MICRO-INFINITY®

ICN77000 Series Controller

INFINITY® SERIES

THE NEW STANDARD FOR QUALITY

CE

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Process Meters	Wire	Soldering Iron Testers	
On/Off Controllers	Rate Meters	pH Pens	

It is the policy of NEWPORT to comply with all worldwide safety and EMC/EMI regulations that apply. NEWPORT is constantly pursuing certification of its products to the European New Approach Directives. NEWPORT will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct but NEWPORT Electronics, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient connected applications.

PATENT NOTICE: The "Meter Case Bezel Design" is a trademark of NEWPORT Electronics, Inc., registered in the U.S.
This product is covered by one or more of the following patents: U.S. No. D336,895; 5,274,577/ FRANCE BREVET No. 91 12756/ UK PATENT No. 2,248,954; 2,249,837/ SPAIN 2,039,150; 9,102,259/ ITALY 1,249,456; 1,250,938/ CANADA 2,052,600/ GERMANY DE 4134398C2. OTHER INTERNATIONAL PATENTS PENDING.

This device is marked with the international hazard 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.

To Order Model ICN77000 SERIES CONTROLLER *(Specify Model Number)*

PROCESS CONTROLLER, DUAL DISPLAY FOR THERMOCOUPLE, RTD, VOLTAGE OR CURRENT INPUTS IN A 1/16 DIN CASE

Model No.	Description
ICN77	Dual displays for simultaneous display of measured value and setpoint. Selectable preset tune, adaptive tune, autotune, PID, PI, PD control modes. The dual control outputs can be configured for a variety of control and alarm applications such as heat, heat/cool, heat/alarm, cool or cool/alarm. The ramp to setpoint feature allows the user to define the rate of rise to setpoint, minimizing thermal shock to the load during start-up. Maximum ramp time 99.59 (HH.MM), Soak: 00.00 to 99.59 (HH.MM),Damping: 1 to 8 in unit steps. Input types J,K,T,E,R,S,B,N,J-DINjC, RTD 100Ω 0.00385, 100Ω & 1kΩ 0.00392, 0 to 20 mA, 4 to 20 mA, 0 to 100mV, 0 to 1V, 0 to 10Vdc. Alarm 1 output includes SPST relay, 3A @ 120Vac, 3A @ 240Vac.
NOTE: The Controller must be ordered completely configured. Options are not field installable.	
[ ]	CASE TYPE
R3	NEMA 12, 1.89 x1.89" (48 x 48mm) bezel and 1.75" ROUND cutout
R5	NEMA 4 (IP65), 2.1 x 2.1" bezel and 1.75 ROUND cutout
3	NEMA 12 bezel for $^1/_{16}$ DIN panel cutout 45mm x 45mm (1.772 x 1.772")
5	NEMA 4 bezel for $^1/_{16}$ DIN panel cutout 45mm x 45mm (1.772 x 1.772")
[ ]	CONTROL OUTPUT #1 (Direct or Reverse Acting)
2	Solid State Relay SSR : 1A @ 120/240Vac continuous
3	Relay: Form C 5A @ 120Vac, 3A @ 240Vac
4	Pulsed 10Vdc @20mA (for use with external SSR)
5	Non-Isolated 1 to 10Vdc or 0-20mA @500Ω max

Model No.	Description *cont.*
[ ]	CONTROL OUTPUT #2 (Direct or Reverse Acting)
0	Insert 0 if second output is not desired
2	Solid State Relay SSR: 1A @ 120/240Vac continuous
3	Relay: Form C 5A @ 120Vac, 3A @ 240Vac
4	Pulsed 10Vdc @20mA (use for external SSR)
[ ]	OPTIONAL OUTPUTS
*	none (no entry required)
-A2	SPST relay, 3A@ 120Vac, 3A @ 240Vac (Alarm 2)
-C2	Isolated RS232, 300 to 19.2k baud
-C4	Isolated RS485, 300 to 19.2k baud
-PV	Isolated Analog Output
-RSP	Remote Setpoint Selection
[ ]	POWER SUPPLY
*	90 to 240 Vac/dc, 50 to 400Hz (no entry required)

Ordering Examples: 1.) ICN77R322-C2 is a NEMA 12 bezel case with 1.75 inch round hole mounting adaptor, dual SSR control outputs and RS232 communications output.
2.) ICN77330 is a NEMA 12 bezel case with 1/16 DIN mounting and single Relay control output.
3.) ICN77544-A2 is a NEMA 4 bezel case with 1/16 DIN mounting, dual pulse control outputs, and a SPST 3A Alarm relay.

Part 1: Introduction

Part 2: Setup

Part 3: Operation: Configuration Mode

List of Figures

1.1 Safety Considerations

The Controller is a panel mount device protected in accordance with Class I of IEC 1010. *Remember that the controller has no power-on switch.* Building installation should include a switch or circuit-breaker that must be compliant to IEC 947-1 and 947-3.

⚠ **The Protective Grounding conductor must be connected for safety reasons.**

Do not expose the controller to rain or moisture. Do not operate your controller in flammable or explosive atmospheres. As with any electronic instrument, you may encounter high voltage exposure when installing, calibrating, or removing parts.
Be careful when working near conductors carrying large currents. Use twisted-pair connections to the meter. Use magnetic shielding materials, or move the meter away from the current source to reduce magnetic field problems. Do not exceed power rating on label located on the top of the controller housing.
Failure to follow all instructions and warnings may result in injury!

Note ☞

⚠ This device is marked with the international hazard 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.

1.2 Before You Begin

Customer Service

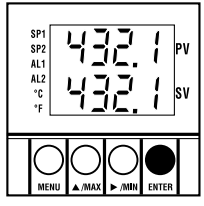
If you need assistance, please call the Customer Service Department, which is listed on the outside back cover of this manual.

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.

TO DISABLE OUTPUTS

Standby mode is useful during setup of the controller or when maintenance of the system is necessary. When the controller is in standby, it remains in the ready condition but all outputs are disabled. This allows the system to remain powered and ready to go.



When the controller is in "RUN" mode, **push ENTER twice to disable all outputs and alarms.**

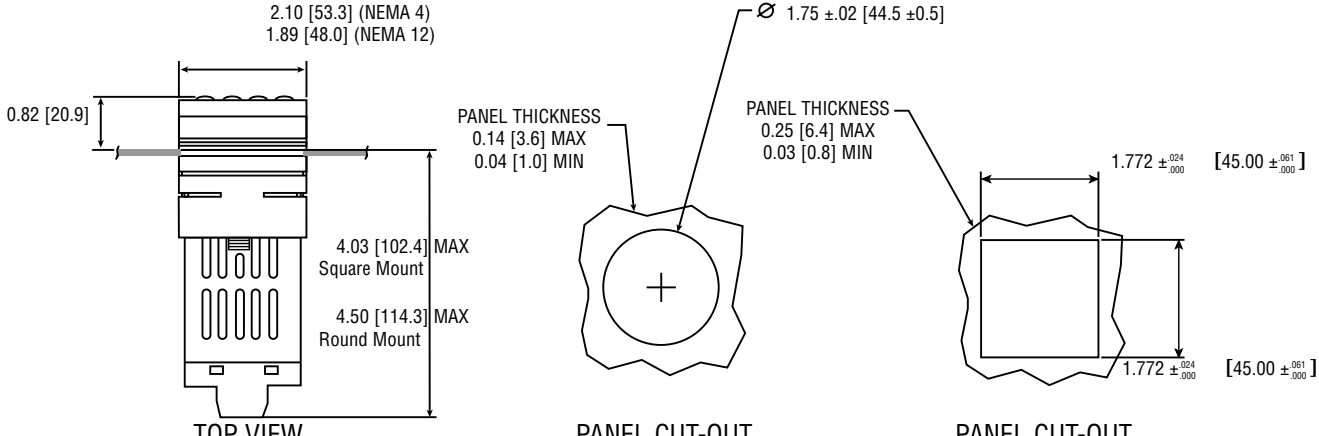
It is now in "STANDBY" mode. Push ENTER once more to resume "RUN" mode.

Tip: **PUSH ENTER TWICE** to disable the system during an **EMERGENCY.**

2.1 Mounting the Controller

Note ☞

If necessary, the rear connector assembly may be removed from the main case for wiring (see Figure 2.1a for Square Mount, Figure 2.1b for Round Mount).



Square Mount Micro Controller Mounting Instructions

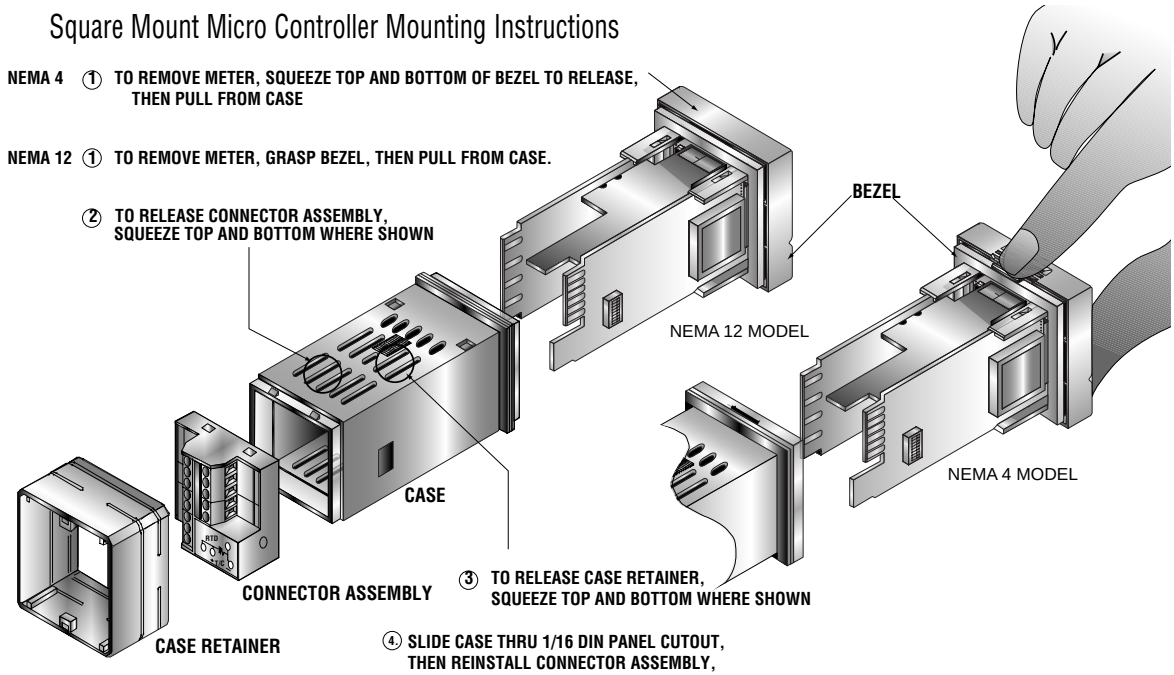


Figure 2.1a — Mounting the Square Mount Controller

Round Mount

Round Mount Micro Controller Mounting Instructions

1. Separate the display from the meter by squeezing the case (where shown) and then unplugging the cable from the meter.

2. Slide the retainer over the rear of the case, but do not engage serrations on case.
3. Pass the cable (from the display) thru a 1 3/4" diameter hole in the mounting panel and connect to the meter (take care to center the connector on the mating pins). While squeezing the case, press the display and meter squarely together until they connect.
4. Check the display and gasket for proper alignment, then slide the retainer tight against the backside of the mounting panel.

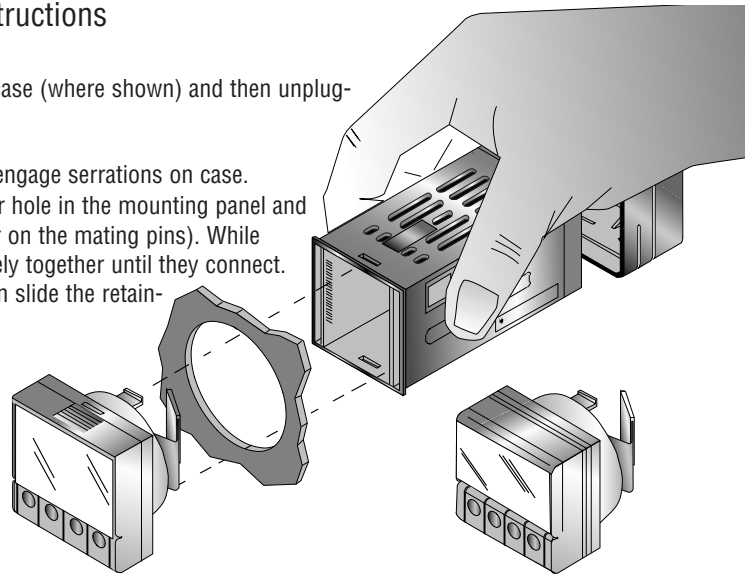


Figure 2.1b — Mounting the Round Mount Controller

2.2. Front Panel View

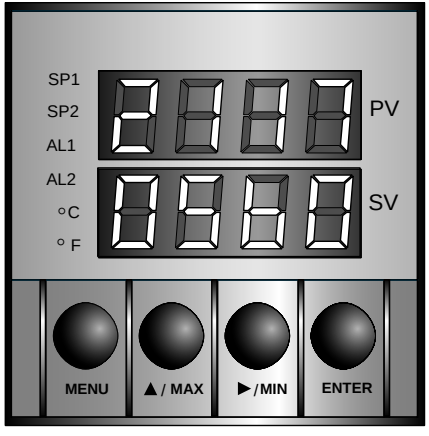


Figure 2.2 Front Panel Display

Front Panel Annunciators	
SP1	OUT1/Setpoint 1 indicator.
SP2	OUT2/Setpoint 2 indicator.
AL1	Alarm 1 indicator.
AL2	Alarm 2 indicator.
°C	°C unit indicator.
°F	°F unit indicator.
PV	Upper display shows the Process Value
SV	Lower display shows the Set Point Value
MENU	Changes display to *Configuration Mode* and advances thru menu items*
▲/MAX	Used in program mode and peak recall*
▶/MIN	Used in program mode and valley recall*
ENTER	Accesses submenus in Configuration Mode and stores selected values*

