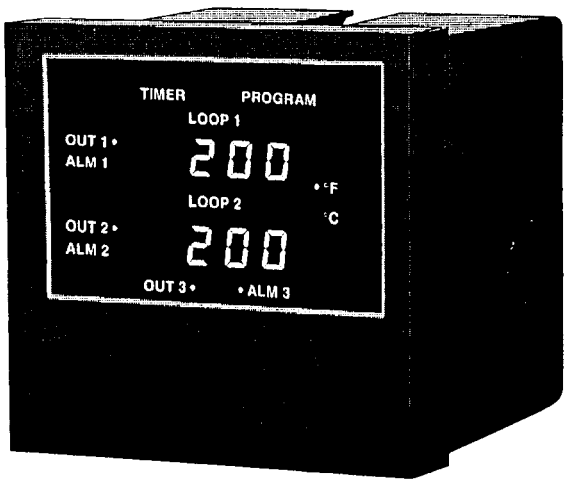
CN3240

Temperature Controller



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Operator's Manual

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Sections

Illustrations

Section 1
Getting Started

The CN3240 temperature controller is a sophisticated dual loop, PID/Overtemp or PID/PID controller, that gives you the flexibility and power of two microprocessor-based controllers in one compact 1/4 DIN package. Using Surface Mount Technology (SMT) and a rugged extruded aluminum housing, the CN3240 provides quality construction and electronic reliability.

Applications

Each of the two independent control loops may be field programmed:

Loop #1	Loop #2
Temperature	Temperature
Temperature	Overtemperature
Alarm/Overtemp	Alarm/Overtemp

The control outputs may be field selected as SSR drive or relay. When used as alarms, the outputs may be programmed as energized, de-energized, latching or non-latching.

Two discrete sensor inputs, one per loop, can be field programmed as J or K thermocouple, or RTD. The control outputs are 5 amp relays, field changeable to solid state relay (SSR) drive. The relay output can be used to directly drive small heater loads up to 500 watts without the use of an external contactor. The output type for each loop is field selectable as ON/OFF or PID. These features, coupled with Timer and Event input capabilities, plus Digital Communications, make the CN3240 extremely versatile and capable.

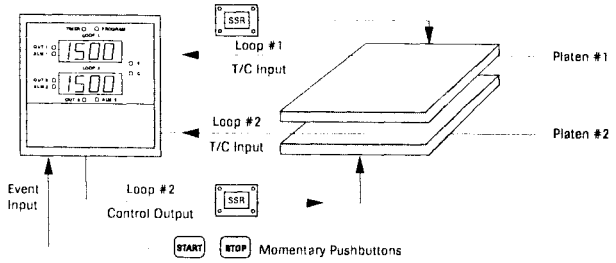
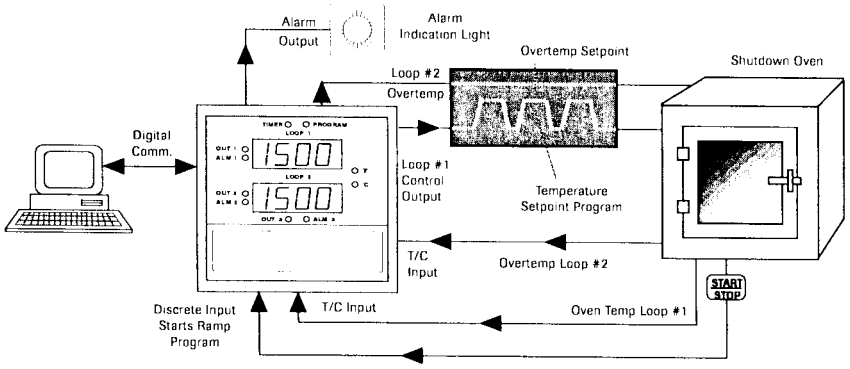


Figure 1.1
2-Loop Platen
Application

Figure 1.2 Oven Application



Input Type	Range	Accuracy
J Iron-Constantan	-73 to 650°C -100 to 1400°F	±0.14% + 1 digit
K CHROMEGA® ALOMEGA®	-73 to 1149°C -100 to 2100°F	±0.14% + 1 digit
RTD 100 ohm Pt	-129 to 538°C -200 to 1000°F	±2°F ±2°F

