge
Meters
Voltmeters
Multimeters
Soldering Iron
Testers
pH pens
pH Controllers
pH Electrodes
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This device is marked with the international caution symbol. It is important to read the Setup Guide before installing or commissioning this device as it contains important information relating to safety and EMC.
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NOTES, WARNINGS and CAUTIONS

Information that is especially important to note is identified by following labels:

• NOTE
• WARNING or CAUTION
• IMPORTANT
• TIP

**NOTE:** Provides you with information that is important to successfully setup and use the Programmable Digital Meter.

**CAUTION or WARNING:** Tells you about the risk of electrical shock.

**CAUTION, WARNING or IMPORTANT:** Tells you of circumstances or practices that can effect the instrument’s functionality and must refer to accompanying documents.

**TIP:** Provides you helpful hints.
INTRODUCTION

1.1 Description

This device can be purchased as monitor (read process value only) or as a controller.

- The iSeries Temperature/Process controllers offer unparalleled flexibility in process measurement. Each unit allows the user to select the input type, from 10 thermocouple types (J, K, T, E, R, S, B, C, N and J DIN), Pt RTDs (100, 500 or 1000 Ω, with either 385 or 392 curve), analog voltage or current input. The voltage/current inputs are fully scalable to virtually all engineering units, with selectable decimal point, perfect for use with pressure, flow or other process input.

- The temperature and process control can be achieved by using On/Off or PID control strategy. Control can be optimized with an Auto Tune feature. The instrument offers a ramp to set point with timed soak period before switching off the output.

- The iSeries device features a large, three color programmable display with capability to change a color every time the Alarm is triggered. The standard features include three outputs with relay, SSR, dc pulse, and isolated analog voltage or current output. Options include programmable RS232 or RS485 serial communication and excitation. Analog Output is fully scaleable and configured as retransmission to follow your display. Universal power supply accepts 90 to 240 Vac. Low voltage power option accepts 24 Vac or 20 to 36 Vdc.
1.2 Safety Considerations

This device is marked with the International Caution Symbol. It is important to read this manual before installing or commissioning this device as it contains important information relating to Safety and EMC (Electromagnetic Compatibility).

This instrument is a panel mount device protected in accordance with EN 61010-1:2001, electrical safety requirements for electrical equipment for measurement, control and laboratory. Installation of this instrument should be done by qualified personnel. In order to ensure safe operation, the following instructions should be followed.

This instrument has no power-on switch. An external switch or circuit-breaker shall be included in the building installation as a disconnecting device. It shall be marked to indicate this function, and it shall be in close proximity to the equipment within easy reach of the operator. The switch or circuit-breaker shall meet the relevant requirements of IEC 947–1 and IEC 947-3 (International Electrotechnical Commission). The switch shall not be incorporated in the main supply cord.

Furthermore, to provide protection against excessive energy being drawn from the main supply in case of a fault in the equipment, an overcurrent protection device shall be installed.

- Do not exceed voltage rating on the label located on the top of the instrument housing.
- Always disconnect power before changing signal and power connections.
- Do not use this instrument on a work bench without its case for safety reasons.
- Do not operate this instrument in flammable or explosive atmospheres.
- Do not expose this instrument to rain or moisture.
- Unit mounting should allow for adequate ventilation to ensure instrument does not exceed operating temperature rating.
- Use electrical wires with adequate size to handle mechanical strain and power requirements. Install without exposing bare wire outside the connector to minimize electrical shock hazards.

EMC Considerations

- Whenever EMC is an issue, always use shielded cables.
- Never run signal and power wires in the same conduit.
- Use signal wire connections with twisted-pair cables.
- Install Ferrite Bead(s) on signal wires close to the instrument if EMC problems persist.

Failure to follow all instructions and warnings may result in injury!
1.3 Before You Begin

Inspecting Your Shipment:
Remove the packing slip and verify that you have received everything listed. Inspect the container and equipment for signs of damage as soon as you receive the shipment. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent. The carrier will not honor damage claims unless all shipping material is saved for inspection. After examining and removing the contents, save the packing material and carton in the event reshipment is necessary.

Customer Service:
If you need assistance, please call the nearest Customer Service Department, listed in this manual.

Manuals, Software:
The latest Operation and Communication Manual as well as free configuration software are available at the website listed on the cover page of this manual.

For first-time users: Refer to the QuickStart Manual for basic operation and set-up instructions.

If you have the Serial Communications Option you can easily configure the controller on your computer.

To Disable Outputs:
To ensure that menu changes are properly stored, Standby Mode should be used during setup of the instrument. During Standby Mode, the instrument remains in a ready condition, but all outputs are disabled. Standby Mode is useful when maintenance of the system is necessary.

When the controller is in "RUN" Mode, push twice to disable all outputs and alarms. It is now in "STANDBY" Mode. Push once more to resume "RUN" Mode.

PUSH TWICE to disable the system during an EMERGENCY.

To Reset the Meter:
When the controller is in the "MENU" Mode, push once to direct controller one step backward of the top menu item.

Push twice to reset controller, prior to resuming "Run" Mode except after "Set Points" and "Alarms", that will go to the "Run" Mode without resetting the controller.
PART 2
SETUP
2.1 Front Panel

Figure 2.1 \( \frac{1}{8} \) and \( \frac{1}{16} \) DIN Front Panel Display

Table 2.1 Front Panel Annunciators

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Output 1/Setpoint 1/Alarm 1 indicator</td>
</tr>
<tr>
<td>2</td>
<td>Setpoint 2/Alarm 2 indicator</td>
</tr>
<tr>
<td>°C</td>
<td>°C unit indicator</td>
</tr>
<tr>
<td>°F</td>
<td>°F unit indicator</td>
</tr>
<tr>
<td>☀</td>
<td>Changes display to Configuration Mode and advances through menu items*</td>
</tr>
<tr>
<td>☀</td>
<td>Used in Program Mode and Peak Recall*</td>
</tr>
<tr>
<td>☀</td>
<td>Used in Program Mode and Valley Recall*</td>
</tr>
<tr>
<td>☀</td>
<td>Accesses submenus in Configuration Mode and stores selected values*</td>
</tr>
</tbody>
</table>

* See Part 3 Operation: Configuration Mode

Figure 2.2 \( \frac{1}{8} \) and \( \frac{1}{16} \) DIN Rear View
2.2 ½ DIN Rear Panel Connections

The rear panel connections are shown in Figure 2.3.

![Diagram of rear panel connections](image)

Table 2.2 ½ DIN Rear Panel Connector

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POWER</strong></td>
<td>AC/DC Power Connector: All models</td>
</tr>
<tr>
<td><strong>INPUT</strong></td>
<td>Input Connector: All models TC, PR (Process), RTD</td>
</tr>
<tr>
<td><strong>OUTPUT 1</strong></td>
<td>Based on one of the following models:</td>
</tr>
<tr>
<td></td>
<td>Relay SPDT</td>
</tr>
<tr>
<td></td>
<td>Solid State Relay</td>
</tr>
<tr>
<td></td>
<td>Pulse</td>
</tr>
<tr>
<td><strong>OUTPUT 2</strong></td>
<td>Based on one of the following models:</td>
</tr>
<tr>
<td>(Alarm 2)</td>
<td>Relay SPDT</td>
</tr>
<tr>
<td></td>
<td>Solid State Relay</td>
</tr>
<tr>
<td></td>
<td>Pulse</td>
</tr>
<tr>
<td><strong>OUTPUT 3</strong></td>
<td>Isolated Analog (Output Voltage and Current)</td>
</tr>
<tr>
<td><strong>OPTION</strong></td>
<td>Based on one of the following models:</td>
</tr>
<tr>
<td></td>
<td>RS232C or RS485 programmable</td>
</tr>
<tr>
<td></td>
<td>Excitation</td>
</tr>
</tbody>
</table>
2.3 1/16 DIN Rear Panel Connections

The rear panel connections are shown in Figure 2.3.

Figure 2.4 1/16 DIN Rear Panel Input Connections

Table 2.3 1/16 DIN Rear Panel Connector

<table>
<thead>
<tr>
<th>POWER</th>
<th>AC/DC Power Connector: All models</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT</td>
<td>Input Connector: All models TC, PR (Process), RTD</td>
</tr>
<tr>
<td>OUTPUT 1</td>
<td>Based on one of the following models: Relay SPDT, Solid State Relay, Pulse</td>
</tr>
<tr>
<td>OUTPUT 2</td>
<td>Based on one of the following models: Relay SPDT, Solid State Relay, Pulse (Alarm 2)</td>
</tr>
<tr>
<td>OUTPUT 3</td>
<td>Isolated Analog (Output Voltage and Current)</td>
</tr>
<tr>
<td>OPTION</td>
<td>Based on one of the following models: RS232C or RS485 programmable Excitation</td>
</tr>
</tbody>
</table>
2.4 Electrical Installation

2.4.1 Power Connections

**Caution:** Do not connect power to your device until you have completed all input and output connections. Failure to do so may result in injury!

Connect the main power connections as shown in Figure 2.4.

![Figure 2.5 Main Power Connections](image)

**Table 2.4  Fuse Requirement (see Specifications)**

<table>
<thead>
<tr>
<th>FUSE</th>
<th>Connector</th>
<th>Output Type</th>
<th>For 115Vac</th>
<th>For 230Vac</th>
<th>DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUSE 1</td>
<td>Power</td>
<td>N/A</td>
<td>100 mA(T)</td>
<td>63 mA(T)</td>
<td>63 mA(T)</td>
</tr>
<tr>
<td>FUSE 2</td>
<td>Power</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>400 mA(T)</td>
</tr>
</tbody>
</table>

For the low voltage power option, in order to maintain the same degree of protection as the standard high voltage input power units (90 - 240 Vac), always use a Safety Agency Approved DC or AC source with the same Overvoltage Category and pollution degree as the standard AC unit (90 - 240 Vac).

The Safety European Standard EN61010-1 for measurement, control, and laboratory equipment requires that fuses must be specified based on IEC127. This standard specifies for a Time-lag fuse, the letter code “T”. The above recommended fuses are of the type IEC127-2-sheet III. Be aware that there are significant differences between the requirements listed in the UL 248-14/CSA 248.14 and the IEC 127 fuse standards. As a result, no single fuse can carry all approval listings. A 1.0 Amp IEC fuse is approximately equivalent to a 1.4 Amp UL/CSA fuse. It is advised to consult the manufacturer’s data sheets for a cross-reference.
2.4.2 Thermocouple

The figure below shows the wiring hookup for any thermocouple type. For example, for Type K hookup, connect the yellow wire to the "2" terminal and the red wire to the "1(-)" terminal.

When configuring your controller, select Thermocouple and Thermocouple Type in the Input Type menu (see Part 3).