** See Part 3 Operation:Configuration Mode and Part 4 Operation: Run Mode for detailed button operation*

2.3. Rear Panel View

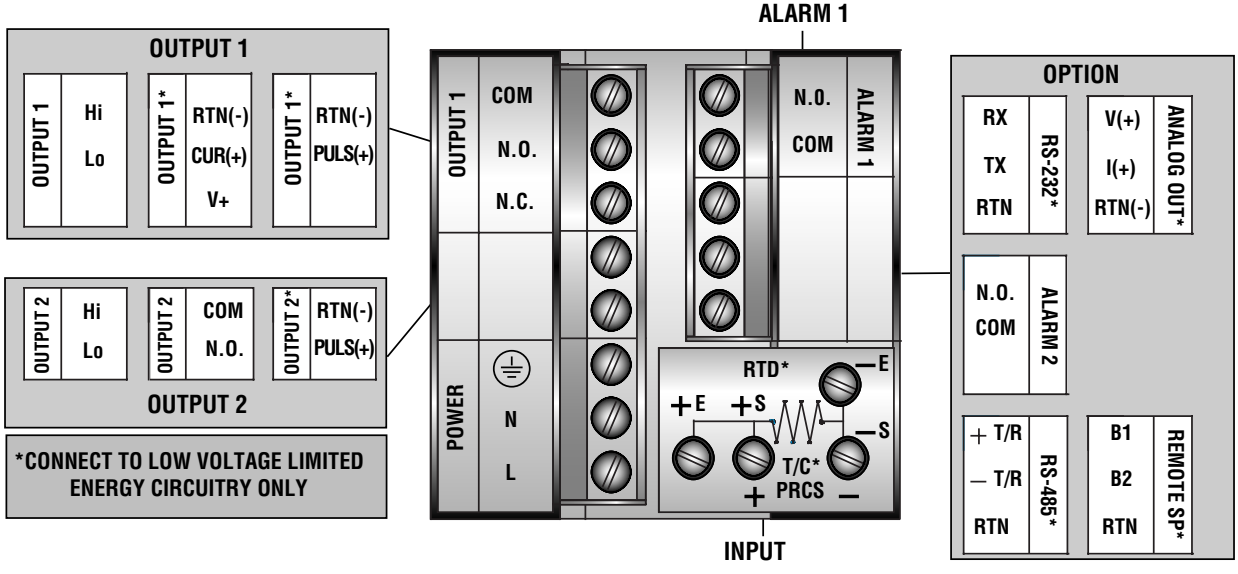


Figure 2.3 Typical Rear Connector Label and Possible Labels of Different Models

Rear Panel Connector Labels

POWER	AC Power Connector: All models
INPUT	Input Connector: All models TC, PR (Process) RTD
ALARM 1	ALARM 1 relay SPST, programmable: All models
OUTPUT 1	Control Output 1: Based on one of the following models. Relay SPDT — Voltage and Current Solid State Relay — Pulse
OUTPUT 2	Control Output 2: Based on one of the following models: Relay SPST Normally Open Solid State Relay Pulse
OPTION	Based on one of the following models: RS232C — Isolated Analog Out RS485 — Alarm 2 Relay SPST, programmable Remote Setpoint

2.4. Mechanical Installation

Dip Switch Configuration

The settings of the DIP switch must be verified or set to comply with your selection at the Input/Type menu (see Section 3.0 for Input/Type). The DIP switch is accessible through an opening on the side of the case. After carefully removing the controller from the case, see Section 2.1 for instructions, locate the dip switch (see Figure 2.4) and set the switches according to the following tables.

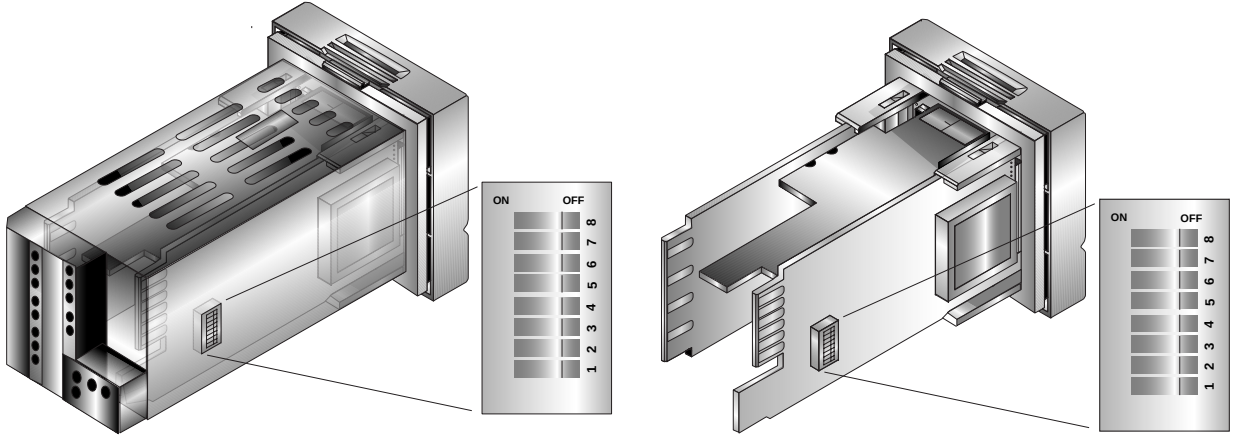
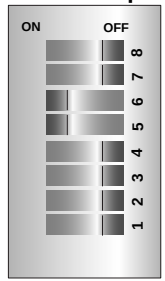


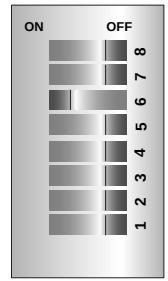
Figure 2.4 Dip Switch Location — switch settings are shown in OFF position

Dip Switch Settings

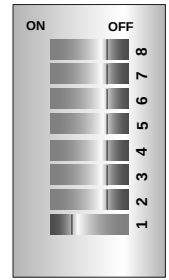
Thermocouple



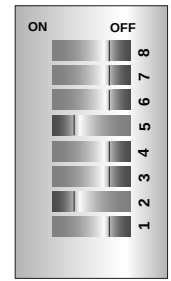
RTD 100



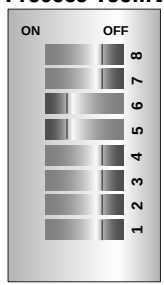
RTD 500/1k ohm



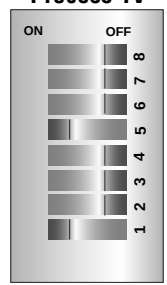
Process 20mA



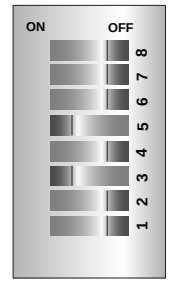
Process 100mV



Process 1V



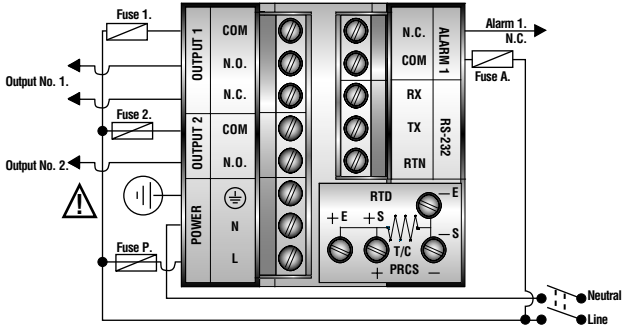
Process 10V



2.5. Electrical Installation

POWER CONNECTION EXAMPLES

The figure below shows the power wiring hookup.



The Protective Conductor terminal must be connected for safety reasons.

Fuse	Connector	Output Type	For 110Vac	For 230Vac
Fuse 1.	Output 1	Relay	5A(T)	3A(T)
Fuse 2.	Output 2	Relay	5A(T)	3A(T)
		SSR	1A(T)	1A(T)
Fuse P.	Power	N/A	50mA(T)	100mA(T)
Fuse A.	Alarm 1	Relay	3A(T)	3A(T)

Note: The installation of fuses is optional, depending on level of protection required. Values shown are minimum recommendations for the protection of the controller. For a specific load, consult the respected electrical specifications to select a suitable fuse.

INPUT CONNECTION EXAMPLES

2.5.1. Thermocouple

The figure below shows the wiring hookup for any thermocouple type. For example, for Type K hookup, connect the yellow wire to the + (+S) terminal and the red wire to the – (–S) terminal. ***When configuring your controller, select Thermocouple and Thermocouple type in the Input Type menu (see part 3).***

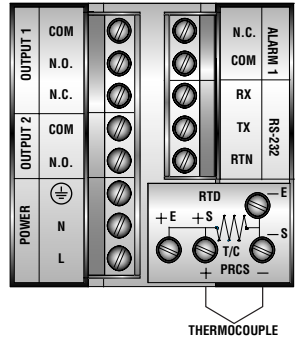


Figure 2.5.2 Thermocouple Wiring Hookup

2.5.3. Two/Three/Four-Wire RTD

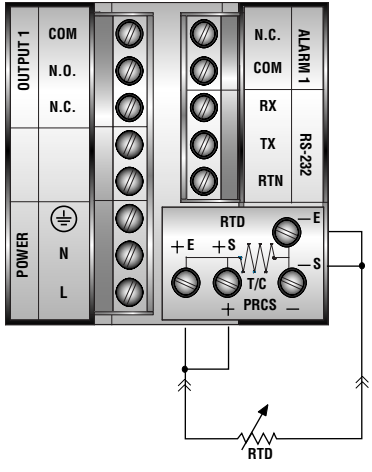
The figures below show the input connections and input connector jumpers required to hookup a 2, 3 or 4-wire RTD.

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

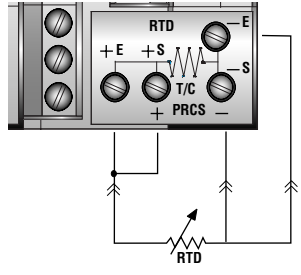
The **three-wire** connection works best with RTD leads closely equal in resistance. The controller measures the RTD, plus upper and lower lead drop voltage and then subtracts twice the measured drop in the lower supply current lead producing excellent lead-resistance cancellation for balanced measurements.

The **four-wire** RTD hookup is applicable to unbalanced lead resistance and enables the controller 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).

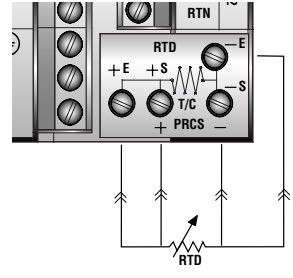
Figure 2.5.3



Two-Wire RTD Hookup

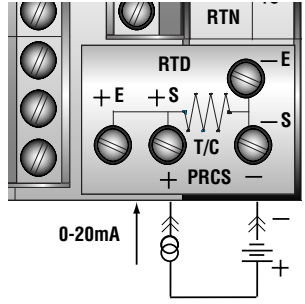


Three-Wire RTD Hookup



Four-Wire RTD Hookup

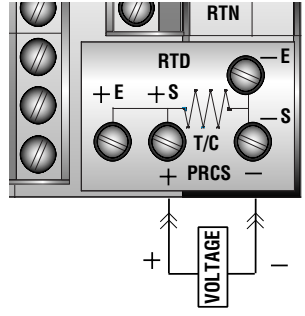
2.5.4. Process Current



The figure shows the wiring hookup for Process current 0 - 20mA.
When configuring your controller, select Process type in the Input Type menu (see part 3).

Figure 2.5.4 Process Current Wiring Hookup

2.5.5. Process Voltage



The figure shows the wiring hookup for Process voltage 0 - .1V, 0 - 1V, or 0 -10V.
When configuring your controller, select Process type in the Input Type menu (see part 3).

Figure 2.5.5 Process Voltage Wiring Hookup

part 3

OPERATION: *CONFIGURATION MODE*

3.1 Introduction

The Controller has two different modes of operation. The first, *Run Mode,* is used to display values for the process variable, setpoint value 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 controller to operate properly, the user must first "program" or configure the menu options in the *Menu Configuration Mode.***

Turning Your Controller On for the First Time

The Controller becomes active as soon as it is connected to a power source. It has no On or Off button. The Controller will at first flash reset on the PV and software version number on the SV display, and then proceed to the *Run Mode.*

Button	Function in Configuration Mode
MENU	To enter the Configuration Mode, the user must first press MENU. Use this button to advance/navigate to the next setting. The first menu to appear will be "ID Code", if enabled. The user can navigate through all the top level menus by pressing MENU. Selecting an ID of 0000 will allow you to bypass the ID menu using the MENU button.
▲/MAX	Press this button to scroll through "flashing" selections. When a numerical value is flashing, this button will increase the active digit from "0" to "9". After "9" the display starts at "0" again. The most significant digit may also show a "–" sign. In the run mode MAX causes the display to flash the PEAK - press again to return to the PV value.
▶/MIN	Press this 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, this button will scroll through the digits from left to right digit allowing the user to select the desired digit to modify. In the run mode, MIN causes the display to flash the VALLEY - press again to return to the PV value.
ENTER	Press this button to access the submenus from a Top Level Menu item. Also, press this button to store a submenu selection or after entering a value — the display will flash a "stored" message to confirm your selection. To reset flashing PEAK or VALLEY press ENTER. In the run mode, press ENTER twice to enable standby mode with flashing "StbY".
NOTE:	Reset: Press MENU then MIN. NOTE: Push Button activations are designed to avoid momentary closures. Therefore, to activate a switch the button must be kept pressed for at least 300 m/sec.. Except for Set Points and the Alarms, modifying any settings of the menu configuration will reset the controller prior to resuming run mode.