To Order (Specify Model Number)	
Model Number	**Description**
CN3240	Dual loop, dual field selectable relay/dc pulse outputs, one auxiliary relay output #3

Options	
Ordering Suffix	**Description**
-4	Isolated RS232C/RS422/RS485 digital communications

Accessories	
Model Number	**Description**
CN3200-FRONT	Splash Cover
CN3200-SOFT	Software for communications option

Unpacking Instructions

Remove the Packing List and verify that you have received all equipment, including the following (quantities in parentheses):

- OMEGA® CN3240 Temperature Controller (1)
- Operator's Manual (1)

If you have any questions about the shipment, please call the OMEGA Customer Service Department.

When you receive the shipment, inspect the container and equipment for signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

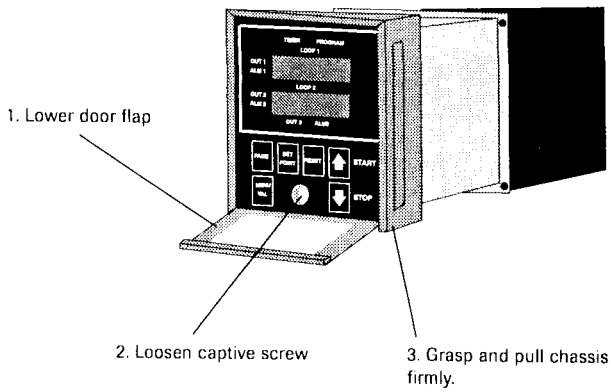
Note: The carrier will not honor damage claims unless all shipping material is saved for inspection. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

Removing the CN3240 from the Instrument Case

The CN3240 instrument chassis can be removed from its case either before or after mounting and wiring. Some applications require internal jumper changes, making it necessary to remove the controller chassis from the case.

To remove the chassis, lower the front door flap and loosen the screw. Pull the chassis out from the case to expose the controller circuit cards. See Figure 2.1 below.

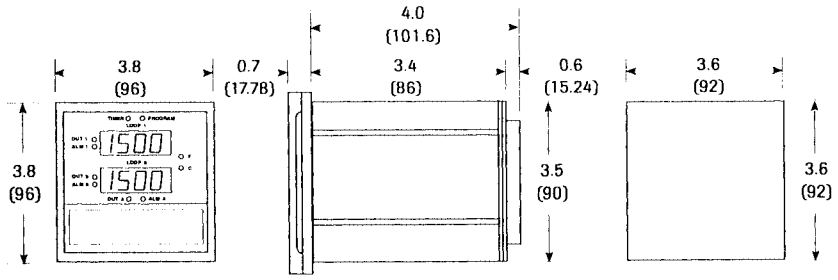
Figure 2.1
Removing the CN3240 from the Instrument Case



Mounting

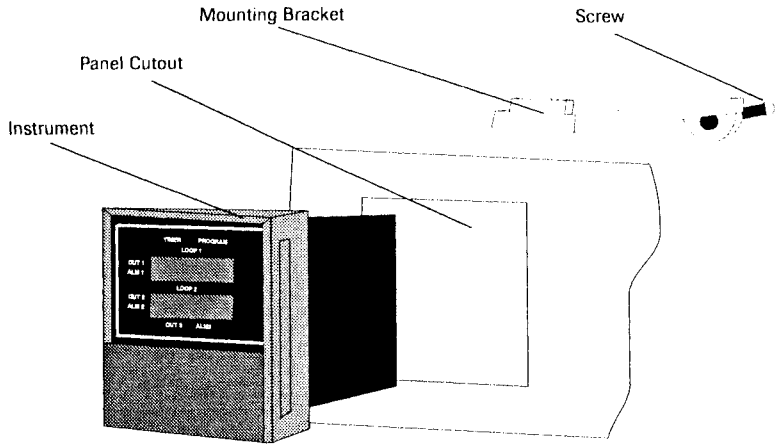
Figure 2.2 shows the mounting dimensions for the controller. Cut out the square "panel cutout" mounting hole and install the unit as shown in Figure 2.3. Loosen the screw at the rear of the mounting bracket and slide the bracket off of the controller. Place the controller through the square panel cutout and replace the mounting bracket. Tighten the screws to secure the controller firmly against the mounting surface.