![Figure 2.6 Thermocouple Wiring Hookup](image)

### Table 2.5 TC Wire Color Chart

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Input Connector</th>
<th>Jacket (external insulation)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Terminal 1 (-)</td>
<td>Terminal 2 (+)</td>
</tr>
<tr>
<td>J</td>
<td>Red</td>
<td>White</td>
</tr>
<tr>
<td>K</td>
<td>Red</td>
<td>Yellow</td>
</tr>
<tr>
<td>T</td>
<td>Red</td>
<td>Blue</td>
</tr>
<tr>
<td>E</td>
<td>Red</td>
<td>Purple</td>
</tr>
<tr>
<td>N</td>
<td>Red</td>
<td>Orange</td>
</tr>
<tr>
<td>R</td>
<td>Red</td>
<td>Black</td>
</tr>
<tr>
<td>S</td>
<td>Red</td>
<td>Black</td>
</tr>
<tr>
<td>B</td>
<td>Red</td>
<td>Gray</td>
</tr>
</tbody>
</table>

If the input wires of the meter get disconnected or broken, it will display "Input (+) Open" message. For safety purpose you may want to set up your alarm to be triggered when input is open. Be sure to set your Alarm correctly (see Alarm 1 & 2 chapters for details).
2.4.3 Two/Three/Four-Wire RTD

The figures below show the input connections and input connector jumpers (shown in bold lines) required to hookup a 2-, 3- or 4-wire RTD.

The **two-wire** connection is simplest method, but does not compensate for lead-wire temperature change and often requires calibration to cancel lead-wire resistance offset.

The **three-wire** connection works best with RTD leads closely equal in resistance. The controller measures the RTD, plus upper and lower lead drop voltage and the subtracts twice the measured drop in the lower supply current lead producing excellent lead-resistance cancellation for balanced measurements.

The **four-wire** RTD hookup is applicable to unbalanced lead resistance and enables the device to measure and subtract the lead voltage, which produces the best lead-resistance cancellation.

When configuring your controller, select RTD type and RTD value in the Input Type menu (see Part 3).

If the input wires of the meter get disconnected or broken, it will display "Input (+) Open" message except in case of 500/1000 Ω 2-wire RTD. In this case the display shows "Input (-) Open" message. For safety purpose you may want to set up your alarm to be triggered when input is open. Be sure to set your Alarm correctly (see Alarm 1 & 2 chapters for details).
2.4.4 Process Current

The figure below shows the wiring hookup for Process Current 0 – 20 mA.

![Process Current Wiring Hookup](image)

When configuring your instrument, select Process Type in the Input Type Menu (see Part 3).

2.4.5 Process Voltage

The figure below shows the wiring hookup for Process Voltage 0 – 100 mV, 0 – 1 V, 0 – 10 V.

![Process Voltage Wiring Hookup](image)

**RL** - Voltage limited resistor, which allows to convert 24 Vdc internal excitation voltage to the appropriate process input value. For instance: if the potentiometer value is equal to 10 kΩ, the minimum RL is 14 kΩ for 10 V process input.

When configuring your instrument, select Process Type in the Input Type Menu (see Part 3).
2.4.6 Wiring Outputs

This meter has three factory installed outputs. The Output 1 can be configured as Control Output or Alarm Output with SPDT Mechanical Relay, SPST Solid State Relay or Pulse. The Output 2 is Alarm Output with SPDT (Mechanical Relay, SPST Solid State Relay or Pulse). The Output 3 is Isolated Analog Output (retransmission) Voltage and Current Output connections are shown below.

![Diagram of wiring connections](image)

**Figure 2.10**
- a) Mechanical Relay and SSR Outputs Wiring Hookup
- b) Pulse Outputs Wiring Hookup

**Figure 2.11 Analog Output Wiring Hookup**
2.4.6 Wiring Outputs (continued)

dc CONTROLLED SSR USED WITH TEMPERATURE CONTROLLER WITH dc VOLTAGE SSR DRIVER OUTPUT

ac CONTROLLED SSR USED WITH TEMPERATURE CONTROLLER WITH MECHANICAL RELAY OUTPUT

ac CONTROLLED SSR USED WITH TEMPERATURE CONTROLLER WITH TRIAC OUTPUT

Figure 2.12 Typical Applications
This device may also have a programmable communication output. The RS232 and RS485 Output Connection are shown below.

![Figure 2.13](image)
a) RS232 Output Wiring Hookup  
b) RS485 Output Wiring Hookup

This meter is capable of supplying 24 Vdc sensor excitation. The excitation output connection is shown below. This option is not available for low voltage power supply.

![Figure 2.14 Excitation Output](image)

If your meter has an excitation option, then communication is not available.

This meter has snubber circuits designed to protect the contacts of the mechanical relays when it switches inductive loads (i.e. solenoids, relays). These snubbers are internally connected between the Common (C) and Normally Open (NO) relay contacts of Output 1 and Output 2.

![Figure 2.15 Snubber Circuits Wiring Hookup](image)

If you have an inductive load connected between Common (C) and Normally Closed (NC) contacts of the mechanical relays and you want to protect them from the rush current during the switching period, you have to connect an external snubber circuit between Common (C) and Normally Closed (NC) contacts as indicated in the figure below.
PART 3
OPERATION: Configuration Mode

3.1 Introduction

The instrument has two different modes of operation. The first, Run Mode, is used to display values for the Process Variable, and to display or clear Peak and Valley values. The other mode, Menu Configuration Mode, is used to navigate through the menu options and configure the controller. Part 3 of this manual will explain the Menu Configuration Mode. For your instrument to operate properly, the user must first "program" or configure the menu options.

Turning your Controller On for the First Time

The device becomes active as soon as it is connected to a power source. It has no On or Off switch. The device at first momentarily shows the software version number, followed by reset RST, and then proceeds to the Run Mode. For first-time users: Refer to the QuickStart Manual for basic operation and set-up instructions.

If you have the Serial Communications Option you can easily configure the controller on your computer.

Table 3.1 Button Function in Configuration Mode

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>MENU</td>
<td>To enter the Menu, the user must first press button. Use this button to advance/navigate to the next menu item. The user can navigate through all the top level menus by pressing MENU. While a parameter is being modified, press to escape without saving the parameter.</td>
</tr>
<tr>
<td>(UP)</td>
<td>Press the up button to scroll through “flashing” selections. When a numerical value is displayed press this key to increase value of a parameter that is currently being modified. Holding the button down for approximately 3 seconds will speed up the rate at which the set point value increments. In the Run Mode press causes the display to flash the PEAK value – press again to return to the Run Mode.</td>
</tr>
<tr>
<td>(DOWN)</td>
<td>Press the down button to go back to a previous Top Level Menu item. Press this button twice to reset the controller to the Run Mode. When a numerical value is flashing (except set point value) press to scroll digits from left to right allowing the user to select the desired digit to modify. When a setpoint value is displayed press to decrease value of a setpoint that is currently being modified. Holding the button down for approximately 3 seconds will speed up the rate at which the setpoint value is decremented. In the Run Mode press causes the display to flash the VALLEY value – press again to return to the Run Mode.</td>
</tr>
<tr>
<td>ENTER</td>
<td>Press the enter button to access the submenus from a Top Level Menu item. Press to store a submenu selection or after entering a value — the display will flash a STRD message to confirm your selection. To reset flashing Peak or Valley press . In the Run Mode, press twice to enable Standby Mode with flashing STBY.</td>
</tr>
</tbody>
</table>

Reset: Except for Alarms, modifying any settings of the menu configuration will reset the instrument prior to resuming Run Mode.
3.2 Menu Configuration

It is required that you put the controller in the Standby Mode for any configuration change other than Setpoints & Alarms.

Figure 3.1 Flow Chart for ID and Set Points
3.2.1 ID Number

SEE ID MENU SELECTION IN CONFIGURATION SECTION FOR ENABLE/DISABLE OR CHANGE ID CODE.

If ID Code is **Disabled** or set as **Default** (0000) the menu will skip ID step to Set Point Menu.

If ID Code is set to **Full** Security Level and user attempts to enter the Main Menu, they will be prompted for an ID Code.

If ID Code is set to **Setpoint/ID** Security Level and user attempts to enter the Configuration Menu, they will be prompted for an ID Code.

**ENTERING YOUR NON-DEFAULT FULL SECURITY ID NUMBER.**

Press 1) Display shows **Id**.
Press 2) Display advances to **____**.
Press & 3) Press to increase digit 0-9. Press to activate next digit (flashing). Continue to use & to enter your 4-digit ID code.
Press 4) If the correct ID code is entered, the menu will advance to the Setpoint 1 Menu, otherwise an error message **ERR** will be displayed and the instrument will return to the Run Mode.

To change ID Code, see ID Menu in the Configuration section.

**ENTERING YOUR NON-DEFAULT SETPOINT/ID SECURITY ID NUMBER.**

Press 5) Display shows **S P 1** Setpoint 1 Menu.
Press 6) Display shows **S P 2** Setpoint 2 Menu.
Press 7) Display shows **Id** ID Code Menu.
Press 8) Display advances to **____**.
Press & 9) Use & to change your ID Code.
Press 10) If correct ID Code is entered, the display will advance to the Input Menu, otherwise the error message **ERR** will be displayed and the controller will return to the Run Mode.

To prevent unauthorized tampering with the setup parameters, the controller provides protection by requiring the user to enter the ID Code before allowing access to subsequent menus. If the ID Code entered does not match the ID Code stored, the controller responds with an error message and access to subsequent menus will be denied.

Use numbers that are easy for you to remember. If the ID Code is forgotten or lost, call customer service with your serial number to access and reset the default to **0000**.
3.2.2 Set Points

SETPOINT 1:

Press ☛ 1) Press ☛, if necessary until SP1 prompt appears.
Press ☛ 2) Display shows previous value of “Setpoint 1” with 1st digit flashing.
Press ▲ & ▼ 3) Press ▲ and ▼ to increase or decrease Setpoint 1 respectively.

Note ▼ Holding ▲ & ▼ buttons down for approximately 3 seconds will speed up the rate at which the set point value increments or decrements.

Press ▲ & ▼ 4) Continue to use ▲ and ▼ to enter your 4-digit Setpoint 1 value.
Press ☛ 5) Display shows STRD stored message momentarily and then advance to SP2 only, if a change was made, otherwise press ☛ to advance to SP2 Setpoint 2 Menu.

SETPOINT 2:

Press ☛ 6) Display shows previous value of “Setpoint 2” with 1st digit flashing.
Press ▲ & ▼ 7) Press ▲ and ▼ to increase or decrease Setpoint 2 respectively.

Note ▼ Holding ▲ & ▼ buttons down for approximately 3 seconds will speed up the rate at which the setpoint value increments or decrements.