3.2 Menu Configuration: *Modifying set points will not reset the controller*

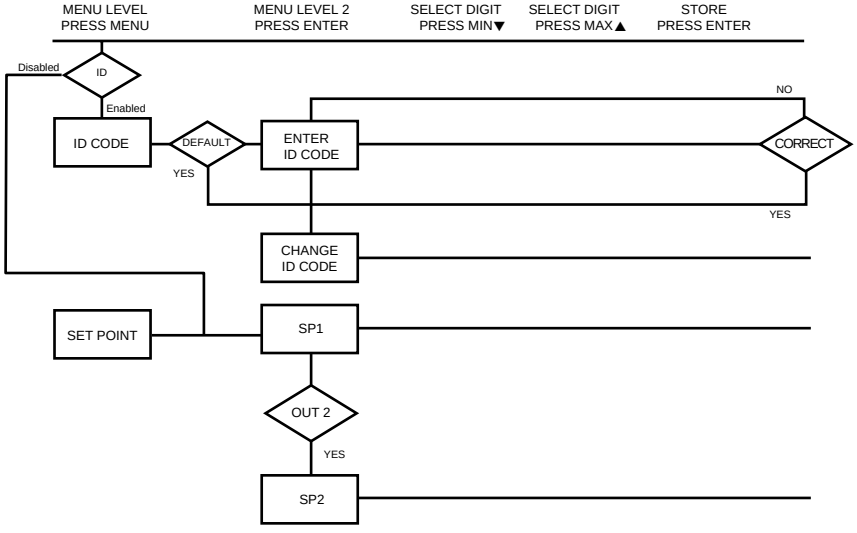


Figure 3.1 Flowchart for ID and Set Point Menus

ID Number (if enabled)

* It is recommended that you put the controller in the standby mode for any configuration change other than setpoints & alarms *

Display	Action	Response
	SEE ID OPTION SUBMENU IN THE BREAK LOOP ALARM SECTION FOR ENABLE/DISABLE ID OPTION	
		**ENTERING OR CHANGING YOUR (NON-DEFAULT) ID NUMBER**
	Press MENU	1) Press MENU, if necessary, until "id codE" prompt appears.
	Press ENTER	2) Display advances to "id cd", if non-default ID code. If default ID code, the menu will advance to cH. id with default value i.e. 0000.
		**Note:** *If the ID Code is the default value i.e. 0000, press MENU again and the menu will skip the ID code to Set Point menu.*
	Press MAX & MIN	3) Press MAX to increase digit 0-9. Press MIN to activate next digit (flashing). Continue to use MAX and MIN to enter your 4-digit ID code.
	Press ENTER	4) If the correct ID code is entered, the menu will display cH. id, otherwise an error message will be displayed and the controller will return to the run mode.
	Press MENU *or* Press MAX & MIN	5) To leave your ID Code **Unchanged,** press MENU and advance to "SEt Po int" menu. To **Change** your ID code use the MAX and MIN buttons to enter a new ID code.
	Press ENTER	6) Display flashes "Strd" message and advances to the next menu "SEt Po int".

Note: 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.

Tip: 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 reset the default to "0000".

Set Points (if ID Number Enabled)

Display	Action	Response
		**SET POINT 1**
	Press MENU	1) Press MENU, if necessary, until "SEt PE" prompt appears.
	Press ENTER	2) Display advances to "SP 1", set point 1.
		**DISPLAY SHOWS PREVIOUS VALUE. 1ST DIGIT FLASHING.**
	Press MAX	4) Press MAX to increase digit 0-9.
	Press MIN	5) Press MIN to activate next digit (flashing).
		6) Continue to use MAX and MIN to enter your 4-digit Set Point 1 value.
	Press ENTER	7) Display flashes "Strd" message only if a change is made, otherwise press menu to advance to "SP2", set point 2.
		**SET POINT 2 : DISPLAY SHOWS PREVIOUS VALUE. 1ST DIGIT FLASHING.**
	Press MAX & MIN	9) Use MAX and MIN buttons to enter your 4-digit Set Point 2 value.
	Press ENTER	13) Display flashes "Strd" message and advances to “Swapping Set Points” submenu.

Set Points *cont.*

Display	Action	Response
		**OUTPUT REDIRECTION: DISPLAY SHOWS "S Lo.1" AND CURRENT SETTING, "S Lo.1" OR "S Lo2"**

When "S Lo.1" is selected, Set-Point 1 (and OUT1 configuration) direct the control output at label "Output 1" and Set-Point 2 (and OUT2 configuration) direct the control output at label "Output 2."
When "S Lo2" is selected , Set-Point 1 (and OUT1 configuration) direct the control output at label "Output 2" and Set-Point 2 (and OUT2 configuration) direct the control at label "Output 1."

Summary	Setting	Set-Point/Out/LED	Output Label
	S Lo.1	1 →	1
		2 →	2
	S Lo2	1 ⤫	1
		2 ⤫	2

Press MAX	14) Press MAX to select the output option.
Press ENTER	15) Press ENTER to make the selection or MENU to advance to "Input Type".

NOTE: Always put unit in stand-by before redirecting the outputs, and always perform a reset afterward to ensure proper operation. With Analog Proportional output option, the following issues need to be consider when redirecting the output: 1) Current (4-20mA) output is disabled; 2) %Hi/Lo and SELF setting is moved to Out2 configuration menu; 3) Control Type and Cycle Time appear in Out1 and is associated with time proportional control at Output 2; 4) Control Type and Cycle Time setting in Out2 is disregard by Analog Proportional output.

Set Points (if ID Number Disabled - default)

Display	Action	Response
		With ID number disabled and in run mode, pressing MENU one time advances the controller to Set Point 1 setting directly.
		SET POINT 1
	Press MENU (1 time) Press MAX Press MIN Press ENTER	1) Press MENU once from run mode. 2) Display flashes the first digit of Set Point 1 3) Press MAX to set the digit, 0-9. 4) Press MIN to activate the next digit (flashing). 5) Repeat step 3 and 4 until all digits are set. 6) Controller stores new setting and returns to run mode.
		SET POINT 2
	Press MENU (2 times)	1) Press MENU twice from run mode. 2) Display flashes the first digit of Set Point 2. 3) Follow step 3 to 6 of Set Point 1 to complete the setting.
		OUTPUT REDIRECTION
	Press MENU (3 times) Press MAX Press ENTER	1) Press MENU 3 times from run mode. 2) Display flashes "Sto.1" in the SV window. (See page 21 for more details.) 3) Press MAX to select the output option. 4) Press ENTER to make the selection or MENU to advance to "Input Type".

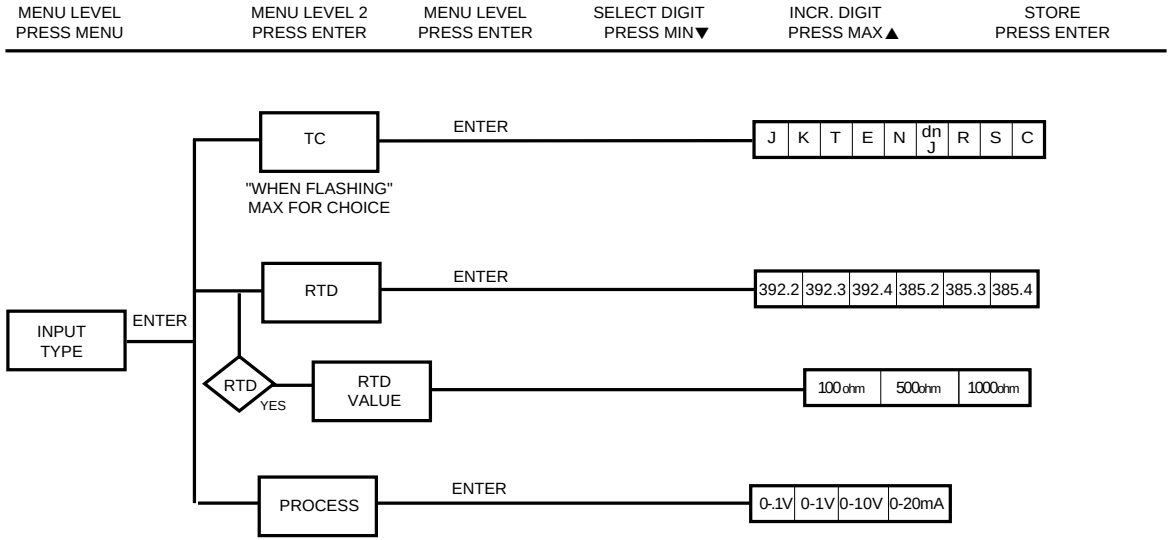


Figure 3.2 Flowchart for Input Type

Input Type (Thermocouple)

Display	Action	Response
		ENTER INPUT TYPE MENU:
inPt tYPE	Press MENU	1) Press MENU, if necessary, until "inPt tYPE" prompt appears.
	Press ENTER	2) Display flashes "rtd", "tc", or "Proc" (RTD, Thermocouple, Process), if the displayed input type is tc, press MENU to skip to step 5 (tc stops flashing).
		THERMOCOUPLE SUBMENU:
inPt t.c	Press MAX	3) Press MAX to scroll to "tc" (flashing).
	Press ENTER	4) Display flashes "stored" message and "tc" stops flashing.
	Press ENTER	5) Display flashes previous thermocouple type selection. ie. "J" (see below for types).
inPt J	Press MAX	6) Scroll through the available thermocouple types to the selection of your choice.
	Press ENTER	7) Display flashes "Strd" message and advances to the next menu Reading Configuration

Note: Use the Input Type (Thermocouple) (RTD) or (Process) and verify your Dip Switch Setting (see section 2.4) and your Electrical Installation (see section 2.5). See the following pages for (RTD) and (Process) menus.

Thermocouple Types: (J, K, T, E, N, DIN J, R, S, B, C)

Display: J cA t E n dnJ r S b c

Input Type (RTD)

Display	Action	Response
		ENTER INPUT TYPE MENU:
inPt tYPE	Press MENU	1) Press MENU, if necessary, until "inpt type" prompt appears.
	Press ENTER	2) Display flashes "rtd", "tc", or "Proc" (RTD, Thermocouple, Process), if the displayed input type is rtd, press MENU to skip to step 5 (rtd stops flashing).
		RTD SUBMENU:
inPt rtd	Press MAX	3) Press MAX to scroll to "rtd" (flashing).
	Press ENTER	4) Display flashes "stored" message and "rtd" stops flashing
	Press ENTER	5) Display flashes previous RTD type selection ie. 392.2. (see below for RTD types)
inPt 392.2	Press MAX	6) Scroll through the available RTD types to the selection of your choice:
	Press ENTER	7) Display flashes "Strd" message and advances to "rtd uALUE".

RTD Types: 385, 392, Two, Three and 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.

Input Type (RTD Value)

Display	Action	Response
		RTD VALUE SUBMENU:
	Press ENTER	4) Press ENTER at "rtd uALU" prompt to enter your RTD Value. Display flashes previous RTD value selection ie. 100_ (see below for RTD value selections)
	Press MAX	7) Scroll through the available RTD Values to the selection of your choice:
	Press ENTER	8) Display flashes "stored" message and advances to "Reading Configuration"

RTD Values: All RTD's may be:

100 ohm	500 ohm	1000 ohm
Display:	100_	500_	1000

Input Type (Process)

Display	Action	Response
		ENTER INPUT TYPE MENU:
inPt tYPE	Press MENU	1) Press MENU, if necessary, until "inpt type" prompt appears.
	Press ENTER	2) Display flashes "rtd", "tc", or "Proc" (RTD, Thermocouple, Process), if the displayed input type is process, press MENU to skip to step 5 (proc stops flashing).
		PROCESS SUBMENU:
inPt Proc	Press MAX	3) Press MAX to scroll to "Proc" (flashing).
	Press ENTER	4) Display flashes "stored" message and "Proc" stops flashing.
	Press ENTER	5) Display flashes previous Process type selection. ie. "0- 10" (see below for types)
Proc 0- 10	Press MAX	6) Scroll through the available Process types to the selection of your choice.
	Press ENTER	7) Display flashes "stored" message and advances to the next menu "Reading Configuration".

NOTE: Use the Input Type (Thermocouple) (RTD) or (Process) and verify your Dip Switch Setting (see section 2.4) and your Electrical Installation (see section 2.5). See the previous pages for (RTD) and (Process) menus.

Process Types:	100mV	1V	10V	0-20 mA
Display:	0-0.1	0- 1.0	0- 10	0-20
Natural Gain	100 cts/mv	10 cts/1mV	1 ct/mV	500cts/mA
Max Display	9999 @100mv	9999@1V	9999@V	9999@20mA

NOTE: For 4-20mA Input select 0-20mA and adjust the Input Scale & Offset accordingly. To adjust 4-20mA input.(see example under INPUT Scale & Offset)

OPERATION: *CONFIGURATION MODE*

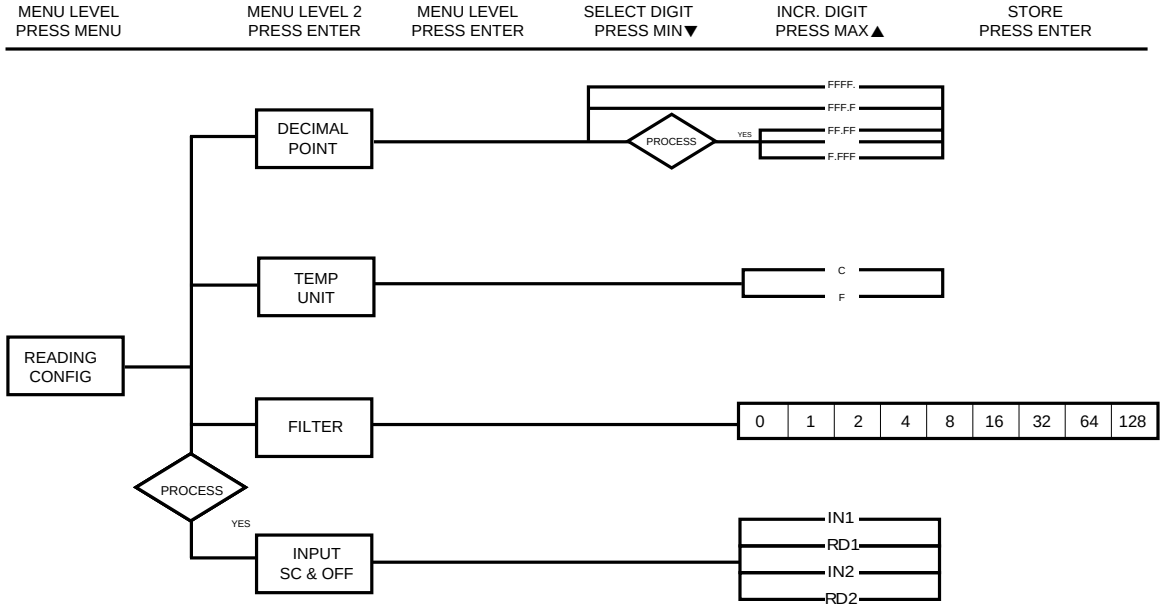


Figure 3.3 Flowchart for Reading Configuration

Reading Configuration

Display	Action	Response
rdG cnFG	Press MENU Press ENTER	1) Press MENU, if necessary, until "Reading Configuration" prompt appears. 2) Display advances to "dEc. Pt" (decimal point).
		DECIMAL POINT SUBMENU:
dEc. Pt	Press ENTER	3) Display flashes previous selection for decimal location.
dc.Pt FFF.F	Press MAX	4) Scroll though the available selections and choose decimal location: **FFFF.** or **FFF.F** (also **F.FFF** and **FF.FF** — if "Process" type was selected in the " inPUt tYPE" menu).
	Press ENTER	5) Display flashes "Strd" message and advances to "Temperature Unit". **Note:** Decimal point for Process input type is passive.
		TEMPERATURE UNIT SUBMENU:
tEnP unit	Press ENTER	6) Display flashes previous Temperature Unit selection.
tEMP F	Press MAX	7) Scroll though the available selections to the temperature unit of your choice: **°F** or **°C**.
	Press ENTER	8) Display flashes "Strd" message and advances to "Filter Constant".

Reading Configuration *cont.*

Display	Action	Response
		**FILTER CONSTANT SUBMENU:**
	Press ENTER	9) Display flashes previous selection for filter constant.
	Press MAX	10) Scroll though the available selections: **0001, 0002, 0004, 0008, 0016, 0032, 0064, 0128. - Default is 0004**
	Press ENTER	11) Display flashes "stored" message only if change was made. **Note:** For PID control select filter value 0001-0004. A filter value of 2 is approximately equal to 1sec. RC low pass time constant. ***IF Process was selected in the "Input Type" menu the display will advance to "Input SC & OFF", otherwise the display advances to the "Alarm 1" menu.***

Note: The **Filter Constant** submenu allows the user to specify the number of readings stored in the digital averaging filter.

Reading Configuration *cont. (If process was selected)*

Display	Action	Response
		**INPUT SCALE & OFFSET SUBMENU:**
	Press ENTER	12) Press enter at the "inPt Sc.OF" prompt. Display flashes 1st digit in submenu "In 1"
	Press MAX & MIN	13) Use MAX and MIN buttons to enter "In 1" value. The "In 1" value = min. input value * the natural gain. Example: 4(mA) x 500 = 2000
	Press ENTER	14) Display advances to "rd 1" submenu.
	Press MAX & MIN	15) Use MAX and MIN buttons to enter "rd 1" value. This value responds to In 1 in terms of some meaningful engineering units
	Press ENTER	16) Display advances to "In 2" submenu. The "In 2" value = max. input value * the natural gain. Example: 20(mA) x 500 = 10000 (9999)
	Press MAX & MIN	17) Use MAX and MIN buttons to enter "In 2" value.
	Press ENTER	18) Display advances to "rd 2" submenu.
	Press MAX & MIN	19) Use MAX and MIN buttons to enter "rd 2" value.
	Press ENTER	20) Display flashes "stored" message and advances to "RLAr 1" menu.
		Note: This submenu allows the user to scale the meter when in process mode and the above display value is an example for 4-20mA input (4 to 20mA = 0000 to 0100%).

Modifying Alarm settings will not reset the controller

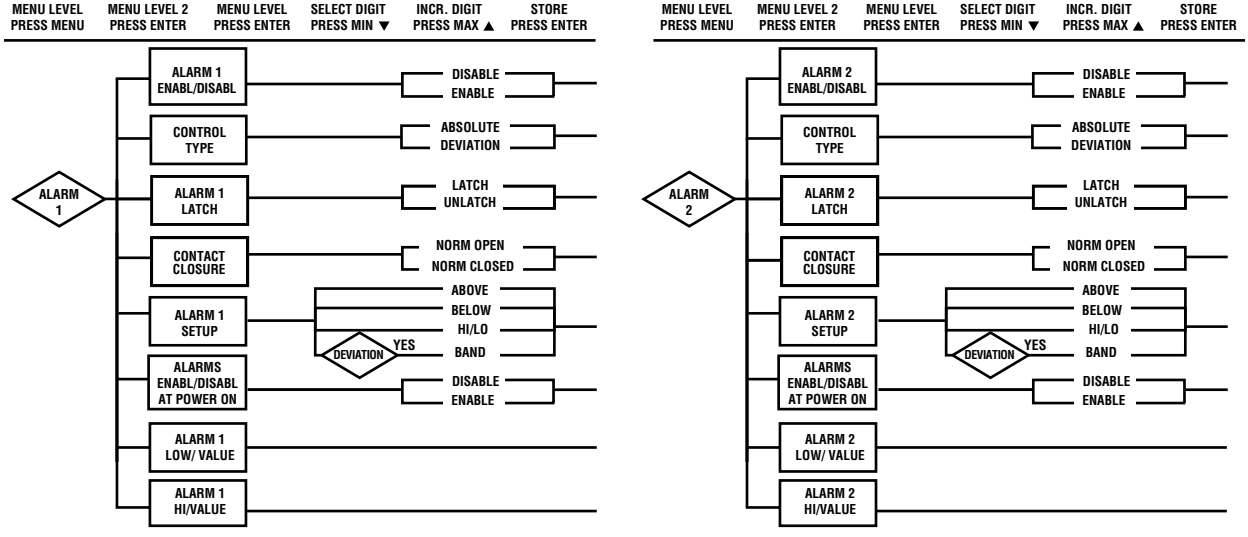


Figure 3.4 Flowchart for Alarm 1 and Alarm 2

Alarm 1

Display	Action	Response
	Press MENU Press ENTER	1) Press MENU, if necessary, until "ALAr 1" prompt appears. 2) Display advances to "ALAr.1 EnbL" or "dSbL" submenu.
	Press MAX Press ENTER	**ALARM 1 ENABLE/DISABLE SUBMENU:** 3) Display flashes previous selection. Press MAX until "EnbL" displays to use Alarm 1. 4) Display flashes "Strd" message only if it was changed, otherwise press MENU to advances to "Control Type" submenu.
	Press MAX Press ENTER	**ALARM TYPE SUBMENU:** 5) Display flashes previous selection. Press MAX to "AbSo" or "dEv." 6) Display flashes "Strd" message only if it was changed, otherwise press MENU to advances to "Alarm 1 Latch" submenu.

Note: **Absolute** mode allows Alarm 1 to function independently from Set Point 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 Set Point 1 — this relation remains fixed even if Set Point 1 is changed.

Alarm 1 *cont.*

Display	Action	Response
		**ALARM LATCHED OR UNLATCHED SUBMENU:**
	Press MAX	7) Display flashes previous selection. Press MAX to **Latched** or **Unlatched.**
	Press ENTER	8) Display flashes "Strd" message and advances to "Contact Closure" submenu.
		**CONTACT CLOSURE SUBMENU:**
	Press MAX	9) Display flashes previous selection. Press MAX to **Normally Closed (nc.)** or **Normally Open (no.)**.
	Press ENTER	10) Display flashes "Strd" message only if it was changed, otherwise press MENU to advances to "APon" Enable/Disable.
		**ALARM 1 SETUP SUBMENU:**
	Press MAX	13) Display flashes previous selection. Press MAX to scroll through the available selections: **Above, Below, HI/Low** and **Band** (Band is active if "Deviation" was selected).
	Press ENTER	14) Display flashes "Strd" message only if it was changed, otherwise press MENU to advances to "Alarm 1 Low Value" submenu.

Above: Alarm 1 condition triggered when the process variable is greater than the Alarm **Hi Value**. (Lo 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 Set Point 1. Band equals **Hi Value** (Lo Value ignored). A "band" is set around the Hi Value by the controller only in the "deviation" mode.

Alarm 1 *cont.*

Display	Action	Response
		**ALARMS ENABLE/DISABLE AT POWER ON:**
	Press MAX	11) Display flashes previous selection. Press MAX to enable or disable.
	Note: *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 set point 1.*	
	Press ENTER	12) Display flashes "stored" message only if it was changed, otherwise press MENU to advances to the "Alarm Setup" submenu.
		**ALARM 1 LOW VALUE SUBMENU:**
	Press MAX & MIN	15) Display flashes 1st digit of previous value. Use MAX and MIN to enter new value.
	Press ENTER	16) Display flashes "Strd" message and advances to "Alarm 1 HI Value" submenu.
		**ALARM 1 HI VALUE SUBMENU:**
	Press MAX & MIN	17) Display flashes 1st digit of previous value. Use MAX and MIN to enter new value.
	Press ENTER	18) Display flashes "Strd" message only if it was changed, otherwise press MENU to advances to "Alarm 2" submenu.

Note: **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.)
Unlatched mode: Relay remains latched only as long as the alarm condition is true.
Normally Closed:"Fail Safe" mode, relay is energized under "normal" conditions and becomes de-energized during alarm or power failure.
Normally Open: If this feature is selected, then the relay is "energized" only when an alarm condition occurs.

Alarm 2

Display	Action	Response
	Press MENU Press ENTER	1) Press MENU, if necessary, until "Alar 2" display appears. 2) Display advances to "Alarm 2 Enable/Disable" submenu.
	*Press MENU*	***IF ALARM 2 IS NOT INSTALLED, THE CONTROLLER WILL SHOW "NOT INSTALLED"*** *Press MENU, if you receive the "not installed" message and advance to the "Loop Break" menu.*
	Press MAX Press ENTER	**Alarm 2 enable/disable Submenu:** 3) Display flashes previous selection. Press MAX until "EnbL" displays to use Alarm 2. 4) Display flashes "Strd" message only if it was changed, otherwise press MENU to advances to "Control Type" submenu.
		The remaining Alarm 2 is identical to Alarm 1 i.e. previous two pages.

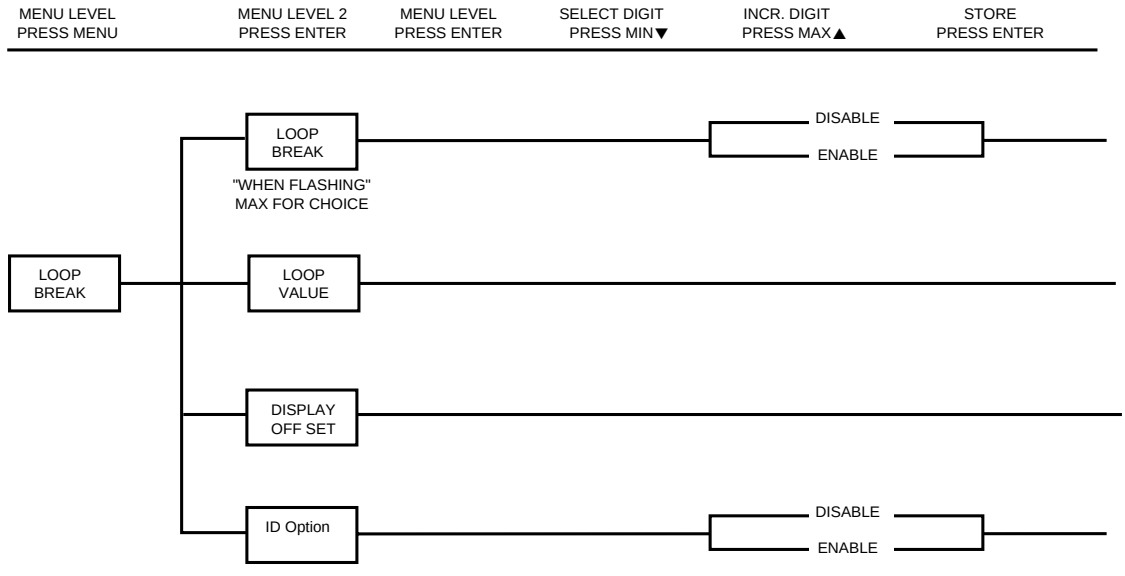


Figure 3.5 Flowchart for Loop Break

Loop Break Alarm

Display	Action	Response
	Press MENU Press ENTER	1) Press MENU, if necessary, until the "Loop Break" prompt appears. 2) Display advances to "Loop Break Enable/Disable" submenu.
	Press ENTER Press MAX Press ENTER	**LOOP BREAK ENABLE/DISABLE SUBMENU:** 3) Display flashes "EnbL" or "dSbL". 4) Scroll through the available selections: **Enable (EnbL)**or **Disable (dSbL).** 5) Display flashes "Strd" message and advances to "Loop Value" menu.

Note: Loop Break is an additional safety feature intended to monitor the rate of change of the process value, while approaching the SPI. It is strictly intended as an additional warning system, therefore it's use is entirely optional.
An active Loop Break will cause the Set Point digits to blink in a rotating pattern. If the process value reaches the set point the blinking will stop and LooP brA1 is completed successfully, otherwise LooP brA1 will flash and will activate RLr1.

Loop Break Alarm *cont.*

Display	Action	Response
		LOOP BREAK ALARM VALUE SUBMENU:
	Press ENTER	6) Display flashes 1st digit of previous loop value.
	Press MAX & MIN	7) Press MAX and MIN buttons to enter a new "loop value".
	Press ENTER	8) Display flashes "StrD" message and advances to "CJ Temperature Adjust" menu.
		TEMPERATURE ADJUST SUBMENU:
	Press ENTER	9) Display flashes 1st digit of previous temperature adjust value.
	Press MAX & MIN	10) Press MAX and MIN buttons to enter a new "temperature adjust" value
	Press ENTER	11) Display flashes "StrD" message and advances to "ID Option" submenu.