Press ▲ 8) Display shows STRD stored message momentarily and then advances to CHFG only, if a change was made, otherwise press ☛ to advance to CHFG Configuration Menu.
3.2.3 Configuration Menu

Figure 3.2 Flow Chart for Configuration Menu

Enter Configuration Menu:

1) Press *, if necessary, until **CNFG** prompt appear.
2) Display advance to **INPT** Input Menu.
3) Pressing and releasing * to scroll through all available menus of Configuration section.

3.2.4 Input Type Menu

Figure 3.3 Flow Chart for Input Type Menu
Input Type (Thermocouple)

ENTER INPUT TYPE MENU:

1) Press , if necessary, until prompt appears.
2) Display advance to Input Menu.
3) Display flashes or (Thermocouple, RTD or Process). If the displayed input type is , press to skip to step 6 ( stops flashing).

THERMOCOUPLE SUBMENU:

4) Scroll through the available selection to (flashing).
5) Display shows stored message momentarily and then (not flashing).
6) Display flashes previous thermocouple type selection. i.e. (see below for types).
7) Scroll through the available thermocouple types to the selection of your choice.
8) Display shows stored message momentarily and then advances to the Reading Configuration Menu.

Note: Use the Input Type (Thermocouple) (RTD) or (Process) and verify your Electrical Installation (see Section 2.3). See the following pages for (TC), (RTD), (Process) menus.

Display: J K T E N dJ J R S B C
Input Type (RTD)

ENTER INPUT TYPE MENU:

Press ☛ 1) Press ☛, if necessary, until CNFG prompt appears.
Press ☛ 2) Display advances to INPT Input Menu.
Press ☛ 3) Display flashes T.ç, RTD or PROC (Thermocouple, RTD or Process). If the displayed input type is RTD, press ☛ to skip to step 6 (RTD stops flashing).

RTD SUBMENU:

Press ☛ 4) Scroll through the available selection to RTD (flashing).
Press ☛ 5) Display shows STRD stored message momentarily and then RTD (not flashing).
Press ☛ 6) Display flashes previous RTD type selection i.e. 392.2 (see below for RTD types selection).
Press ☛ 7) Scroll through the available RTD types to the selection of your choice.
Press ☛ 8) Display shows STRD stored message momentarily and then advances to RTD RTD value.

RTD Types: 392 385 Two, Three or Four-wire
Display: 392.2, 392.3, 392.4, 385.2, 385.3, 385.4

Note: Last digit indicates: 2-, 3- or 4-wire input.

RTD VALUE SUBMENU:

Press ☛ 9) Display flashes previous RTD value selection i.e. 100- (see below for RTD value selection).
Press ☛ 10) Scroll through the available RTD values to the selection of your choice.
Press ☛ 11) Display shows STRD stored message momentarily and then advances to RDG Reading Configuration Menu.

RTD Values: 100 ohm 500 ohm 1000 ohm
Display: 100 500 1000
Input Type (Process)

ENTER INPUT TYPE MENU:
- Press 1) Press , if necessary, until prompt appears.
- Press 2) Display advance to Input Menu.
- Press 3) Display flashes , , or (Thermocouple, RTD or Process). If the displayed input type is , press to skip to step 6 (stops flashing).

PROCESS SUBMENU:
- Press 4) Scroll through the available selection to (flashing).
- Press 5) Display shows stored message momentarily and then (not flashing).
- Press 6) Display flashes previous Process type selection. i.e. (see below for Process types selection).
- Press 7) Scroll through the available Process types to the selection of your choice.
- Press 8) Display shows stored message and then advances to Reading Configuration Menu.

Process Types: 100 mV 1 V 10 V 0 – 20 mA
Display: 0-0.1 0-1.0 0-10 0-20

For 4-20 mA Input select 0-20 mA and adjust the Input/Reading accordingly. To adjust 4-20 mA input, see example under Input/Reading Submenu.

3.2.5 Reading Configuration Menu

It is required that you put the controller in the Standby Mode for any configuration change other than Set Points & Alarms.

Figure 3.4 Flow Chart for Reading Configuration Menu
ENTER READING CONFIGURATION MENU:

Press 1) Press  if necessary, until CNFG prompt appears.
Press 2) Display advances to INPT Input Menu.
Press 3) Display advances to RDG Reading Configuration Menu.
Press 4) Display advances to DEC Decimal Point.

DECIMAL POINT SUBMENU:

Press 5) Display flashes previous selection for Decimal location.
Press 6) Scroll through the available selections and choose Decimal location: FFFF or FFF.F (also F.FF and F.FFF — if PROC Process type was selected in the Input Type Menu).
Press 7) Display shows STRD stored message momentarily and then advances to TEMP Temperature Unit.

Note: Decimal Point for Process Input Type is passive.

TEMPERATURE UNIT SUBMENU:

Press 8) Display flashes previous Temperature Unit selection.
Press 9) Scroll though the available selections to the Temperature Unit of your choice: °F or °C.
Press 10) Display shows STRD stored message momentarily and then advances to FLTR Filter Constant.

FILTER CONSTANT SUBMENU:

Press 11) Display flashes previous selection for Filter Constant.
Press 12) Scroll though the available selections: 0001, 0002, 0004, 0006, 0016, 0032, 0064, 0128. - Default is 0004
Press 13) Display shows STRD stored message momentarily only, if a change was made, otherwise press  to advance to the next menu.

Note: If Process was selected in the Input Type Menu the display will advance to IN.RD Input/Reading Submenu, otherwise the display advances to the ALR1 Alarm 1 Menu.

The Filter Constant Submenu allows the user to specify the number of readings stored in the Digital Averaging Filter.

Tip: For PID control select filter value 0001-0004. A filter value of 2 is approximately equal to 1 second RC low pass time constant.
Reading Configuration (If Process was selected)

INPUT/READING (SCALE AND OFFSET) SUBMENU:

Input Voltage or Current can be converted or scaled into values appropriate for the process or signal being measured. So, a reading may be displayed, for example, in units of weight or velocity instead of in amperes or volts.

The instrument determines Scale and Offset values based on two user-provided input values entered with the corresponding readings. Note that “In1” Input 1 and “In2” Input 2 are represented and entered as a product of the input voltage/current and the conversion number from the Table 3.2.

The following instructions include details for a specific scenario in which a 4-20 mA input (in the 20 mA Process Mode) is to be represented as a measurement of 0-100 percent.

Press 14) Press at the In1 prompt. Display shows In1 Input 1 Submenu.

Press 15) Display shows Input 1 value with 1st digit flashing.

Press & & 16) Use and buttons to enter In1 value.

The In1 value = min. input value * conversion number.

Example: 4 mA as 4(mA) x 500 = 2000.

Press 17) Display advances to Rd1 Reading 1 Submenu.

Press & & 18) Use and buttons to enter Rd1 value.

This value represents In1 in terms of some meaningful engineering units. To show the 4 mA as zero percent enter Rd1 value = 0000.

Example: Rd1 value = 0000.

Press 19) Display In2 Input 2 Submenu.

Press 20) Display shows Input 2 value with 1st digit flashing.

The In2 value = max. input value * conversion number.

Example: 20(mA) x 500 = 10000 (9999).

Press & & 21) Use and buttons to enter In2 value.

Press 22) Display advances to Rd2 Reading 2 Submenu.

Press & & 23) Use and buttons to enter Rd2 value.

Example: Rd2 value = 0100.

Press 24) Display flashes stored message momentarily and then advances to ALR1 only, if change was made, otherwise press to advance to ALR1 Alarm 1 Menu.
Conversion number is a coefficient of conversion between input values and real full display range (10000 counts, shown as 9999). See Table 3.2 below for proper conversion number.

### Table 3.2 Conversion Table

<table>
<thead>
<tr>
<th>RANGE</th>
<th>CONVERSION NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mV</td>
<td>10000 / (100 x 1) = 100</td>
</tr>
<tr>
<td>1 V</td>
<td>10000 / (1000 x 1) = 10</td>
</tr>
<tr>
<td>10 V</td>
<td>10000 / (1000 x 10) = 1</td>
</tr>
<tr>
<td>0 -20 mA</td>
<td>10000 / (20 x 1) = 500</td>
</tr>
</tbody>
</table>

Example =

0 - 1 V = 0 - 100.0

In 1 = 0
Rd 1 = 0
Inp 2 = 9999
Rd 2 = 100.0
3.2.6 Alarm 1

This unit is equipped with three physical outputs that can only be configured as follows:

a) Alarm 1, Alarm 2 & Analog Output
b) Output 1, Alarm 2 & Analog Output

**Note**: Alarm must be DISABLED if Ramp is ENABLED.

**Figure 3.5 Flow Chart for Alarm 1**

**ENTER ALARM 1 MENU:**

1) Press \( \text{CNFG} \), if necessary, until \( \text{CNFG} \) prompt appears.

2) Display advances to \( \text{INPT} \) Input Menu.

3) Press \( \text{CNFG} \), if necessary, until Display advances to \( \text{ALR 1} \) Alarm 1 Menu.

4) Display advances to Alarm 1 \( \text{ENbl} \) Enable or \( \text{DSbl} \) Disable Submenu and flashes the previous selection.
**ALARM 1 ENABLE/DISABLE SUBMENU:**

Press 5) Scroll though the available selection until ENbl displays to use Alarm 1.

Press 6) Display shows Strd stored message momentarily and then advances to Absa only, if it was changed, otherwise press to advance to Absa Alarm 1 Absolute/Deviation Submenu.

If DSbl Alarm 1 Disabled was selected, all submenus of Alarm 1 Menu will be skipped and meter advances to ALR2 Alarm 2 Menu. If ENbl Alarm 1 Enabled was selected, Output 1 would be automatically disabled, and reassigned as Alarm 1.

**ALARM 1 ABSOLUTE/DEVIATION SUBMENU:**

Press 7) Display flashes previous selection. Press Absa Absolute or Deva Deviation.

Press 8) Display shows Strd stored message momentarily and then advances to LtcH only, if it was changed, otherwise press to advance to LtcH Alarm 1 Latch/Unlatch Submenu.

**Absolute** Mode allows Alarm 1 to function independently from Setpoint 1. If the process being monitored does not change often, then "Absolute" Mode is recommended.

**Deviation** Mode allows changes to Setpoint 1 to be made automatically to Alarm 1. Deviation Mode is typically the ideal mode if the process temperature changes often. In Deviation Mode, set Alarm 1 a certain number of degrees or counts away from Setpoint 1 — this relation remains fixed even if Setpoint 1 is changed.

**ALARM 1 LATCH/UNLATCH SUBMENU:**

Press 9) Display flashes previous selection. Press LtcH Latched or Unlt Unlatched.

Press 10) Display shows Strd stored message momentarily and then advances to LtcCl only, if it was changed, otherwise press to advance to LtcCl Contact Closure Submenu.