Note: Loop Break Alarm 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 10 counts or if the input type is either RTD or Thermocouple, the value would be °4 Fahrenheit or 2°Celsius. At the specified time interval, if the process value change is less than the stated rate flashing, "LbAL" will be displayed, the output " 1" will be de-energized, and Alarm 1 energized. Loop break alarm will be disabled when the process value (PV) enters the control band.

Tip: Display 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 ± tAdJ). tAdJ is adjustable between -1999 to 9999.

Loop Break Alarm *cont.*

Display	Action	Response
		ID CODE OPTION SUBMENU
		12) Display flashes current status of ID Option, enabled or disabled.
	Press MAX	13) Press MAX button to select between **Enable** and **Disable**
	Press ENTER	14) Display flashes "Strd" and advances to "Output 1."

NOTE: With ID Code Option disabled, the ID Number submenu is hidden. Refer to the appropriate Set Points section for setting differences.

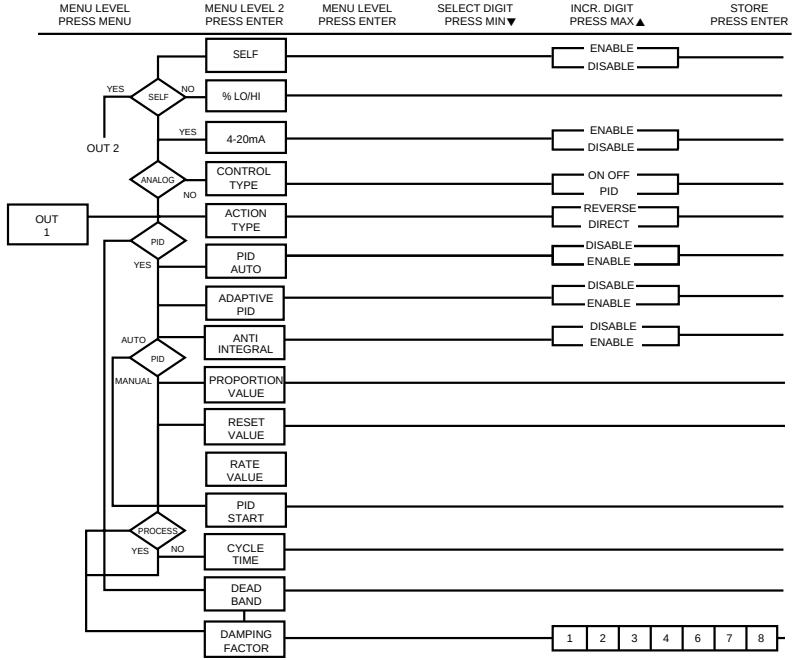


Figure 3.6 Flowchart for Output 1

Output 1

Display	Action	Response
	Press MENU	1) Press MENU, if necessary, until the "out 1" prompt appears.
	Press ENTER	2) Display advances to "Self" submenu.
		SELF SUBMENU The Self option allows the output of the controller to be controlled manually from the front panel.
		3) Display flashes the current setting of Self, enabled or disabled.
	Press MAX	4) Press the MAX button to select between **Enable** and **Disable.**
	Press ENTER	5) If Self enable was selected, Output 1 setting is completed and the display advances to the next menu.

NOTE: The output is now under the direct control of the operator and can be adjusted in the run mode, by pressing the MAX and MIN buttons. The control value (0 - 99), now display in the SV window indicate, approximately in percent, the output. For example, a setting of 0050 of an analog output of 0~10Vdc would produce roughly 5Vdc at the output. Also, to insure smooth transition when switching to self mode, the proportional control output is left in its last value, when self mode is activated for the first time.

		6) Display advances to the "Minimum/Percent Low" submenu, if self is disabled.
		MINIMUM/PERCENT LOW SUBMENU Specify in percent, the minimum value (0000) for control output. If the output is analog, then the minimum voltage or current, in percent, is specified. If the output is time proportional, then the minimum duty-cycle, in percent, is specified.
		7) Display shows " Lo", and flashes the 10s digit of the current "Percent Low" setting.
	Press MIN & MAX	8) Use MAX & MIN buttons to enter a new value for "Percent Low".
	Press ENTER	9) Press ENTER to store the current setting and to advance to Maximum/Percent High.

Output 1 *cont.*

Display	Action	Response
		MAXIMUM/PERCENT HIGH SUBMENU Specify in percent, the maximum value (0099) for control output. If the output is analog, then the maximum voltage or current, in percent, is specified. If the output is time proportional, then the maximum duty-cycle, in percent, is specified.
		10) Display show " HI" and flashes the 10s digit of the current Percent Low setting.
	Press MIN & MAX	11) Use MAX & MIN buttons to enter a new value for Percent Low.
	Press ENTER	12) Press ENTER to store the current setting and to advance to *Control Type submenu.

Example: On an analog output of 0~10Vdc, a setting of %LO = 10 and %HI = 90, cause the minimum on the control output to be 1V and the maximum on the control output to 9V. 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 SUBMENU:** *(Relay, SSR or Pulse Option)*
	Press ENTER	13) Display flashes "on.oF" or "P id".
	Press MAX	14) Scroll through the available selections: **ON/OFF** or **PID.** If **ON/OFF** is selected proceed on page 58
	Press ENTER	15) Display flashes "Strd" message and advances to "Action Type" submenu.

Note: 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 Controller provides an "Auto Tuning" feature making the tuning process automatic, possibly optimum.

Output 1 *cont.*

Display	Action	Response
4-20 cUrr		
Actn tYPE		
Actn drct		

***If Current/Voltage is your analog control output 1, this menu i.e. ctrL type will not appear, instead 4-20 / Curr or 0-20/Curr will be displayed. Select "EnbL" for a 4-20mA output or "dSbL" for a 0-20 mA output. If 4-20mA is enabled, %HI/LO setting will have no effect. **NOTE: Both Current and Voltage control outputs are active simultaneously.**

ACTION TYPE SUBMENU:

Press ENTER — 16) Display flashes "drct" or "rurS".

Press MAX — 17) Scroll through the available selections: **Direct** or **Reverse**.

Press ENTER — 18) Display flashes "Strd" message and advances to "Auto PID" submenu.

If "ON/OFF" was selected in the Control Type, the display skips to the "Dead Band" submenu.

Note: 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 set point. If a positive error should cause the controller output to increase (i.e. cooling), it would be called **Direct Acting.** If a negative error should cause the output to decrease (i.e. heating), it would be called **Reverse Acting.**

Output 1 *cont.*

Display	Action	Response
AUto PId		**AUTO TUNE PID SUBMENU:**
	Press ENTER	19) Display flashes "EnbL" or "dSbL".
	Press MAX	20) Scroll through the available selections: **Enable** or **Disable.**
AUto EnbL		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 controller to do the auto *P Id* and the *P*, *P I* or *P Id*, first select auto disable and enter 0000 for unwanted parameter. e.g. for *P I* enter 0000 for the rate.
	Press ENTER	21) Display flashes "stored" message and advances to "Adaptive Control" submenu.
AdPt ctrL		***ADAPTIVE CONTROL SUBMENU: *** *(NOT INSTALLED YET)*
	Press ENTER	22) Display flashes "EnbL" or "dSbL".
	Press MAX	23) Scroll through the available selections: **Enable** or **Disable.**
AdPt EnbL		If "**Enabled**", the Adaptive Tuning dynamically changes and updates the P, I, and D parameters for optimum control. The adaptive tuning is useful when the load continuously changes thereby requiring new values for *P*, *I*, and *d*.
	Press ENTER	24) Display flashes "stored" message and advances to "Anti Integral" submenu.

Output 1 *cont.*

Display	Action	Response
		ANTI INTEGRAL SUBMENU:
AntI IntG	Press ENTER	25) Display flashes "EnbL" or "dSbL".
	Press MAX	26) Scroll through the available selections: **Enable** or **Disable.**
AntI EnbL		If "**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.
	Press ENTER	27) Display flashes "stored" message and advances to "Proportional Band" submenu if auto PID was disabled, otherwise it will go to "**Start PID**".
Strt PId		**START AUTO PID:**
	Press ENTER	28) Display flashes "EnbL" or "dSbL".
	Press MAX	29) Scroll through the available selections: **Enable** or **Disable.**
Strt EnbL		If "**Enabled**", the controller is ready to calculate P, PI or PID parameters. The set points must be at least 20°F or 11°C above the (PV) process value in order to perform autotune, otherwise an error message will be displayed.
	Press ENTER	30) Display flashes "Strd" message and advances to the cycle Time submenu.

Note: *To start auto PID select PID, enable Auto PID and enable Start PID. Sometimes Auto PID parameter needs fine tuning i.e. for each 5°F over shoot increase the Proportional Band (PB) by 15% and for each ±1°F fluctuation at the Set Point (SP) increase reset by 20%.* ***Once started, do not perform any operations or settings before first stopping auto-tune. Any alarms or other output is disabled during auto-tune.***

Output 1 *cont.*

Display	Action	Response
		If "AUTO TUNE PID" was "DISABLED", the display will show the following three submenus so the user may 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 e. g. PI enter 0000 for rate:
PrOP bAnd	Press ENTER Press MAX & MIN Press ENTER	**PROPORTIONAL BAND SUBMENU:** 28) Display flashes 1st digit of the previous P "proportional band" value. 29) Press MAX and MIN buttons to enter a new "proportional band" value 30) Display flashes "Strd" message and advances to "Reset Setup" submenu. Note: Proportional band is in degree of temperature or counts of process.
rESt StuP	Press ENTER Press MAX & MIN Press ENTER	**RESET SETUP SUBMENU:** 31) Display flashes 1st digit of the previous I "reset" value. 32) Press MAX and MIN buttons to enter a new "reset" value. 33) Display flashes "Strd" message and advances to "Rate Setup" menu. Note: Reset unit is in seconds 0-3999
rAtE StuP	Press ENTER Press MAX & MIN Press ENTER	**RATE SETUP SUBMENU:** 34) Display flashes 1st digit of previous D "rate" value. 35) Press MAX and MIN buttons to enter a new "rate" value 36) Display flashes "Strd" message and advances to the "Cycle Time" submenu for RTD and Thermocouple types. **If the Output 1 is analog option the display skips to "Damping Factor".** Note: Rate unit is in seconds 000.0-399.9

Output 1 *cont.*

Display	Action	Response
		CYCLE TIME SUBMENU:
	Press ENTER	37) Display flashes 1st digit of the previous "Cycle Time" value.
	Press MAX & MIN	38) Press MAX and MIN buttons to enter a new "Cycle Time" value. (1 to 199 seconds).
	Press ENTER	39) Display flashes "stored" message and advances to "Damping Factor" submenu.

Note: 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 life time 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).

Output 1 *cont.*

Display	Action	Response
		DAMPING FACTOR SUBMENU:
	Press ENTER	40) Display flashes the previous "damping factor" selection.
	Press MAX	41) Scroll through the available selections: **0000, 0001, 0002, 0003, 0004, 0005, 0006, 0007, 0008 - Default is 0003**
	Press ENTER	42) Display flashes "StrA" message and advances to the "Output 2" menu.

Note: Damping Factor is a measure of speed, overshoot, and undershoot in which the process variable responds to the output changes of the controller, which were used during the Auto Tune. This value is typically set to the ratio of Rate to Reset. This Default value is (0004). For fast response time, this value should be decreased while for slow response time it should be increased.

Output 1 *cont.*

Display	Action	Response
		The "DEADBAND" submenu will only appear if the "ON/OFF" was selected from the "Control Type" menu.
		**DEADBAND SUBMENU:**
	Press ENTER	43) Display flashes 1st digit of the previous "Deadband" value.
	Press MAX & MIN	44) Press MAX and MIN buttons to enter a new "Deadband" value
	Press ENTER	45) Display flashes "Strd" message and advances to the "Output 2" menu.
		Note: Dead band units are the same as proportional band units.

Note: The Deadband 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.

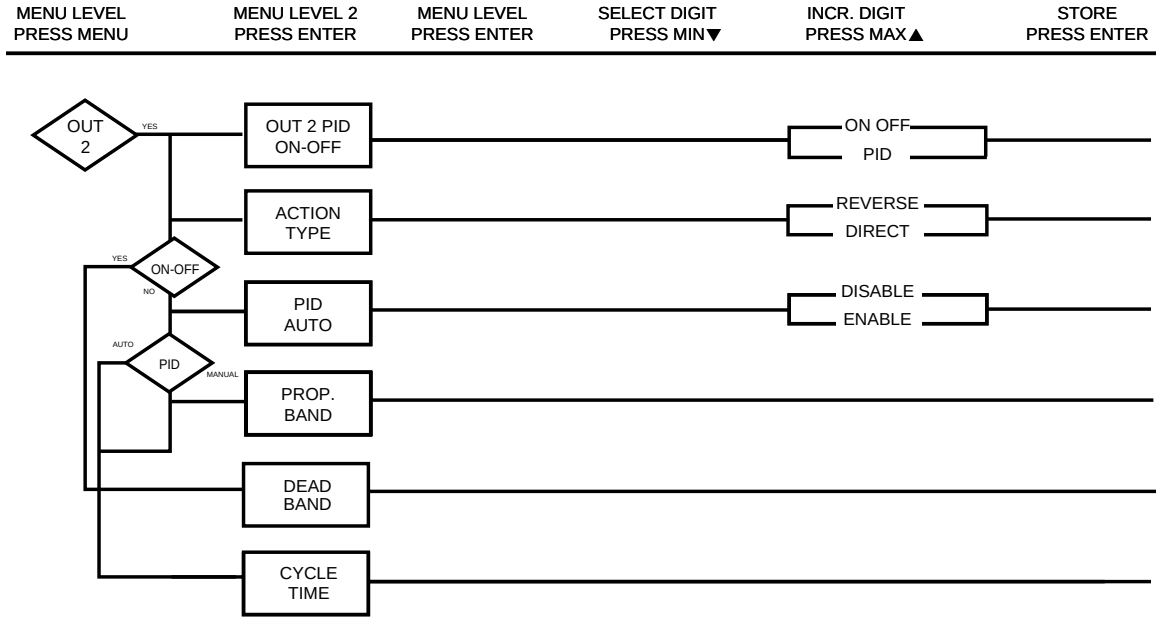


Figure 3.7 Flowchart for Output 2

Output 2

Display	Action	Response
out 2	Press MENU Press ENTER	1) Press MENU, if necessary, until the "out 2" prompt appears. 2) Display advances to "Control Type" submenu.
not_ InSt	Press MENU	***IF OUTPUT 2 IS NOT INSTALLED, THE CONTROLLER WILL SHOW "NOT INSTALLED"*** Press MENU, if the "not installed" message is displayed, advance to the "Ramp & Soak" submenu.
ctrL tYPE	Press ENTER Press MAX	**CONTROL TYPE SUBMENU:** 3) Display flashes "on.oF" or "P id". 4) Scroll through the available selections: on/oFF or P id.
ctrL P id	Press ENTER	5) Display flashes "Strd" message and advances to "Action Type" submenu.