**Latched Mode:** Relay remains "latched" until reset. To reset already latched alarm, select Alarm Latch and press Max twice (i.e. Unlatch and then back to Latch) or from a Run Mode, push twice to put the controller in Standby Mode and then push one more time to return to the Run Mode.

**Unlatched Mode:** Relay remains latched only as long as the alarm condition is true.
CONTACT CLOSURE SUBMENU:

Press 11) Display flashes previous selection. Press to Normally Closed or Normally Open.

Press 12) Display shows stored message momentarily and then advances to only, if it was changed, otherwise press to advance to Active Submenu.

Normally Open: If this feature is selected, then the relay is "energized" only when an alarm condition occurs.

Normally Closed: "Fail Safe" Mode. Relay is energized under "normal" conditions and becomes de-energized during alarm or power failure.

ACTIVE SUBMENU:

Press 13) Display flashes previous selection. Press to scroll through the available selections: Above, Below, HI/Lo HI/Low and Band Band. (Band is active if Deviation was selected).

Press 14) Display shows stored message momentarily and then advances to Alarm Enable/Disable at Power On Submenu.

Above: Alarm 1 condition triggered when the process variable is greater than the Alarm Hi Value (Low value ignored).

Below: Alarm 1 condition triggered when the process variable is less than the Alarm Low Value (Hi value ignored).

Hi/Low: Alarm 1 condition triggered when the process variable is less than the Alarm Low Value or above the Hi Value.

Band: Alarm 1 condition triggered when the process variable is above or below the "band" set around Setpoint 1. Band equals Hi Value (Low Value ignored). A "band" is set around the Setpoint by the instrument only in the "Deviation" Mode.

The Band for the AL 1 would be following the Setpoint 1 value
The Band for the AL 2 would be following the Setpoint 2 value.

The Band or the Deviation Value should be entered under:

AL1 High (if they want Alarm 1)
AL2 High (if they want Alarm 2)
AL Low value is ignored in the Band mode.

Example: if customer requires a Deviation Value of ±10 degrees around a setpoint (using Output 2 as alarm)

Alarm 2: - Deviation
Contact Closure type: Deviation---Band
AL2 High: 10 (Band they want around Setpoint 2)

Then the Band Value is to be entered under AL2 HI: 10 not 80+10 = 90
ALARM ENABLE/DISABLE AT POWER ON:

Press ✽ 15) Display flashes previous selection. Press ▲ to ENBL enable or DSBL disable.
Press ✽ 16) Display shows STRD stored message. momentarily and then advances to ALR.L only, if it was changed, otherwise press ✽ to advance to the ALR.L Alarm 1 Low Value Submenu.

If the alarm is enabled at Power On, the alarm will be active right after reset. If the alarm is disabled at Power On, the alarm will become enabled when the process value enters the non alarm area. The alarm is not active while the process value is approaching Setpoint 1.

ALARM 1 LOW VALUE SUBMENU:

Press ✽ 17) Display flashes 1st digit of previous value. Use ▲ and ▼ to enter new value.
Press ▲ & ▼ 18) Use ▲ and ▼ to enter Alarm 1 Low Value.
Press ✽ 19) Display shows STRD storage message momentarily and then advances to ALR.H only, if it was changed, otherwise press ✽ to advance to ALR.H Alarm 1 Hi Value Submenu.

ALARM 1 HI VALUE SUBMENU:

Press ✽ 20) Display flashes 1st digit of previous value. Use ▲ and ▼ to enter new value.
Press ▲ & ▼ 21) Use ▲ and ▼ to enter Alarm1 Hi Value.
Press ✽ 22) Display shows STRD stored message momentarily and then advances to the next menu only, if it was changed, otherwise press ✽ to advance to the next menu.
3.2.7 Alarm 2

This unit is equipped with three physical outputs that can only be configured as:

a) Alarm 1, Alarm 2 & Analog Output
b) Output 1, Alarm 2 & Analog Output

**Note**: Alarm must be DISABLED if Ramp is ENABLED.

**Figure 3.6 Flow Chart for Alarm 2**

**ENTER ALARM 2 MENU:**

1. Press \( \text{CNFG} \), if necessary, until \( \text{CHFG} \) prompt appears.
2. Press \( \text{INPT} \); Display advances to \( \text{INPT} \) Input Menu.
3. Press \( \text{ALR2} \), if necessary, until Display advances to \( \text{ALR2} \) Alarm 2 Menu.
4. Press \( \text{abo}\); Display advances to \( \text{abo} \) Absolute/Deviation Submenu.

**Note**: Alarm 2 menu items are identical to Alarm 1 Menu, except Alarm 2 does not have Alarm enable/disable at Power On submenu item. Modifying Alarm Settings will not reset the instrument.
3.2.8 Loop Break Time/Field Calibration

**Figure 3.7 Flow Chart for Loop Break Time/Field Calibration**

**ENTER LOOP BREAK TIME MENU:**

1. Press \( \uparrow \) if necessary, until \( \text{CHFG} \) prompt appears.
2. Press \( \downarrow \) Display advances to \( \text{INPT} \) Input Menu.
3. Press \( \uparrow \) if necessary, until Display advances to \( \text{LOOP} \) Loop Break Time Menu.
4. Press \( \downarrow \) Display advances to Loop Break Time \( \text{ENBL} \) Enable or \( \text{DSBL} \) Disable Submenu and flashes the previous selection.

**LOOP BREAK ENABLE/DISABLE SUBMENU:**

5. Scroll through the available selections: \( \text{ENBL} \) or \( \text{DSBL} \).
6. Display shows \( \text{STRD} \) stored message momentarily and then advances to \( \text{B.TIM} \) Loop Break Time Value Submenu.

Loop Break is an additional safety feature intended to monitor the rate of change of the process value, while approaching the SP1. It is strictly intended as an additional warning system, therefore its use is entirely optional. An active Loop Break will cause the Process Value digits to blink in a rotating pattern. If the process value reaches the set point the blinking will stop and \( \text{B.TIM} \) is completed successfully, otherwise \( \text{BR.AL} \) Break Alarm warning will flash, and Output 1 will be turned off.

**LOOP BREAK TIME VALUE SUBMENU:**

7. Display flashes 1st digit of previous Loop Value.
8. Press \( \uparrow \) and \( \downarrow \) buttons to enter a new Loop Value (0 to 99.59).
9. Display shows \( \text{STRD} \) stored message momentarily and then advances to \( \text{R.ADJ} \) Reading Adjust Submenu.

**Loop Break Time Value** allows the user to determine the time interval in MM:SS (from zero to 99 minutes and 59 seconds) that the Process Value changes at least 10 counts or if the Input Type is either RTD or Thermocouple, the value changes 4° Fahrenheit or 2° Celsius. At the specified time interval, if the process value change is less than the stated rate, flashing \( \text{B.TIM} \) will be displayed, the output 1 will be de-energized, and Alarm 1 energized. Loop break time will be disabled when the Process Value (PV) enters the control band.
READING ADJUST SUBMENU:
Press 10) Display flashes 1st digit of previous reading adjust value.
Press & 11) Press ▲ and ▼ buttons to enter a new Reading Adjust value (-1999 to 9999).
Press 12) Display shows STRD stored message momentarily and then advances to SP.dV Setpoint Deviation Menu.

Reading Offset Adjust allows the user to fine tune a minor error of the transducer, however some applications may require a large offset adjust. (Displayed Process Value = Measured Process Value ± R.ADJ).
Reading Adjust is adjustable between -1999 to 9999. Note: For Temperature reading only, not Process.

SETPOINT DEVIATION ENABLE/DISABLE SUBMENU:
Press 13) Display advances to Setpoint Deviation ENBL Enable or DSBL Disable Submenu and flashes the previous selection.
Press 14) Scroll through the available selections: ENBL or DSBL.
Press 15) Display shows STRD stored message momentarily and then advances to the CAL Menu.

Setpoint Deviation Submenu, if “enabled”, allows changes to Setpoint 1 to be made automatically to Setpoint 2. This mode is very helpful if the Process Value changes often. In Setpoint Deviation Mode, set SP2 a certain number of degrees or counts away from SP1 - this relation remains fixed when SP1 is changed. For instance: Setting SP1=200 and SP2=20 and enabling SP.dV means that the absolute value of SP2=20. Moving SP1 to 300, the absolute value of SP2 becomes 320.

THERMOCOUPLE FIELD CALIBRATION SUBMENU:

⚠️ CAUTION: Do not perform the following steps until you fully understand this entire section.

* If you accidently engage the flashing 0000 (CAL° alert) simply re-press the last button you pressed, to avoid unintentionally mis-calibrating your meter.

Note: RTD and Process are perfectly calibrated. This section is applicable to Thermocouple (TC) calibration only.

Be sure that the TC being used to calibrate the meter is of the type selected in the TC submenu. Place the TC in an ice-bath (or other 0°C / 32°F environment). In ambient temperature conditions: connect the TC to the meter, apply power to the meter.

⚠️ CAUTION: Do not proceed with TC calibration unless the above conditions have been in effect for at least one hour.

Press 16) Display shows CAL°.
Press 17) Display shows flashing 0000.
Press 18) Display will still show flashing 0000.
Press 19) Display shows OUT1 (meaning Calibration is complete)
3.2.9 Output 1

This unit is equipped with three physical outputs that can only be configured as follows:

a) Alarm 1, Alarm 2 & Analog Output
b) Output 1, Alarm 2 & Analog Output

It is required that you put the controller in the Standby Mode for any configuration change other than Set Points & Alarms.

Figure 3.8 Flow Chart for Output 1
ENTER OUTPUT 1 MENU:

1) Press  if necessary, until CHFD prompt appears.
2) Display advances to INPUT Input Menu.
3) Press  if necessary, until Display advances to OUT1 Output 1 Menu.
4) Display advances to SELF Self Submenu.

SELF SUBMENU:

The Self Option allows the output of the instrument to be controlled manually from the front panel.

5) Display flashes the current setting of Self, ENBL Enabled or DSBL Disabled.
6) Press the  button to select between Enable and Disable.
7) If Self ENBL Enabled was selected, display shows STRD stored message momentarily and then advances to the next menu (Output 1 setting is completed).

The output is now under the direct control of the operator and can be adjusted in the Run Mode (M00.0 to M99.9), by pressing the  and  buttons, where M calls for the Manual (Self) Control. For example, setting of M50.0 of an Analog Output of 0 to 10 Vdc would produce roughly 5 Vdc at the output.

8) If Self DSBL Disabled was selected, display shows STRD stored message momentarily and then advances to OPL0 Minimum/Percent Low Submenu of Output 1 Menu.

There is a shorter way to Enable or Disable Self Mode. From a Run Mode, press  and then press . Self Mode is Enabled now. Press  or  to display MXX.X. To disable Self, press  and then press . Display goes to the Run Mode. Self Mode is Disabled now.

MINIMUM/PERCENT LOW SUBMENU:

Specify in percent, the minimum value (0000) for control output. If the output is analog proportional (Current or Voltage), then the minimum voltage or current, in percent, is specified. If the output is time proportional (Relay, SSR or Pulse), then the minimum duty-cycle, in percent, is specified.

9) Display flashes 1st digit of previous “Percent Low” setting.
10) Use  and  buttons to enter a new value for “Percent Low”.
11) Display shows STRD stored message momentarily and then advances to OPL1 Maximum/Percent High Submenu.
MAXIMUM/PERCENT HIGH SUBMENU:

Specify in percent, the maximum value (99) for control output. If the output is analog proportional (Current or Voltage), then the maximum voltage or current, in percent, is specified. If the output is time proportional (Relay, SSR, or Pulse), then the maximum duty-cycle, in percent, is specified.

Press 12) Display flashes 1st digit of previous “Percent High” setting.
Press & 13) Use and buttons to enter a new value for “Percent High”.
Press 14) Display shows stored message momentarily and then advances to Control Type Submenu.

Example: On an Analog Output of 0~10 Vdc, a setting of %LO = 10 and %HI = 90, cause the minimum on the control output to be 1 V and the maximum on the control output to be 9 V. The same setting on a time proportional output, will cause 10% duty cycle for the minimum control output and 90% duty cycle for maximum control output. To disable %LO/HI, set LO to 00 and HI to 99. If %LO/HI is at other values than the default (%LO = 00, %HI = 99), SOAK is disabled.

CONTROL TYPE OUTPUT:

(Relay, SSR, or Pulse)
Press 15) Display flashes On/Off or Proportional, Integral, Derivative.
Press 16) Scroll through the available selections: “ON/OFF” or “PID”.
Press 17) Display flashes stored message momentarily and then advances to Action Type Submenu.

The ON/OFF control is a coarse way of controlling the process. The “Dead Band” improves the cycling associated with the On/Off control.

The PID control is best for processes where the set point is continuously changing and/or a tight control of the process variable is required. PID control requires tuning and adjustment of the "Proportional", "Integral or Reset" and "Derivative or Rate" terms by a trial-and-error method.

The instrument provides an "Auto Tuning" feature making the tuning process automatic, possibly optimum.
ACTION TYPE SUBMENU:

The error that results from the measurement of the Process Variable may be positive or negative since it may be greater or smaller than the Setpoint. If a positive error should cause the instrument output to increase (i.e. cooling), it would be called Direct Acting. If a negative error should cause the output to increase (i.e. heating), it would be called Reverse Acting.

Press 18) Display flashes DRCT Direct or RVRS Reverse.
Press 19) Scroll through the available selections: “Direct” or “Reverse”.
Press 20) Display shows STRD stored message momentarily and then advances to AUTO only, if it was changed, otherwise press to advance to AUTO Auto PID Submenu (if PID Control Type was selected).

If “ON/OFF” was selected in the Control Type, the display skips to the Dead Band Submenu.

AUTO PID SUBMENU:

Press 21) Display flashes ENBL or DSBL.
Press 22) Scroll through the available selections: “Enable” or “Disable”.
Press 23) Display shows STRD stored message momentarily and then advances to ANTL only, if it was changed, otherwise press to advance to ANTL Anti Integral Submenu.

If “Enabled”, the controller can determine, by enabling Start PID, the optimum values for the three adjustments — Proportional, Reset and Rate corresponding to P, I, and D. These values may be changed once the Auto Tuning is complete.

If “Disabled” is selected, the user will manually enter these three adjustment values. If you want the instrument to do the Auto PID and the P, PI or PID, first select Auto Disable and enter 0000 for unwanted parameter. i.e. for PI enter 0000 for the rate.

ANTI INTEGRAL SUBMENU:

Press 24) Display flashes ENBL or DSBL.
Press 25) Scroll through the available selections: “Enable” or “Disable”.
Press 26) Display shows STRD stored message momentarily and then advances to STL only, if it was changed, otherwise press to advance to STL to Start Auto Tune PID Submenu (If Auto PID was Enabled).

If Auto PID was disabled display advances to PROP Proportional Band Submenu.
If Anti Integral (Anti Windup) Submenu “Enabled”, this feature allows the error term outside the proportional band to be calculated and accumulated for integration. This may be an important feature in applications where fast response time is desirable.

START AUTO TUNE PID:

Press 27) Display flashes ENBL or DSBL.
Press 28) Scroll through the available selections: “Enable” or “Disable”.
Press 29) Display shows STRD stored message momentarily and then advances to CYCL only, if it was changed, otherwise press to advance to CYCL Cycle Time Submenu.

If “Enabled”, the controller is ready to calculate P, PI or PID parameters. The instrument performs this by activating the output and observing the delay and rate at which the Process Value changes. The setpoints must be at least 18°F or 10°C above the (PV) Process Value in order to perform Auto Tune, otherwise an error message will be displayed.

To start Auto Tune PID select PID, enable Auto PID and enable Start PID. Sometimes Auto PID parameter needs fine tuning i.e. for each 5°F overshoot increase the Proportional Band (PB) by 15% and for each ±1°F fluctuation at the Setpoint (SP) increase reset by 20%.

Once started, display shows A.TUN with letters blinking in the rotating pattern. When auto tune stops, display will show process value. Do not perform any operations or settings before first stopping Auto Tune. Any alarms or other output is disabled during Auto Tune.

If “AUTO PID” was “DISABLED”, the display will show the following three submenus. This allows the user to manually enter values for Proportional, Reset and Rate terms corresponding to P, I, and D. It also can be used for Auto PID for disabling unwanted parameter i.e. PI enter 0000 for Rate.

PROPORTIONAL BAND SUBMENU:

Press 30) Display flashes 1st digit of the previous PROP Proportional band value.
Press & 31) Press and buttons to enter a new “Proportional Band” value.
Press 32) Display shows STRD stored message momentarily and then advances to REST only, if it was changed, otherwise press to advance to REST Reset Setup Submenu.

Proportional Band is in degrees of temperature or counts of process. Proportional Band is defined, as the change in the instrument input to cause a 100% change in the controller output.
RESET SETUP SUBMENU:

Press 33) Display flashes 1st digit of the previous Reset value.
Press 34) Press  and  buttons to enter a new “Reset” value.
Press 35) Display shows stored message momentarily and then advances to Rate only, if it was changed, otherwise press to advance to Rate Setup Submenu.

Reset unit is in seconds 0-3999.

RATE SETUP SUBMENU:

Press 36) Display flashes 1st digit of previous Rate value.
Press 37) Press  and  buttons to enter a new Rate value.
Press 38) Display shows stored message momentarily and then advances to the only, if it was changed, otherwise press to advance to Cycle Time submenu for RTD and Thermocouple types.

Rate unit is in seconds 000.0-399.9.

If the Output 1 is Analog Option the display skips to Damping Factor.

CYCLE TIME SUBMENU:

Press 39) Display flashes 1st digit of the previous Cycle Time value.
Press 40) Press  and  buttons to enter a new “Cycle Time” value. (1 to 199 seconds)
Press 41) Display shows stored message momentarily and then advances to Damping only, if it was changed, otherwise press to advance to Damping Factor Submenu.

A Cycle Time selected between 1 and 199 seconds determines the total On/Off time of each proportional cycle. For example, a 15 second cycle time means that every 15 seconds the output will turn on for part or all of the cycle. For Relay control outputs, do not select a cycle time of less than 7 seconds or the relays’ lifetime will be shortened. For a cycle time of less than 7 seconds select SSR or DC pulse. Use an external SSR with the DC pulse option for higher currents (higher than 1 Amp).
DAMPING FACTOR SUBMENU:

Press  42) Display flashes the previous “Damping Factor” selection.
Press  43) Scroll through the available selections: 0000, 0001, 0002, 0003, 0004, 0005, 0006, 0007.
Press  44) Display flashes STRD stored message and then advances to ANLG only, if it was changed, otherwise press  to advance to ANLG Analog Output Menu.

Damping Factor is a measure of speed, overshoot, and undershoot in which the process variable responds to the output changes of the instrument, which were used during the Auto Tune. This value is typically set to the ratio of Rate to Reset. This Default value is (0003). For fast response time, this value should be decreased while for slow response time it should be increased.

Note: The "DEADBAND" Submenu will only appear if "ON/OFF" was selected from the "Control Type" Menu.

DEADBAND SUBMENU:

Press  45) Display flashes 1st digit of the previous dead Deadband value.
Press  &  46) Press  and  buttons to enter a new “Deadband” value.
Press  47) Display shows STRD stored message and then advances to ANLG only, if it was changed, otherwise press  to advance to ANLG Analog Output Menu.

Dead Band units are the same as Proportional Band units.

Tip: The Dead Band or neutral zone is the number of degrees or counts (if Input Type is Process) around the set point which the Process Variable must pass above or below the set point, before the output changes state.
3.2.10 Analog Output (Retransmission)

This unit is equipped with three physical outputs that can only be configured as follows:

a) Alarm 1, Alarm 2 & Analog Out
b) Output 1, Alarm 2 & Analog Out

Analog Output is available only if the Analog Output option board is factory installed.

It is required that you put the controller in the Standby Mode for any configuration change other than Set Points & Alarms.

**Figure 3.9 Flow Chart for Analog Output (Retransmission)**

**ENTER ANALOG OUTPUT MENU:**

1) Press , if necessary, until prompt appears.
2) Display advances to Input Menu.
3) Press , if necessary, until Display advances to Analog Output Menu.
4) Display advances to Analog Output Current/Voltage Submenu and flashes the previous selection.

**CURRENT/VOLTAGE SUBMENU:**

5) Display flashes Current or Voltage.
6) Scroll through the available selection: Current or Voltage. (Example Voltage).
7) Display shows stored message momentarily and then advances to Submenu only if it was changed, otherwise press to advance to Reading 1 Submenu.
READING 1:
- Press \( \uparrow \) 8) Display flashes 1st digit of previous “Reading 1” value.
- Press \( \uparrow \) & \( \downarrow \) 9) Enter “Reading 1” value. (Example 0000).
- Press \( \uparrow \) 10) Display advances to \textit{OUT.1} Out 1 Submenu.

OUT 1:
- Press \( \uparrow \) 11) Display flashes 1st digit of previous “Out 1” value.
- Press \( \uparrow \) & \( \downarrow \) 12) Enter “Out 1” value. (Example 00.00).
- Press \( \uparrow \) 13) Display advances to \textit{RD2} Reading 2 Submenu.