Note: 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 tight control of the process variable is required.

Output 2 *cont.*

Display	Action	Response
		ACTION TYPE SUBMENU:
Actn tYPE	Press ENTER	6) Display flashes "drct" or "rurS".
	Press MAX	7) Scroll through the available selections: **Direct** or **Reverse.**
	Press ENTER	8) Display flashes "Strd" message and advances to "Auto PID" submenu.
Actn drct		**If "ON/OFF" was selected in the Control Type, the display skips to the "Dead Band" submenu.**

Note: 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 set point. If a positive error should cause the controller output to increase (i.e. cooling), it would be called **Direct Acting.** If a negative error should cause the output to decrease (i.e. heating), it would be called **Reverse Acting.**

Output 2 *cont.*

Display	Action	Response
		AUTO TUNE PID SUBMENU:
AUto PId	Press ENTER	9) Display flashes "EnbL" or "dSbL".
	Press MAX	10) Scroll through the available selections: **Enable** or **Disable.**
		If "**Enabled**", the PID parameter of Output 1 will be copied to Output 2.
AUto EnbL	Press ENTER	11) Display flashes "Strd" message and advances to the next submenu —
		If "AUTO TUNE PID" was "ENABLED", the display skips to the "CYCLE TIME" submenu.
		If "AUTO TUNE PID" was "DISABLED", the display will show the "Proportional Band" submenu allowing the user to manually enter the Proportional Band value.
		Note: *The Reset and Rate value are the same as Output 1.*
		PROPORTIONAL BAND SUBMENU:
ProP bAnd	Press ENTER	12) Display flashes 1st digit of the previous "proportional band" value.
	Press MAX & MIN	13) Press MAX and MIN buttons to enter a new "proportional band" value
	Press ENTER	14) Display flashes "Strd" message and advances to the "Cycle Time" submenu.
		Note: *Refer to proportional band.*

Output 2 *cont.*

Display	Action	Response
		**CYCLE TIME SUBMENU:**
	Press ENTER	15) Display flashes 1st digit of the previous "Cycle Time" value.
	Press MAX & MIN	16) Press MAX and MIN buttons to enter a new "Cycle Time" value. (1 to 199 seconds).
	Press ENTER	17) Display flashes "stored" message and advances to "Damping Factor" submenu.

Note: A cycle time selected between 1 to 199 seconds indicates 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 life time 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 current (higher than 1 Amp).

Output 2 *cont.*

Display	Action	Response
		The "DEADBAND" submenu will only appear if the "ON/OFF" was selected from the "Control Type" menu.
		**DEADBAND SUBMENU:**
	Press ENTER	18) Display flashes 1st digit of the previous "Deadband" value.
	Press MAX & MIN	19) Press MAX and MIN buttons to enter a new "Deadband" value.
	Press ENTER	20) Display flashes "stored" message and advances to the "Ramp Value" menu.
		Note: Refer to proportional band

Note: The Deadband is the number of degrees or counts around the set point which the process variable must pass through before the output changes state.

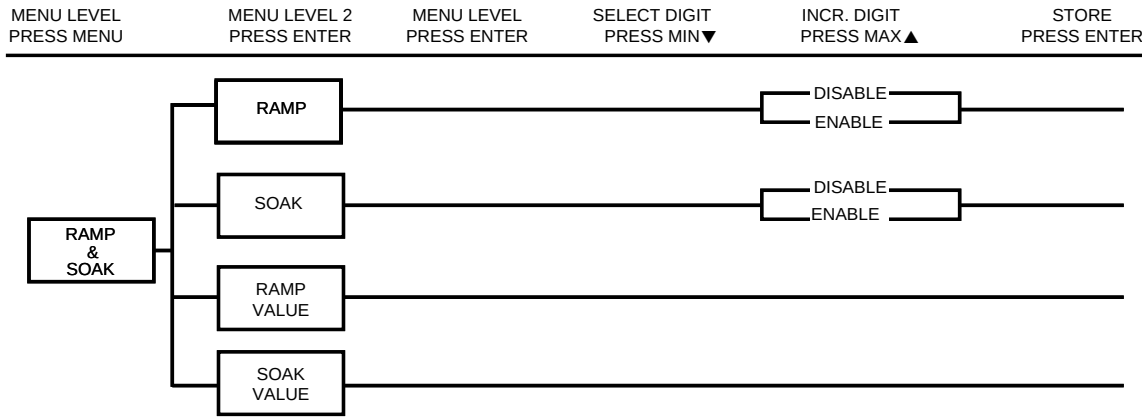


Figure 3.8 Flowchart for Ramp & Soak

Ramp & Soak

Display	Action	Response
rAMP SoAc	Press MENU Press ENTER	1) Press MENU, if necessary, until the "rAMP SoAc" prompt appears. 2) Display advances to "Ramp Enable/Disable" submenu.
rAMP EnbL		**RAMP ENABLE/DISABLE SUBMENU:**
	Press ENTER	3) Display flashes "EnbL" or "dSbL".
	Press MAX	4) Scroll through the available selections: **Enable** or **Disable.**
	Press ENTER	5) Display flashes "Strd" message and advances to "Soak Enable/Disable" menu.
SoAc EnbL		**SOAK ENABLE/DISABLE SUBMENU:**
	Press ENTER	6) Display flashes "EnbL" or "dSbL".
	Press MAX	7) Scroll through the available selections: **Enable** or **Disable.**
	Press ENTER	8) Display flashes "Strd" message and advances to "Ramp Value" menu.

Note: Ramp & Soak provides users with the flexibility to slowly bring the process variable to the desired set point. Ramp & Soak Values is specified in HH.MM format. This value indicates the time specified to bring the process variable to Setpoint 1. Once 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 controller by pressing MENU and then MIN 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 SV with OUT 1 fully ON.

Ramp & Soak *cont.*

Display	Action	Response
		**RAMP VALUE SUBMENU:**
	Press ENTER	9) Display flashes 1st digit of previous "rAMP" value.
	Press MAX & MIN	10) Press MAX and MIN buttons to enter a new "rAMP" value
	Press ENTER	11) Display flashes "Strd" message and advances to "Soak Value" menu.
		**SOAK VALUE SUBMENU:**
	Press ENTER	9) Display flashes 1st digit of previous "soak" value.
	Press MAX & MIN	10) Press MAX and MIN buttons to enter a new "soak" value
	Press ENTER	11) Display flashes "Strd" message and advances to the "Analog Output"

Note: 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 is disabled during this time.

3.3 Available Options

The Controller may be ordered with one of the three following options:

1) **Analog Output:** This option provides additional flexibility to transmit the equivalent value of process variable to other devices using a 4 to 20 mA current loop or 0-10 volt signal.

2) **Communication Option:** This option makes the controller a very powerful instrument providing the user with even greater capability since all the parameters can be transmitted via a personal computer.

3) **Remote Set Point:** One of the three already stored set points can be activated.

Analog Output Option

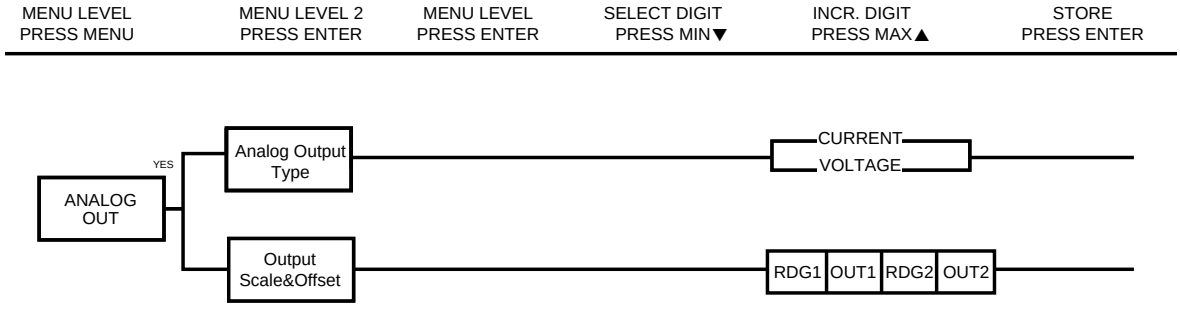


Figure 3.9 Flowchart for Analog Output Option

Analog Output Option *cont.*

Display	Action	Response
AnLG OUt	Press MENU Press ENTER	1) Press MENU, if necessary, until the "AnLG OUt" prompt appears. 2) Display advances to "Analog Type" submenu.
not_ InSt	*Press MENU*	***IF THE ANALOG OUTPUT OPTION IS NOT INSTALLED, THE CONTROLLER WILL SHOW*** "not InSt" *Press MENU, if you receive the "not installed" message and advance to the "Communication" submenu.*
AnLG uoLt	Press ENTER Press MAX Press ENTER	**ANALOG TYPE SUBMENU:** 3) Display flashes "uoLt" or "cUrr". 4) Scroll through the available selections: **Volt** or **Current.** 5) Display flashes "stored" message and advances to "Reading 1" of the Output Reading submenu.

Analog Output Option *cont.*

Display	Action	Response
		READING 1
	Press ENTER	6) Display flashes 1st digit of previous Reading 1 value.
	Press MAX & MIN	7) Enter "Reading 1" value
	Press ENTER	8) Display advances to "*oUt. 1*"
		OUT 1
	Press ENTER	9) Display flashes 1st digit of previous Out1 value.
	Press MAX & MIN	10) Enter "Out 1" value
	Press ENTER	11) Display advances to "Reading 2"
		READING 2
	Press ENTER	12) Display flashes 1st digit of previous Reading 2 value.
	Press MAX & MIN	13) Enter "Reading 2" value
	Press ENTER	14) Display advances to "*oUt.2*"
		OUT 2
	Press ENTER	15) Display flashes 1st digit of previous Out 2 value.
	Press MAX & MIN	16) Enter "Reading 1" value
	Press ENTER	17) Display advances to the "Communication Option" menu.

Note: The above example is for 0-10 of the entire range of the process input and analog output. For 0-20mA output all you need is to set OUT2 to *20.00*.

Communication Option

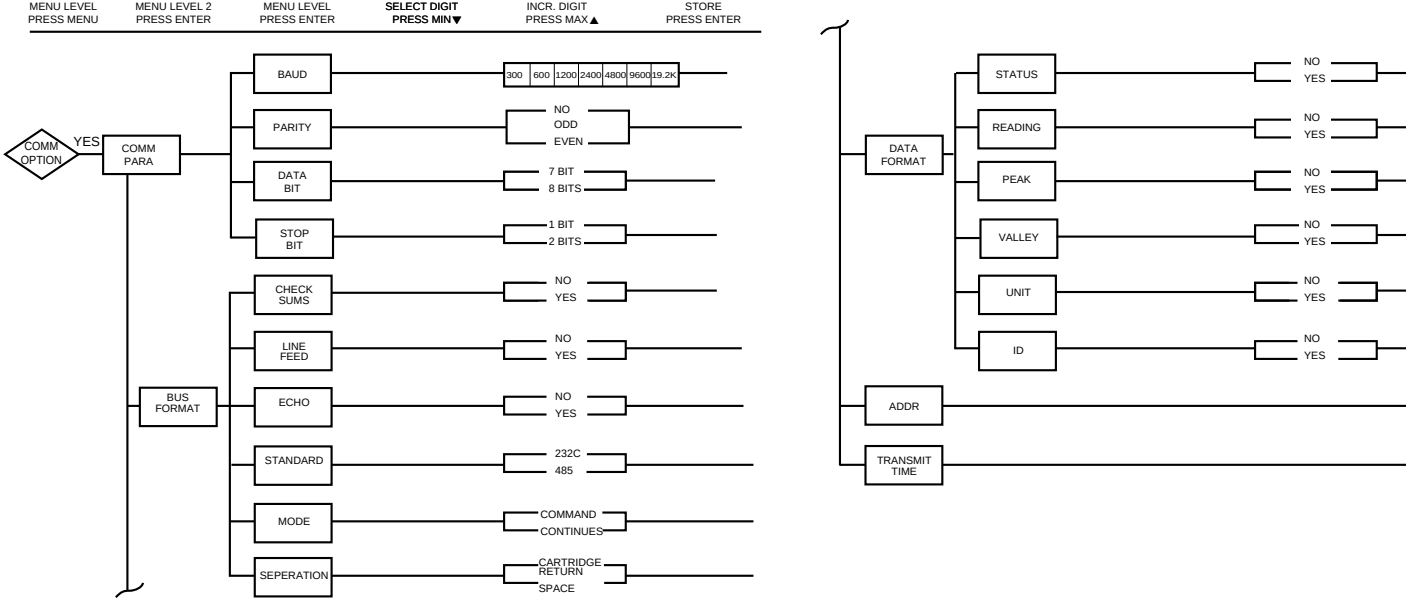


Figure 3.10 Flowchart for Communication Option

Communication Option *cont.*

Display	Action	Response
	Press MENU Press ENTER	1) Press MENU, if necessary, until the "com oPtn" prompt appears. 2) Display advances to "Communication Parameters" submenu.
	*Press MENU*	***IF THE COMMUNICATION OPTION IS NOT INSTALLED, THE CONTROLLER WILL SHOW*** "not_InSt" *Press MENU, if you receive the "not installed" message and advance to the "Remote Set Point" menu.*
	Press ENTER	**COMMUNICATION PARAMETERS SUBMENU:** Display shows "communication parameters" prompt. 3) Display advances to "bAUd" submenu
	Press ENTER Press MAX Press ENTER	**BAUD SUBMENU:** 4) Display flashes previous selection for "BAUD" value. 5) Scroll through the available selections: **300, 600, 1200, 2400, 4800, 9600, 19.2K.** 6) Display flashes "Strd" message and advances to "Parity" submenu.