READING 2:
- Press \( \uparrow \) 14) Display flashes 1st digit of previous “Reading 2” value.
- Press \( \uparrow \) & \( \downarrow \) 15) Enter “Reading 2” value. (Example 9999).
- Press \( \uparrow \) 16) Display advances to \textit{OUT.2} Out 2 Submenu.

OUT 2:
- Press \( \uparrow \) 17) Display flashes 1st digit of previous “Out 2” value.
- Press \( \uparrow \) & \( \downarrow \) 18) Enter “Out 2” value. (Example 10.00)
- Press \( \uparrow \) 19) Display advances to the \textit{ALR2} Alarm 2 Menu.

\textbf{Note:} The above example is for 0-10 V of the entire range of the Process Input and Analog Output. For 0-20 mA output you need to set “Analog Type” to Current and OUT 2 to 20.00.
3.2.11 Ramp & Soak

**Note** Alarm must be DISABLED if Ramp is ENABLED.

**Note** It is required that you put the controller in the Standby Mode for any configuration change other than Set Points & Alarms.

![Flow Chart for Ramp and Soak](image)

**Figure 3.10 Flow Chart for Ramp and Soak**

**ENTER RAMP AND SOAK MENU:**
1) Press , if necessary, until CNFG prompt appears.
2) Display advances to INPT Input Menu.
3) Press , if necessary, until Display advances to RAMP Ramp and SOAK Soak Menu.

**RAMP ENABLE/DISABLE SUBMENU:**
4) Display advances to “Ramp Enable/Disable” Submenu and flashes ENBL or DSBL.
5) Scroll through the available selections: “Enable” or “Disable”.
6) Display shows STRD stored message momentarily and then advances to SOAK Soak Enable/Disable Menu.

**SOAK ENABLE/DISABLE SUBMENU:**
7) Display flashes ENBL or DSBL.
8) Scroll through the available selections: “Enable” or “Disable”.
9) Display shows STRD stored message momentarily and then advances to “Ramp Value” Submenu.
Ramp & Soak provides users with the flexibility to slowly bring the Process Variable (PV) to the desired setpoint. Ramp & Soak values are specified in HH.MM format. The Ramp value indicates the time specified to bring the process variable to Setpoint 1 (SP1). Once the set point is reached, the PID takes over and the Process Variable will be controlled at the desired set point indefinitely. If Soak is enabled, PID will control the Process Variable at the specified Setpoint for the duration of Soak time and then will turn off Output 1. To start a new Ramp/Soak cycle, reset the instrument by pressing  and then  button.

An active Ramp/Soak will change SP1 one degree above the PV and will cause the most significant digit to blink. The SP1 will be incremented by one degree until it reaches the original SP1. The minimum Ramp time must be at least twice the time that it will take the PV to reach the Setpoint Value (SV) with OUT 1 fully ON.

**RAMP VALUE SUBMENU:**

- Press  10) Display flashes 1st digit of previous stored “Ramp Value”.
- Press  &  11) Press  and  buttons to enter a new “Ramp Value”.
- Press  12) Display shows  stored message momentarily and then advances to “Soak Value” Submenu.

**SOAK VALUE SUBMENU:**

- Press  13) Display flashes 1st digit of previous stored “Soak Value”.
- Press  &  14) Press  and  buttons to enter a new “Soak Value”.
- Press  15) Display shows  stored message and advances to the  ID Code Menu.

The Ramp and Soak time is 00:00 to 99:59 i.e. HH.MM. (from zero to 99 hours and 59 minutes) During Ramp & Soak do not perform any operations or settings before first stopping it. Any alarms or other output are disabled during this time. To stop Ramp & Soak first put instrument into Standby Mode, then go to Ramp & Soak Menu and disable it.
**3.2.12 ID CODE**

**Figure 3.11 Flow Chart for ID Code**

**ENTER ID CODE MENU:**

1. **Press** ₁, if necessary, until **CNFG** prompt appears.
2. **Press** ₂, if necessary, until Display advances to **INPT** Input Menu.
3. **Press** ₃, if necessary, until Display advances to **ID** ID Code Menu.

**ENTERING OR CHANGING YOUR (NON-DEFAULT) ID CODE:**

4. **Display advances to** ₄ with ₁ˢᵗ under score flashing.
5. **Press** ₅ and ₆ to enter your 4-digit “ID Code” number.
6. **Display advances to** ₆. **Change ID Code Submenu.**

*Note:* If entered “ID Code” is incorrect display shows **ERR** Error message momentarily and then skips to the Run Mode.

7. **Display flashes the first digit of previous entered “ID Code” number.**
8. **Press** ⁷ and ⁸ buttons to enter your new “ID Code” number.
9. **Display shows** ⁹ stored message momentarily and then advances to the **FULL** Full Security Submenu.
ENTERING OR CHANGING YOUR (DEFAULT) ID CODE:

Enter \textit{id} menu (Repeat steps from 1 to 3).

Press \textbf{10} Display advances to \textbf{CH. id} Change ID Code Submenu.
Press \textbf{11} Display shows 0000 message with flashing 1\textsuperscript{st} digit.

\textbf{Note}: If you want to change your default “ID Code” you can do it now, otherwise press \textbf{1} and menu will skip to \textbf{FULL} Full Security Submenu.

Press \textbf{12} & \textbf{13} Press \textbf{1} and \textbf{v} buttons to enter your new “ID Code” number.
Press \textbf{14} & \textbf{15} Display shows \textbf{SP. id} stored message momentarily and then advances to \textbf{FULL} Full Security Submenu.

FULL SECURITY LEVEL SUBMENU:

Press \textbf{16} Display flashes \textbf{ENbl} Enable or \textbf{DSbl} Disable.
Press \textbf{17} Scroll through the available selections: “Enable” or “Disable”.
Press \textbf{18} Display shows \textbf{STRd} stored message momentarily and then advances to \textbf{SP. id} Setpoint/ID Submenu.

\textbf{Note}: If "Full" Security Level is "Enabled" and the user attempts to enter the Main Menu, they will be prompted for an ID Code. The ID Code should be correct to enter the instrument Menu item.

SETPOINT/ID SECURITY LEVEL SUBMENU:

This Security Level can be functional only if \textbf{FULL} Security Level is Disabled.

Press \textbf{19} Display flashes \textbf{ENbl} Enable or \textbf{DSbl} Disable.
Press \textbf{20} Scroll through the available selections: “Enable” or “Disable”.
Press \textbf{21} Display shows \textbf{STRd} stored message momentarily and then advances to \textbf{COMM} Communication Submenu.

\textbf{Note}: If "Setpoint/ID" Security Level is "Enabled" and the user attempts to advance into the \textbf{CNFG} Configuration Menu, he will be prompted for ID Code number. The ID Code should be correct to proceed into the Configuration Menu, otherwise display will show an Error and skip to the Run Mode.

\textbf{Note}: If “Full” and “Setpoint/ID” Security Levels are "Disabled", the ID code will be “Disabled” and user will not be asked for ID Code to enter the Menu items (“ID” Submenu will not show up in “ID/Setpoint” Menu).
3.2.13 COMMUNICATION OPTION
Purchasing the controller with Serial Communications permits an instrument to be configured or monitored from an IBM PC compatible computer using software available at the website listed on this manual or on the CD-ROM enclosed with your shipment. For complete instructions on the use of the Communications Option, refer to the Serial Communications Reference Manual.

Figure 3.12 Flow Chart for Communication Option
ENTER COMMUNICATION OPTION MENU:

Press 1) Press 1, if necessary, until **CNFG** prompt appears.
Press 2) Display advances to **INPT** Input Menu.
Press 3) Press 1, if necessary, until Display advances to **CONN** Communication Options Menu.
Press 4) Display advances to **C.PAR** Communication Parameters Submenu.

If Communication Option is not installed, the display shows **NONE** and skips to the Color Display Menu.

COMMUNICATION PARAMETERS SUBMENU:

Allows the user to adjust Serial Communications Settings of the instrument. When connecting an instrument to a computer or other device, the Communications Parameters must match. Generally the default settings (as shown in Section 5) should be utilized.

Press 5) Display advances to **BAUD** Baud Submenu.

BAUD SUBMENU:

Press 6) Display flashes previous selection for **BAUD** value.
Press 7) Scroll through the available selections: 300, 600, 1200, 2400, 4800, 9600, 19.2K.
Press 8) Display shows **STRD** stored message momentarily and then advances to **PRTY** only, if it was changed, otherwise press 1 to advance to **PRTY** Parity Submenu.

PARITY SUBMENU:

Press 9) Display flashes previous selection for “Parity”.
Press 10) Scroll through the available selections: NO, ODD, EVEN.
Press 11) Display shows **STRD** stored message momentarily and then advances to **DATA** only, if it was changed, otherwise press 1 to advance to **DATA** Data Bit Submenu.

DATA BIT SUBMENU:

Press 12) Display flashes previous selection for “Data Bit”.
Press 13) Scroll through the available selections: 7-BIT, 8-BIT.
Press 14) Display shows **STRD** stored message and then advances to **STOP** only, if it was changed, otherwise press 1 to advance to **STOP** Stop Bit Submenu.
STOP BIT SUBMENU:

Press 15) Display flashes previous selection for “Stop Bit”.
Press 16) Scroll through the available selections: 1-BIT, 2-BIT.
Press 17) Display shows stored message momentarily and then advances to only, if it was changed, otherwise press to advance to Bus Format Submenu.

BUS FORMAT SUBMENU:

Determines Communications Standards and Command/Data Formats for transferring information into and out of the controller via the Serial Communications Bus. Bus Format submenus essentially determine how and when data can be accessed via the Serial Communications of the device.


MODBUS PROTOCOL SUBMENU:

Press 19) Display flashes previous selection for Modbus.
Press 20) Scroll through the available selections: NO, YES.
Press 21) Display shows stored message momentarily and then advances to only, if it was changed, otherwise press to advance to Line Feed submenu.

To select iSeries Protocol, set Modbus submenu to “No”.
To select Modbus Protocol, set Modbus submenu to “Yes”.

If Modbus Protocol was selected, the following Communications Parameters must be set as: No Parity, 8-bit Data Bit, 1-Stop Bit. Do not attempt to change these parameters.

LINE FEED SUBMENU:

Determines if data sent from the instrument will have a Line Feed appended to the end - useful for viewing or logging results on separate lines when displayed on communications software at a computer.

Press 22) Display flashes previous selection for “Line Feed”.
Press 23) Scroll through the available selections: NO, YES.
Press 24) Display shows stored message momentarily and then advances to only, if it was changed, otherwise press to advance to Echo Submenu.

ECHO SUBMENU:

When valid commands are sent to the instrument, this determines whether the command will be echoed to the Serial Bus. Use of echo is recommended in most situations, especially to help verify that data was received and recognized by the controller.
Press 25) Display flashes previous selection for “Echo”.
Press 26) Scroll through the available selections: NO, YES.
Press 27) Display flashes stored message momentarily and then advances to only if it was changed, otherwise press to advance to Communication Standard Submenu.

COMMUNICATION INTERFACE STANDARD SUBMENU:
Determines whether device should be connected to an RS232C serial port (as is commonly used on IBM PC-compatible computers) or via an RS485 bus connected through appropriate RS232/485 converter. When used in RS485 Mode, the device must be accessed with an appropriate Address Value as selected in the Address Submenu described later.

Press 28) Display flashes previous selection for “Standard”.
Press 30) Display shows stored message momentarily and then advances to only, if it was changed, otherwise press to advance to Data Flow Mode Submenu.

DATA FLOW MODE SUBMENU:
Determines whether the instrument will wait for commands and data requests from the Serial Bus or whether the instrument will send data automatically and continuously to the Serial Bus. Devices configured for the RS485 Communications Standard operate properly only under Command Mode.

Press 31) Display flashes previous selection for “Mode”.
Press 32) Scroll through the available selections: “Command”, “Continuous”.
Press 33) Display shows stored message momentarily and then advances to only, if it was changed, otherwise press to advance to Data Separation Submenu.

DATA SEPARATION CHARACTER SUBMENU:
Determines whether data sent from the device in Continuous Data Flow Mode will be separated by spaces or by Carriage Returns.

Press 34) Display flashes previous selection for “Separation” Submenu.
Press 35) Scroll through the available selections: “Space” or “Carriage Return”.
Press 36) Display shows stored message momentarily and then advances to only, if it was changed, otherwise press to advance to Data Format Submenu.
DATA FORMAT SUBMENU:

Preformatted data can be sent automatically or upon request from the controller. Use the Data Format Submenus to determine what data will be sent in this preformatted data string. Refer to the iSeries Communications Manual for more information about the data format. At least one of the following suboptions must be enabled and hence output data to the Serial Bus.

Note: This menu is applicable for Continuous Mode of RS232 communication.

Press  37) Display advances to STAT Alarm Status Submenu.

ALARM STATUS SUBMENU:

Includes Alarm Status bytes in the data string.

Press  38) Display flashes previous selection for “Status” (alarm status).
Press  39) Scroll through the available selections: NO, YES.
Press  40) Display shows stored message momentarily and then advances to only, if it was changed, otherwise press to advance to Reading Submenu.

MAIN READING SUBMENU:

Includes Main Reading in the data string.

Press  41) Display flashes previous selection for “Reading”.
Press  42) Scroll through the available selections: NO, YES.
Press  43) Display shows stored message momentarily and then advances to only, if it was changed, otherwise press to advance to Peak Submenu.

PEAK VALUE SUBMENU:

Includes Peak Value in the data string.

Press  44) Display flashes previous selection for Submenu.
Press  45) Scroll through the available selections: NO, YES.
Press  46) Display shows stored message momentarily and then advances to only, if it was changed, otherwise press to advance to Valley Submenu.

VALLEY VALUE SUBMENU:

Includes Valley Value in the data string.

Press  47) Display flashes previous selection for “Valley”.
Press  48) Scroll through the available selections: NO, YES.
Press  49) Display shows stored message momentarily and then advances to only, if it was changed, otherwise press to advance to Temperature Unit Submenu.
TEMPERATURE UNIT SUBMENU:

Includes a byte in the data string to indicate whether reading is in Celsius or Fahrenheit.

Press 50) Display flashes previous selection for UNIT.
Press 51) Scroll through the available selections: NO, YES.
Press 52) Display shows STORED stored message momentarily and then advances to ADDR only, if it was changed, otherwise press to advance to ADDR Address Setup Submenu.

ADDRESS SETUP SUBMENU:

This menu is applicable to the RS485 Option only.

Press 53) Display advances to “Address Value” (0000 to 0199) Submenu.

ADDRESS VALUE SUBMENU:

Press 54) Display flashes 1st digit of previously stored Address Value.
Press 55) Press and to enter new “Address Value”.
Press 56) Display shows STORED stored message momentarily and then advances to only, if it was changed, otherwise press to advance to Transmit Time Interval Submenu.

TRANSMIT TIME INTERVAL SUBMENU:

This menu is applicable if “Continuous” Mode was selected in the “Data Flow Mode” Submenu and the device is configured as an RS232C Standard device. Also, one or more options under the Data Format Submenu must be enabled.

Press 57) Display advances to “Transmit Time Value” Submenu.

TRANSMIT TIME INTERVAL VALUE SUBMENU:

Determines the interval at which data will be emitted to the RS232 Serial Bus when the instrument is in Continuous Data Flow Mode.

Press 59) Press and to enter new “Transmit Time Value”, e.g. 0030 will send the data every 30 seconds in Continuous Mode.
Press 60) Display shows STORED stored message momentarily and then advances to only, if it was changed, otherwise press to advance to COLOR Color Display Selection Menu.

For more details, refer to the Communication Manual available at the website listed on the cover page of this manual or on the CD-ROM enclosed with your shipment.
3.2.14 DISPLAY COLOR SELECTION

This submenu allows the user to select the color of the display.

ENTER DISPLAY COLOR SELECTION MENU:

Press  1) Press , if necessary, until prompt appears.
Press  2) Display advances to Input Menu.
Press  3) Press , if necessary, until Display advances to Display Color Selection Menu.
Press  4) Display advances to Normal Color Submenu.

NORMAL COLOR DISPLAY SUBMENU:

Press  5) Display flashes the previous selection for “Normal Color”.
Press  6) Scroll through the available selections: GRN, RED or AMBR.
Press  7) Display shows stored message momentarily and then advances to only, if it was changed, otherwise press to advance to Alarm 1 Display Color Submenu.

The menu below allows the user to change the color of display when alarm is triggered.

ALARM 1 DISPLAY COLOR SUBMENU:

Press  8) Display flashes previous selection for “Alarm 1 Color Display”.
Press  9) Scroll through the available selections: GRN, RED or AMBR.
Press  10) Display shows stored message momentarily and then advances to only, if it was changed, otherwise press to advance to Alarm 2 Display Color Submenu.
ALARM 2 DISPLAY COLOR SUBMENU:

Press 
11) Display flashes previous selection for “Alarm 2 Color Display”.
Press 
12) Scroll through the available selections: GRN, RED or AMBR.
Press 
13) Display shows STRD stored message momentarily and then momentarily shows the software version number, followed by RST Reset, and then proceeds to the Run Mode.

IN ORDER TO DISPLAY ONE COLOR, SET THE SAME DISPLAY COLOR ON ALL THREE SUBMENUS ABOVE.

Tip
If user wants the Display to change color every time when both Alarm 1 and Alarm 2 are triggered, the Alarm values should be set in such a way that Alarm 1 value is always on the top of Alarm 2 value, otherwise value of Alarm 1 will overwrite value of Alarm 2 and Display Color would not change when Alarm 2 is triggered.

Note
Example 1:
Output 1 & Alarm 2: SSR
Alarm Setup: Absolute, Above, Alarm 2 HI Value "ALR.H" = 200, Alarm 1 HI Value "ALR.H" = 400
Color Display Setup: Normal Color "N.CLR" = Green, Alarm 1 Color “1.CLR” = Amber, Alarm 2 Color “2.CLR” = Red

Display Colors change sequences:

<table>
<thead>
<tr>
<th>GREEN</th>
<th>RED</th>
<th>AMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>AL2.H = 200</td>
<td>AL1.H = 400</td>
</tr>
</tbody>
</table>

Example 2:
Output 1 & Alarm 2: Pulse
Alarm Setup: Absolute, Below, Alarm 2 Low Value “ALR.L” = 300, Alarm 1 Low Value “ALR.L” = 100
Color Display Setup: "N.CLR" = Green, "1.CLR" = Amber, "2.CLR" = Red

Display Colors change sequences:

<table>
<thead>
<tr>
<th>AMBER</th>
<th>RED</th>
<th>GREEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>AL1.L = 100</td>
<td>AL2.L = 300</td>
</tr>
</tbody>
</table>
Example 3:

**Output 1:** Relay, Setpoint 1: 200  
**Alarm 2:** Relay, Setpoint 2: 200  
**Alarm 1 Setup:** Deviation, Band, “ALR.H” = 20  
**Alarm 2 Setup:** Deviation, Hi/Low, “ALR.H” = 10, “ALR.L” = 5  
**Color Display Setup:** “N.CLR” = Green, “1.CLR” = Amber, “2.CLR” = Red

Display colors change sequences:

<table>
<thead>
<tr>
<th>AMBER</th>
<th>RED</th>
<th>GREEN</th>
<th>GREEN</th>
<th>RED</th>
<th>AMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>180</td>
<td>195</td>
<td>200</td>
<td>210</td>
</tr>
</tbody>
</table>

**Reset:** The instrument automatically resets after the last menu of the Configuration Mode has been entered. After the instrument resets, it advances to the Run Mode.
PART 4
SPECIFICATIONS

Accuracy
±0.5°C temp; 0.03% reading process

Resolution
1°/0.1°; 10 μV process

Temperature Stability
1) RTD: 0.04°C/°C
2) TC @ 25°C (77°F): 0.05°C/°C
  Cold Junction Compensation
3) Process: 50 ppm/°C

Thermocouple Lead Resistance
100 ohm max

RTD Input (ITS 68)
100/500/1000 Ω Pt sensor,
2-, 3- or 4-wire;
0.00385 or 0.00392 curve

Voltage Input
0 to 100 mV, 0 to 1 V, 0 to 10 Vdc

Input Impedance
10 MΩ for 100 mV
1 MΩ for 1 or 10 Vdc

Current Input
0 to 20 mA (5 ohm load)

Configuration
Single-ended

Polarity
Unipolar

Step Response
0.7 sec for 99.9%

Decimal Selection
None, 0.1 for temperature
None, 0.1, 0.01 or 0.001 for process

Setpoint Adjustment
-1999 to +9999 counts

Span Adjustment
0.001 to 9999 counts

Offset Adjustment
-1999 to +9999

CONTROL
Action
Reverse (heat) or direct (cool)

INPUT
Input Types
Thermocouple, RTD, Analog Voltage, Analog Current

Thermocouple Type (ITS90)
ALARM 2
Relay
SPDT type, 250 Vac or 30 Vac @ 3 A (Resistive Load)

SSR
20-265 Vac @ 0.05-0.5 A (Resistive Load); continuous

DC Pulse
Non-Isolated; 10 Vdc @ 20 mA

OUTPUT 3
ANALOG OUTPUT (programmable)
Isolated, Retransmission 0 to 10 Vdc or 0 to 20 mA, 500 Ω max. Accuracy is 1% of FS, for Scaling Gain from 0.03 to 100 mV per count
Isolation is 1000 Vdc
Linearity is 0.2%

COMMUNICATIONS
(Optional in place of excitation)
RS232/RS422/RS485/MODBUS:
Selectable from menu; both ASCII and modbus protocol selectable from menu.
Programmable 300 to 19.2 K baud; complete programmable setup capability; program to transmit current display, alarm status, min/max, actual measured input value and status.