Communication Option *cont.*

Display	Action	Response
		**PARITY SUBMENU:**
	Press ENTER	7) Display flashes previous selection for "Parity".
	Press MAX	8) Scroll through the available selections: **NO, ODD, EVEN.**
	Press ENTER	9) Display flashes "Strd" message and advances to "Data Bit" submenu.
		**DATA BIT SUBMENU:**
	Press ENTER	7) Display flashes previous selection for "Data Bit".
	Press MAX	8) Scroll through the available selections: **7 BIT, 8 BIT.**
	Press ENTER	9) Display flashes "Strd" message and advances to "Stop Bit" submenu.
		**STOP BIT SUBMENU:**
	Press ENTER	7) Display flashes previous selection for "Stop Bit".
	Press MAX	8) Scroll through the available selections: **1 BIT, 2 BIT.**
	Press ENTER	9) Display flashes "Strd" message and advances to "BUS FORMAT" submenu.
		**BUS FORMAT SUBMENU:**
		Display shows "bUS FrMt" prompt.
	Press ENTER	10) Display advances to "Check Sum" submenu.

Communication Option *cont.*

Display	Action	Response
		**CHECK SUM SUBMENU:** Not Installed
	Press ENTER	11) Display flashes previous selection for "Check Sum".
	Press MAX	12) Scroll through the available selections: **NO, YES.**
	Press ENTER	13) Display flashes "Strd" message and advances to "Line Feed" submenu.
		**LINE FEED SUBMENU:**
	Press ENTER	14) Display flashes previous selection for "Line Feed".
	Press MAX	15) Scroll through the available selections: **NO, YES.**
	Press ENTER	16) Display flashes "Strd" message and advances to "ECHO" submenu.
		**ECHO SUBMENU:**
	Press ENTER	17) Display flashes previous selection for "ECHO".
	Press MAX	18) Scroll through the available selections: **NO, YES.**
	Press ENTER	19) Display flashes "Strd" message and advances to "Standard" submenu.
		**STANDARD SUBMENU:**
	Press ENTER	20) Display flashes previous selection for "Standard".
	Press MAX	21) Scroll through the available selections: **232C, 485.**
	Press ENTER	22) Display flashes "Strd" message and advances to "Mode" submenu.

Communication Option *cont.*

Display	Action	Response
		**MODE SUBMENU:**
	Press ENTER	23) Display flashes previous selection for "Mode".
	Press MAX	24) Scroll through the available selections: **CMND, CONT** (command, continuous)
	Press ENTER	25) Display flashes "Strd" message and advances to "Separation" submenu.
		**SEPARATION SUBMENU:**
	Press ENTER	26) Display flashes previous selection for "Separation".
	Press MAX	27) Scroll through the available selections: **SPCE, CR** (space, carriage return)
	Press ENTER	28) Display flashes"Strd" message and advances to "Data Format" submenu.
		**DATA FORMAT SUBMENU:**
		Display shows "dAtA FrMt" prompt. This menu is applicable for continuous mode of RS232 communication
	Press ENTER	32) Display advances to "Status" submenu.

Communication Option *cont.*

Display	Action	Response
		**STATUS SUBMENU:**
	Press ENTER	33) Display flashes previous selection for "Status" (alarm status).
	Press MAX	34) Scroll through the available selections: **NO, YES**
	Press ENTER	35) Display flashes "Strd" message and advances to "Reading" submenu.
		**READING SUBMENU:**
	Press ENTER	36) Display flashes previous selection for "Reading".
	Press MAX	37) Scroll through the available selections: **NO, YES**
	Press ENTER	38) Display flashes "Strd" message and advances to "Peak" submenu.
		**PEAK SUBMENU:**
	Press ENTER	39) Display flashes previous selection for "Peak".
	Press MAX	40) Scroll through the available selections: **NO, YES**
	Press ENTER	41) Display flashes "Strd" message and advances to "Valley" submenu.
		**VALLEY SUBMENU:**
	Press ENTER	42) Display flashes previous selection for "Valley".
	Press MAX	43) Scroll through the available selections: **NO, YES**
	Press ENTER	44) Display flashes "Strd" message and advances to "Unit" submenu.

Communication Option *cont.*

Display	Action	Response
		**UNIT SUBMENU:**
	Press ENTER	45) Display flashes previous selection for "Unit".
	Press MAX	46) Scroll through the available selections: **NO, YES**
	Press ENTER	47) Display flashes "Strd" message and advances to "ID" submenu.
		**ID SUBMENU:** Not Installed
	Press ENTER	48) Display flashes previous selection for "Reading".
	Press MAX	49) Scroll through the available selections: **NO, YES**
	Press ENTER	50) Display flashes "Strd" message and advances to "Address Setup" submenu.
		**ADDRESS SETUP SUBMENU:** .
		Display shows "Addr StUP" prompt. This menu is applicable to the RS 485 option only
	Press ENTER	51) Display advances to "Address Value" (0000 to 0199) submenu.
		**ADDRESS VALUE SUBMENU:**
	Press ENTER	52) Display flashes 1st digit of previous address value.
	Press MAX & MIN	53) Enter new address value
	Press ENTER	54) Display flashes "Strd" message and advances to "Transmit Time" submenu.
		If no change press “menu” to go on.

Communication Option *cont.*

Display	Action	Response
		**TRANSMIT TIME SUBMENU:** Display shows "trt i SEUP" prompt. This menu is applicable if continuous mode was selected.
	Press ENTER	55) Display advances to "Transmit Time Value" submenu.
		**TRANSMIT TIME VALUE SUBMENU:**
	Press ENTER	56) Display flashes 1st digit of previous transmit time in seconds.
	Press MAX & MIN	57) Enter new transmit time, e.g. 0030 will send every 30 seconds the data in continuous mode.
	Press ENTER	58) Display flashes "Strd" message and advances to "Remote Setpoint" menu. If no change press “menu” to go on.

COMMUNICATION COMMANDS (Table 3.12)

Command Prefix (Command Class)	Meaning
^AE	Special read, Communication parameters
P (Put)	Write HEX data into RAM
W (Write)	Write HEX data into EEPROM. **1,000,000 writes to EEPROM is guaranteed!**
G (Get)	Read HEX data from RAM
R (Read)	Read HEX data from EEPROM
U	Read status byte
V	Read measurement data string in decimal format
X	Read measurement data values in decimal format
D	Disable
E	Enable
Z	Reset

Command Formats

For "P" and "W" Command classes:	For "G" and "R" Command classes:	For "X", "V", "U", "D", "E", and"Z" Command classes:
Point-to-point mode: * ccc<data> <CR> Multipoint mode:* nnccc (<data>) <CR>	Point-to-point mode:* ccc <CR> Multipoint mode:* nnccc <CR>	Point-to-point mode:* ccc <CR> Multipoint mode:* nnccc <CR>

Where "*****" is the selected Recognition Character. You may select any ASCII table symbol from "!" (HEX address "21") to the right-hand brace (HEX "7D") except for the caret "^", "A", "E", which are reserved for bus format request."(nn)" are the two ASCII characters for the device Bus Address. Use values from "00" to hex "C7" (199 decimal).

"**ccc**" stands for the hex-ASCII Command Class letter (one of eleven given in table 3.12), followed by the two hex-ASCII Command Suffix characters identifying the meter data, features or menu items to which the command is directed (given in table 3.13).

"**<data>**" is the string of characters containing the variable information the computer is sending to the meter. These data (whether BCD or binary) are encoded into hex-ASCII characters, two characters to the byte. Square brackets (indicating optional status) enclose this <data> string, since some commands contain no data.

"**<nn>**" is the device address for RS485 communication and the max is 199 in decimal.

Examples:

1. To reset the controller, send *Z02<CR>
2. To read setpoint 1, send *R01<CR>
3. To change setpoint 1 to 100.0, send *W01 20 03E8 (3E8 is HEX value at 1000) 2 stands for decimal position, 0 is illegal.TC/RTD 1 or 2, PROCESS 1, 2, 3, or 4.
4. To change setpoint 1 to -100.0, send *W01 A0 03E8 most significant bit of the most significant nibble is the sign.
5. To send the same as in 4 for RS485 of transmit address 01 the command is *01W01A03E8.

NOTE: Default settings are Recog. Char. "*", 9600bps, 7 data, 1 stop, and Odd Parity.

COMMAND LETTERS AND INDEX (Table 3.13)

Command	Command Index	Function	Command Bytes	#OF Characters	Default Value
RW	01	SP1	3	6	200000
RW	02	SP2	3	6	200000
GPRW	03	RDGOFF	3	6	200000
RW	04	OUTOFF	2	4	00000
RW	05	ID	2	4	0000
-	06	N/A	-	-	
RW	07	INPUT	1	2	04
GPRW	08	RDGCNF	1	2	4A
RW	09	AL1CNFG	1	2	00
RW	0A	AL2CNFG	1	2	00
RW	0B	LOOP BREAK TIME	2	4	003B
RW	0C	OUT1CNF	1	2	81
RW	0D	OUT2CNF	1	2	60
RW	0E	RAMPTIME	2	4	0000
RW	0F	ANGLSCL	3	6	9186A0
RW	10	COMM.PARAMETERS	1	2	0D
RW	11	RSP1	3	6	200000
RW	12	AL1LO	3	6	A003E8
RW	13	AL1HI	3	6	215F90
GPRW	14	RDGSCL	3	6	100001

COMMAND LETTERS AND INDEX *cont.*

Command	Command Index	Function	Command Bytes	#OF Characters	Default Value
RW	15	AL2LO	3	6	A003E8
RW	16	AL2HI	3	6	215F90
GPRW	17	PB1/DEAD BAND	2	4	00C8
GPRW	18	RESET 1	2	4	00B4
GPRW	19	RATE 1	2	4	0000
GPRW	1A	CYCLE 1	1	2	07
-	1B	N/A	-	-	
GPRW	1C	PB2/DEAD BAND	2	4	00C8
GPRW	1D	CYCLE 2	1	2	07
RW	1E	SOAK TIME	2	4	0000
RW	1F	BUS FORMAT	1	2	14
GPRW	20	DATA FORMAT	1	2	02
RW	21	ADDRESS	1	2	01
RW	22	TRANSMIT TIME INTERVAL	2	4	0010
RW	23	RSP 2	3	6	200000
RW	24	RSP 3	3	6	200000
RW	25	C.J.OFFSET ADJ.	3	6	200000
RW	26	RECOGNITION CHARACTER	1	2	2A

COMMAND LETTERS AND INDEX *cont.*

Command Index	Command	Function
D	01	DISABLE ALARM 1
D	02	DISABLE ALARM 2
D	03	STANDBY
E	01	ENABLE ALARM 1
E	02	ENABLE ALARM 2
E	03	DISABLE STANDBY
X	01	SEND MAIN READING
X	02	SEND PEAK READING
X	03	SEND VALLEY READING
X	04	SEND READING
X	05	SEND READING
U	01	SEND ALARM STATUS
U	03	SEND SW VERSION
V	01	SEND DATA STRING
Z	02	HARD RESET

Command Format

Description: INPUT.76543210 means 8 bit positions of the Input Command Data (Operand).

INPUT .10= 00 TC
01 RTD
10 PC
11 NIA

INPUT.5432= 0000 J/392-2/0-10 mV
0001 K/392-3/0-1 V
0010 T/392-4/0-10 V
0011 E/385.2/0-20 mA
0101 DIN-J/385.4
0110 R
0111 S
1000 B
1001 C

INPUT 7.6= 00=100 ohm RTD
01=500 ohm RTD
10=1000 ohm

RDGCNF.210= 000 Not Allowed
001 Decimal Point 1
010 Decimal Point 2
011 Decimal Point 3*
100 Decimal Point 4*
101
*Process only

RDGCNFG.3= 0 °C
1 °F

RDGCNFG.765= 000 Filter constant 1
001 Filter constant 2
010 Filter constant 4
011 Filter constant 8
100 Filter constant 16
101 Filter constant 32
110 Filter constant 64
111 Filter constant 128

Example: To set RTD, 4 wire, .0392 Curve, 100m ohms. The command data is 00001001 Bin = 09HEX. Send *W0705.

Command Format (cont.)

AL1CNFG.0= 0 Disable
1 Enable

AL1CNFG.1=0 Absolute
1 Deviation

AL1CNFG.2=0 Unlatch
1 Latch

AL1CNFG.3=0 Normally Open
1 Normally Closed

AL1CNFG.54=00 Above
01 Below
10 Hi/Lo
*11 Band
*Deviation

AL1CNFG.6=0 Loop Break Alarm Disable
1 Loop Break Alarm Enable

AL1CNFG.7=0 Alarm Power On Enable
1 Alarm Power On Disable

AL2CNFG.0= 0 Disable
1 Enable

AL1CNFG.1=0 Absolute
1 Deviation

AL2CNFG.2=0 Unlatch
1 Latch

AL2CNF3.3=0 Normally Open
1 Normally Close

AL2CNFG.54=00 Above
01 Below
10 Hi/L
11 Band*
*Deviation Only

AL2CNFG.7=0 Volt Retransmission
1 Current Retransmission

Command Format (cont.)