RS485
Addressable from 0 to 199

ALARM 1 & 2 (programmable):
Type
Same as Output 1 & 2

Operation
High/low, above/below, band, latch/unlatch, normally open/normally closed and process/deviation; front panel configurations
EXCITATION
(optional in place of Communication)
24 Vdc @ 25 mA
Not available for Low Power Option

INSULATION
Power to Input/Output
2300 Vac per 1 min. test
1500 Vac per 1 min. test
(Low Voltage/Power Option)

Power to Relays/SSR Outputs
2300 Vac per 1 min. test

Relays/SSR to Relay/SSR Outputs
2300 Vac per 1 min. test

RS232/485 to Inputs/Outputs
500 Vac per 1 min. test

INSULATION
Power to Input/Output
2300 Vac per 1 min. test
1500 Vac per 1 min. test
(Low Voltage/Power Option)

Power to Relays/SSR Outputs
2300 Vac per 1 min. test

Relays/SSR to Relay/SSR Outputs
2300 Vac per 1 min. test

RS232/485 to Inputs/Outputs
500 Vac per 1 min. test

Approvals
FM, UL, C-UL, and
see CE Approval Section

GENERAL

Line Voltage/Power
90-240 Vac +/-10%, 50-400 Hz*
110-375 Vdc, equivalent voltage
5 W, power consumption
* No CE compliance above 60 Hz

Low Voltage/Power Option
20-36 Vdc, 4 W**, power consumption
External power source must meet Safety
Agency Approvals.
** Units can be powered safely with 24 Vac
but, no Certification for CE/UL are claimed.

External Fuse Required
Time-Delay, UL 248-14 listed:
100 mA/250 V
400 mA/250 V (Low Voltage/Power Option)
Time-Lag, IEC 127-3 recognized:
100 mA/250 V
400 mA/250 V (Low Voltage/Power Option)

Environmental Conditions
0 to 55°C (32 to 131°F),
90% RH non-condensing

0 to 50°C (32 to 122°F) for UL only.
90% RH non-condensing

Protection
NEMA 1(Type 1) front bezel 1⁄8 DIN
NEMA 4 (IP65) front bezel 1⁄16 DIN

Dimensions
48 H x 96 W x 127 mm D
(1.89 x 3.78 x 5”) 1⁄8 DIN
48 H x 48 W x 127 mm D
(1.89 x 1.89 x 5”) 1⁄16 DIN

Panel Cutout
45 H x 92 W mm
(1.772” x 3.622 ”) 1⁄8 DIN
45 mm (1.772”) square 1⁄16 DIN

Weight
295 g (0.65 lb) 1⁄8 DIN
159 g (0.35 lb) 1⁄16 DIN
4.1 1/8 DIN Mounting

TOP VIEW

PANEL CUTOUT

REAR VIEW

FRONT VIEW
4.2 1/16 DIN Mounting

PANEL CUTOUT

REAR VIEW

FRONT VIEW

SINGLE DISPLAY

TOP VIEW
<table>
<thead>
<tr>
<th>TC</th>
<th>Input Type</th>
<th>Range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>Iron-Constantan</td>
<td>-210 to 760°C</td>
<td>0.4°C</td>
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<td>-346 to 1400°F</td>
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<td>CHROMEGA®, ALOMEGA®</td>
<td>-270 to -160°C</td>
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<td>-160 to 1372°C</td>
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<td>-454 to -256°F</td>
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<td>-256 to 2502°F</td>
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<td>Copper-Constantan</td>
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<td>-190 to 400°C</td>
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<td>-454 to -310°F</td>
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<td>CHROMEGA-Constantan</td>
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<td>-454 to -364°F</td>
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<td>-364 to 1832°F</td>
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<td>40 to 1788°C</td>
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<td>-58 to 104°F</td>
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<td>104 to 3250°F</td>
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<td>S</td>
<td>Pt/10%Rh-Pt</td>
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<td>100 to 1768°C</td>
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<td>-58 to 212°F</td>
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<td>212 to 3214°F</td>
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<td>B</td>
<td>30%Rh-Pt/6%Rh-Pt</td>
<td>200 to 640°C</td>
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<td>640 to 1820°C</td>
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<td>212 to 1184°F</td>
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<td>1184 to 3308°F</td>
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<td>5%Re-W/26%Re-W</td>
<td>0 to 2354°C</td>
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<td>32 to 4253°F</td>
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<td>Nicrosil-Nisil</td>
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<td>-100 to 1300°C</td>
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<td>-418 to -148°F</td>
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<td>-148 to 2372°F</td>
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<tr>
<td>L</td>
<td>J, DIN</td>
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<td>-328 to 1652°F</td>
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<td>Pt, 0.00385, 100 Ω, 500 Ω, 1000 Ω</td>
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<td>-328 to 1652°F</td>
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<td>RTD</td>
<td>Pt, 0.00392, 100 Ω, 500 Ω, 1000 Ω</td>
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<td>-328 to 1562°F</td>
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<td>PROCESS</td>
<td>Voltage</td>
<td>0 to 100 mV, 0 to 1 V, 0 to 10 Vdc</td>
<td>0.03% rdg</td>
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<td>PROCESS</td>
<td>Current</td>
<td>0 to 20 mA, 4 to 20 mA</td>
<td>0.03% rdg</td>
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<tr>
<td>MENU ITEMS</td>
<td>FACTORY PRESET VALUES</td>
<td>NOTES</td>
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<td>Alarm 1 (ALR1)</td>
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<td>Alarm 2 (ALR2)</td>
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<td>Loop Break Time (LOOP)</td>
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<td>Loop Value (B.TIM)</td>
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<td>Current/Voltage (CURR/VOLT)</td>
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<td>Scale and Offset</td>
<td>Reading: 0 - 999.9 cts, Output: 0 - 10 V</td>
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<tr>
<td>MENU ITEMS</td>
<td>FACTORY PRESET VALUES</td>
<td>NOTES</td>
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<td><strong>Ramp &amp; Soak (RAMP):</strong></td>
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<td>Ramp (RAMP)</td>
<td>Disable (DSBL)</td>
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<td>Soak (SOAK)</td>
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<td>Ramp Value (RAMP)</td>
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<td>Soak Value (SOAK)</td>
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<td>Echo (ECHO)</td>
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<td>Standard Interface (STND)</td>
<td>RS232 (232C)</td>
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<td>Command Mode (MODE)</td>
<td>Command (CMD)</td>
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<td>Separation (SEPR)</td>
<td>Space (SPCE)</td>
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<td>Alarm Status (STAT)</td>
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<td>Reading (RDNG)</td>
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<td>Multipoint Address (ADDR)</td>
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<td>Transmit Time (TR.TM)</td>
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<td>Normal Color (N.CLR)</td>
<td>Green (GRN)</td>
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<td>Alarm 1 Color (1.CLR)</td>
<td>Red (RED)</td>
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<td>Alarm 2 Color (2.CLR)</td>
<td>Amber (AMBR)</td>
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PART 6
CE APPROVALS INFORMATION

This product conforms to the EMC directive 89/336/EEC amended by 93/68/EEC, and with the European Low Voltage Directive 72/23/EEC.

Electrical Safety EN61010-1:2001
Safety requirements for electrical equipment for measurement, control and laboratory.

Double Insulation
Pollution Degree 2

Dielectric withstand Test per 1 min
• Power to Input/Output: 2300Vac (3250Vdc)
• Power to Input/Output: 1500Vac (2120Vdc)
  (Low Voltage dc Power Option*)
• Power to Relays/SSR Output: 2300Vac (3250Vdc)
• Ethernet to Inputs: 1500Vac (2120Vdc)
• Isolated RS232 to Inputs: 500Vac (720Vdc)
• Isolated Analog to Inputs: 500Vac (720Vdc)
• Analog/Pulse to Inputs: No Isolation

Measurement Category I
Category I are measurements performed on circuits not directly connected to the Mains Supply (power). Maximum Line-to-Neutral working voltage is 50Vac/dc. This unit should not be used in Measurement Categories II, III, IV.

Transients Overvoltage Surge (1.2 / 50uS pulse)
• Input Power: 2500V
• Input Power: 1500V
  (Low Voltage dc Power Option*)
• Ethernet: 1500V
• Input/Output Signals: 500V

Note: *Units configured for external low power dc voltage, 20-36Vdc

Immunity and Emissions requirements for electrical equipment for measurement, control and laboratory.
• EMC Emissions Table 4, Class B of EN61326
• EMC Immunity** Table 1 of EN61326

Note: **I/O signal and control lines require shielded cables and these cables must be located on conductive cable trays or in conduits. Furthermore, the length of these cables should not exceed 30 meters

Refer to the EMC and Safety installation considerations (Guidelines) of this manual for additional information.
Warranty/Disclaimer

NEWPORT Electronics, Inc. warrants this unit to be free of defects in materials and workmanship for a period of one (1) year from the date of purchase. In addition to NEWPORT’s standard warranty period, NEWPORT Electronics will extend the warranty period for four (4) additional years if the warranty card enclosed with each instrument is returned to NEWPORT.

If the unit should malfunction, it must be returned to the factory for evaluation. NEWPORT’s Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by NEWPORT, if the unit is found to be defective it will be repaired or replaced at no charge. NEWPORT’s WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of NEWPORT’s control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

NEWPORT is pleased to offer suggestions on the use of its various products. However, NEWPORT neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by NEWPORT, either verbal or written. NEWPORT warrants only that the parts manufactured by it will be as specified and free of defects. NEWPORT makes no other warranties or representations of any kind whatsoever, expressed or implied, except that of title, and all implied warranties including any warranty of merchantability and fitness for a particular purpose are hereby disclaimed. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of NEWPORT with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall NEWPORT be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by NEWPORT is not intended to be used, nor shall it be used: (1) as a “Basic Component” under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, or used on humans, or misused in any way, NEWPORT assumes no responsibility as set forth in our basic WARRANTY / DISCLAIMER language, and additionally purchaser will indemnify NEWPORT and hold NEWPORT harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

Return Requests/Inquiries

Direct all warranty and repair requests/inquiries to the NEWPORT Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO NEWPORT, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM NEWPORT’S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting NEWPORT:
1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult NEWPORT for current repair charges. Have the following information available BEFORE contacting NEWPORT:
1. P.O. number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

NEWPORT’s policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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