Time Proportional: OUT1CNFG.0= 0 on/off
1 PID

Analog Proportional: OUT1CNFG.0=0 0-20mA
1 4-20mA

OUT1CNFG.1= 0 Reverse
1 Direct

OUT1CNFG.2= 0 Manual PID
1 Auto PID

OUT1CNFG.3= 0 Adaptive Enable
1 Adaptive Disable

OUT1CNFG.4= 0 Anti Wind Up Disable
1 Anti Wind Up Enable

OUT1CNFG.5= 0 Auto PID Stop
1 Auto PID Start

OUT2CN FG.0=0 on/off
1 PID

OUT2CNFG.1= 0 Reverse
1 Direct

OUT2CNFG.2= 0 Manual PID
1 Auto PID

OUT2CNFG.3= 0 Ramp Disable
1 Ramp Enable

OUT2CNFG.4= 0 Soak Disable
1 Soak Enable

OUT2CNFG.567= 000 Damping 1
001 Damping 2
010 Damping 3
011 Damping 4
100 Damping 5
101 Damping 6
110 Damping 7
111 Damping 8

Command Format (cont.)

COMM.PARAMETERS.210 =	000	300 BAUD	COMM. PARAMETERS.43 =	00	No Parity		
	001	600		01	odd		
	010	1200		10	Even		
	011	2400		11	N/A		
	100	4800					
	101	9600	COMM. PARAMETERS.5 =	0	7 Bit Data	COMM. PARAMETERS.6 =	0 1 Stop Bit
	110	19200		1	8 Bit Data		1 2 Stop Bit

BUSFORMAT.0 =	N/A	BUS FORMAT.1 =	0 No LF	BUSFORMAT.2 =	0 No Echo
			1 LF		1 Echo
BUSFORMAT.3 =	0 RS232	BUSFORMAT.4 =	0 Continues	BUSFORMAT.5 =	0 CR
	1 RS 485		1 Command		1 Space

DATAFORMAT is used for V01 command or continues mode (RS232)

DATAFORMAT .0 =	0 No Status	DATAFORMAT .1 =	0 No Reading	DATAFORMAT .2 =	0 No Peak
	1 Alarm Status		1 Reading		1 Peak
DATAFORMAT .3 =	0 No Valley	DATAFORMAT .6 =	0 No Unit	DATAFORMAT .7 =	N/A
	1 Valley		1 Unit		

ADDRESS is applicable for RS485 and can be 01 to 199

TRANSMIT TIME INTERVAL is applicable in RS232 and continues mode which specifies the time between transmission and the minimum time is 500 msec.

Command Format (cont.)

RDGOFF.0~19	= offset data	RDGOFF.20~22 =	DP+2	RDGOFF.23 =	0 positive offset 1 negative offset
RDGSC.0~18	= scale data	RDGSC.19 =	0 direct scale 1 reverse scale	RDGSC.20~23 =	DP+1

Example: to have an input of 4 to 20mA displayed as 0 to 100,
Scale = (100-0)/(9999-2000) RDGSC.0~18=1E858 RDGSC.19 = 0 (direct scale) RDGSC.20~23 = 8(DP=7)
Offset = 0-(0.125) (2000) RDGOFF.0~19=0019 RDGOFF.20~22=2(DP=0) RDGOFF.23 = 1, (Offset is negative)
Send the command as *W03A00019 (offset = A00019) and *W1481E858 (scale = 81E858)

NOTE: To communicate when the continues mode is enabled, the continues mode must be stopped by sending 13 Hex (Xof) and then send ^AE

Remote Setpoint Option

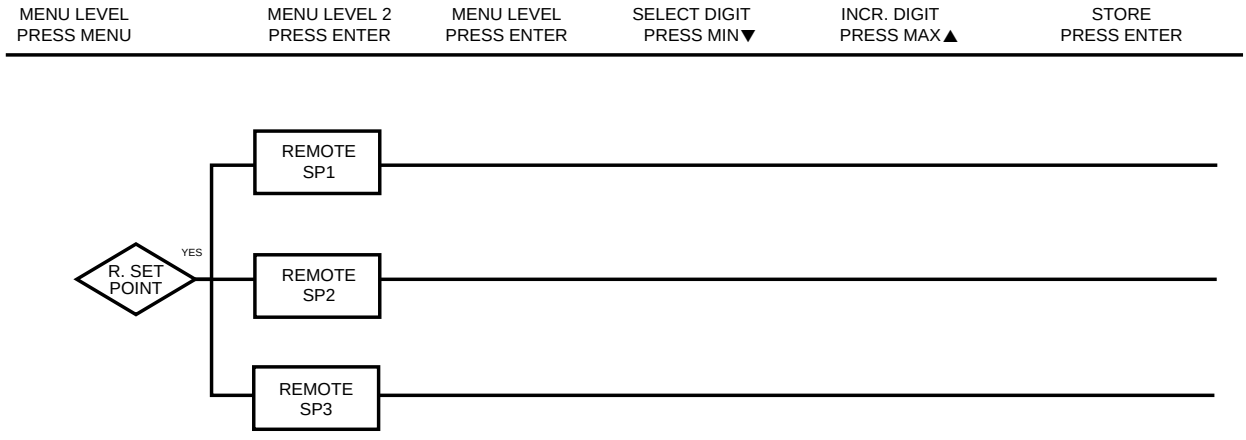


Figure 3.11 Flowchart for Remote Setpoint

Remote Setpoint Option *cont.*

Display	Action	Response
	Press MENU Press ENTER	1) Press MENU, if necessary, until the "r.SEt Pont" prompt appears. 2) Display advances to "Remote Setpoint 1" submenu.
	*Press MENU*	***IF THE REMOTE SETPOINT IS NOT INSTALLED, THE CONTROLLER WILL SHOW "NOT INSTALLED"*** *Press MENU, if you receive the "not installed" message.*
	Press ENTER Press MAX & MIN Press ENTER	**REMOTE SETPOINT 1 SUBMENU:** 3) Display flashes 1st digit of previous selection for "Remote Setpoint 1" value. 4) Enter a new "remote setpoint 1" value. 5) Display flashes "Strd" message and advances to "Remote Setpoint 2" submenu.
	Press ENTER Press MAX & MIN Press ENTER	**REMOTE SETPOINT 2 SUBMENU:** 3) Display flashes 1st digit of previous selection for "Remote Setpoint 2" value. 4) Enter a new "remote setpoint 2" value. 5) Display flashes "Strd" message and advances to "Remote Setpoint 3" submenu.

Remote Setpoint Option *cont.*

Display	Action	Response
		**REMOTE SETPOINT 3 SUBMENU:**
	Press ENTER	3) Display flashes 1st digit of previous selection for "Remote Setpoint 3" value.
	Press MAX & MIN	4) Enter a new "remote setpoint 3" value.
	Press ENTER	5) Display flashes "StrD" message and the display shows "reset" ending the *Configuration Mode*.
		**RESET:** **The controller automatically resets after the last menu of the *Configuration Mode* has been entered. After the controller resets, the controller advances to the *Run Mode (see Part 4 Operation: Run Mode).***

Note: *In order to select r.SP remotely connect Bi1 and Bi2 as follows:*

	Bi1	Bi2
r.SP.1	GND	GND
r.SP.2	GND	OPEN
r.SP.3	OPEN	GND
Set Point 1	OPEN	OPEN

part 4

SPECIFICATIONS

SPECIFICATIONS

Accuracy: ±0.5°C temp; 0.03% rdg. process
Resolution: 1°/0.1°; 10 µV process
Temperature Stability: 0.08°C/°C; 50 ppm/°C process
Thermocouple Cold End Tracking: 0.05°C/°C
NMRR: 60 dB
CMRR: 120 dB
Common Mode Voltage: 2500 V peak test for 1 min. per IEC spacing
A/D Conversion: Dual slope
Reading Rate: 3 samples per second
Digital Filter: Programmable
Display: Dual 4-digit, 7-segment LED, 9.2 mm (0.36"); red process variable, green setpoint; indicators for output and alarm status; 7.6 mm (0.3") for NEMA 12 units
Warmup to Rated Accuracy: 30 min

INPUT

Input Types: Thermocouple, RTD, analog voltage, analog current
Thermocouple Lead Resistance: 100 Ω max
RTD Input: 100/500/1000Ω 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
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 or 0.01
Span Adjustment: 0.001 to 9999 counts
Offset Adjustment: -999 to +9999

CONTROL

Action: Reverse (heat) or direct (cool)
Modes: Time proportioning and proportional control modes; selectable preset tune, adaptive tune, auto-tune, PID, proportional, proportional with integral, proportional with derivative with anti-reset windup, on-off
Rate: 0 to 999.9 sec
Reset: 0 to 99 min 59 sec
Cycle Time: 1 to 199 seconds; set to 0 for on/off operation
Gain: 0.5 to 100% of span; setpoints 1 or 2
Damping: 0000 to 0008
Soak: 00.00 to 99.59(HH:MM), or off
Ramp to Setpoint: 00.00 to 99.59(HH:MM), or off
Autotune: Operator initiated from front panel
Break Protection: Programmable up- or down-scale

SPECIFICATIONS

CONTROL OUTPUT:

Relay: 5 A @ 120 Vac, 3 A @ 240 Vac; configurable for on/off, PID or ramp and soak

Output 1: SPDT type

Output 2: SPST type

SSR: Rated 1 A @ 120/240 Vac, continuous

DC Pulse: non-isolated; 10 Vdc @ 20 mA

Analog Output: 0 to 10 Vdc or 0 to 20 mA; 500 Ω max

OPTIONS:

Remote Setpoint Selection: Up to 3 setpoints stored in memory; contact closure selection

COMMUNICATIONS:

RS-232 or RS-485: 300 to 19.2k baud; complete programmable setup capability; program to transmit current display, alarm status, min/max, actual measured input value and status

RS-485: Addressable from 0 to 199

Connection: Screw terminals

ALARM 2

Type: SPST relay, 3 A @ 120 Vac, 3 A @ 240 Vac

Operation: High/low, latching/ non-latching, and process/deviation; front panel configurations

ANALOG OUTPUT: Isolated 0 to 10 Vdc or 0 to 20 mA, programmable

INSULATION:

Power to Input or Output: 2500V ac or dc.
Except for Alarm 2 option that has only 1500Vac or dc.
Between inputs 500Vac or dc.
Approvals:
UL ISCE E136081
CE per EN50081-1, EN50082-1, EN61010-1

GENERAL

Power: 90 to 240 Vac/dc, 50 to 400 Hz; 10 to 34 Vac/dc power optional
Environmental Condition: 0 to 55°C (32 to 131°F), 90% RH non-condensing
Installation Category: II per IEC1010
Equipment Class: I per IEC1010
Polution Degree: 2 per IEC1010
Power Consumption: 5 VA max @ 120 Vac
ICN77300 Series: 48 H x 48 W x 123.3 mm D (1.89" x 1.89" x 4.85");
ICN77500 Series: 53 H x 53 W x 123.3 mm D (2.1" x 2.1" x 4.85");
Panel Cutout: 45 mm (1.777") square, ⅛ DIN
ICN77R300 Series: 48 H x 48 W x 135 mm D (1.89" x 1.89" x 5.32");
ICN77R500 Series: 53 H x 53 W x 135 mm D (2.1" x 2.1" x 5.32");
Panel Cutout: 44.5 mm (1.75") dia round
Weight: 227 g (0.5 lb)

part 4

SPECIFICATIONS

	Input Type	Range	Accuracy*
J	Iron-Constantan	-210 to 760°C -346 to 1400°F	0.4°C 0.7°F
K	CHROMEGA®-ALOMEGA®	-270 to -160°C -160 to 1372°C -454 to -256°F -256 to 2502°F	1.0°C 0.4°C 1.8°F 0.7°F
T	Copper-Constantan	-270 to -190°C -190 to 400°C -454 to -310°F -310 to 752°F	1.0°C 0.4°C 1.8°F 0.7°F
E	CHROMEGA-Constantan	-270 to -220°C -220 to 1000°C -454 to -364°F -364 to 1832°F	1.0°C 0.4°C 1.8°F 0.7°F
R	Pt/13%Rh-Pt	-50 to 40°C 40 to 1788°C -58 to 104°F 104 to 3250°F	1.0°C 0.5°C 1.8°F 0.9°F
S	Pt/10%Rh-Pt	-50 to 100°C 100 to 1768°C -58 to 212°F 212 to 3214°F	1.0°C 0.5°C 1.8°F 0.9°F
B	30%Rh-Pt/6%Rh-Pt	200 to 640°C 640 to 1820°C 212 to 1184°F 1184 to 3308°F	1.0°C 0.5°C 1.8°F 0.9°F

	Input Type	Range	Accuracy*
C	5%Re-W/26%Re-W	0-2354°C 32-4253°F	0.4°C 0.7°F
N	Nicrosil-Nisil	-250 to -100°C -100 to 1300°C -418 to -148°F -148 to 2372°F	1.0°C 0.4°C 1.8°F 0.7°F
L	J DIN	-200 to 900°C -328 to 1652°F	0.4°C 0.7°F
RTD	Pt, 0.00385, 100Ω, 500Ω, 1000Ω	200 to 900°C -328 to 1652°F	0.4°C 0.7°F
RTD	Pt, 0.00392, 100Ω, 500Ω, 1000Ω	-200 to 850°C -328 to 1562°F	0.4°C 0.7°F

PROCESS

Voltage	0 to 100mV,0 to 1V,	0.03% rdg
	0 to 10Vdc	0.03% rdg
Current	0 to 20mA, 4 to 20 mA	0.03% rdg

Warranty

NEWPORT ELECTRONICS, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. NEWPORT Warranty adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that NEWPORT's customers receive maximum coverage on each product..

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. However, 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 or which are damaged by misuse are not warranted. These include contact points, fuses, and triacs.

In addition to our standard warranty period, NEWPORT ELECTRONICS will extend the warranty period for one (1) additional year only if the warranty card enclosed with each instrument is returned to NEWPORT.

Newport is glad to offer suggestions on the use of its various products. Nevertheless, 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.

Every precaution for accuracy has been taken in the preparation of this manual; however, NEWPORT neither assumes responsibility for any omissions or errors that may appear nor assumes liability for any damages that result from the use of the products in accordance with the information contained in the manual.

SPECIAL CONDITIONS: Should this equipment be used in any nuclear installation or activity, purchaser will indemnify NEWPORT and hold NEWPORT harmless from any liability or damage whatsoever arising out of the use of the equipment in such a manner.

Return Requests

Direct all warranty and repair request/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. NEWPORT's warranty does not apply to defects resulting from action of the purchaser, mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification.

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.

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