Figure 2.2 Mounting Dimensions



Measurements are shown in inches. Millimeters are shown in parentheses.

Figure 2.3 Mounting Diagram



Good Wiring Practices

1. When planning the system wiring, be sure to consider the importance of separating wiring into functionally similar bundles - i.e. power leads, sensor leads, output signal lines, etc. If the power leads and sensor leads must cross, they should cross at a 90° angle to each other (perpendicular).

2. Locate all sources of noise in your system - motors, contacts, solenoids, etc. When driving a contactor coil or other inductive load, an appropriately rated AC. snubber circuit is recommended (OMEGA P/N 1821-101), as described on page 9, "Relay Output Wiring." Design the control system such that wiring is separated as far as possible from these noise sources.

3. For sensor wiring practices, see Sensor Wiring Notes, next page.

4. Additional information on good wiring practices is available from IEEE, 345 East 47th St., NY, NY 10017. Request IEEE Standard No. 518-1982.

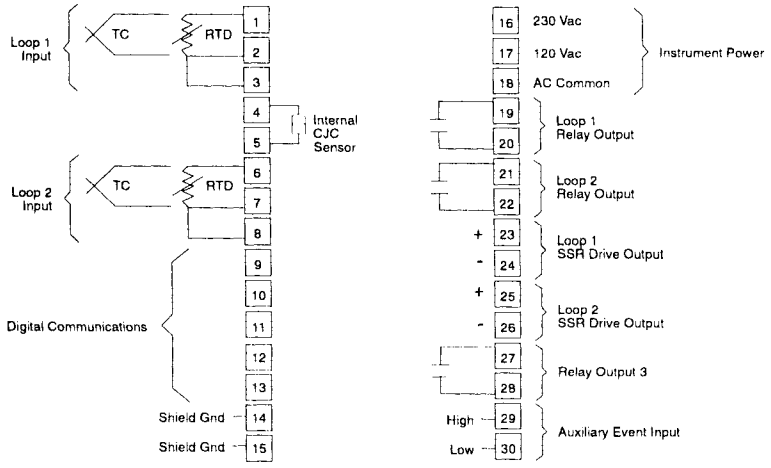
Wiring Instructions

Make all electrical wiring connections to the back of the controller before power is applied to the unit.

All wiring must comply with local codes, regulations and ordinances. This instrument is intended for panel mounting and the terminals must be enclosed within a panel. Use National Electric Code (NEC) Class 1 wiring for all terminals except the sensor terminals.

Check the wiring decal on the side of the unit to verify the model number. The wiring decal shows the wiring terminations. All wires will be connected to the terminals on the back of the instrument case. Specific wiring instructions for different input and output types are given in this section.

Figure 2.4 Wiring Terminal Identification



Sensor Input Wiring

Sensor Input Wiring Notes:

- Sensor leads (thermocouple and RTD) should not be run together in the same conduit as power wiring.
- Twisted pair shielded wire is recommended for sensor connections.
- False process readings can occur if the sensor wire is exposed to electrical noise.
- Ungrounded thermocouples are recommended. If grounded thermocouples are used, the grounds must be at the same potential.
- If thermocouple extension wire is required, it must be the same type as the thermocouple (i.e. if a Type K thermocouple is used, then Type K extension wire must be used).
- Thermocouple wires should connect directly to the controller terminals. Do not use copper crimp terminals or solder terminals to make connections.
- If shielded thermocouple wire is used, the shield must be grounded at one end only, preferably at the shield ground terminal on the controller, as shown in Figure 2.5.
- Three wire RTDs are recommended for greatest accuracy.
- Standard shielded copper wire is recommended for RTD extensions.

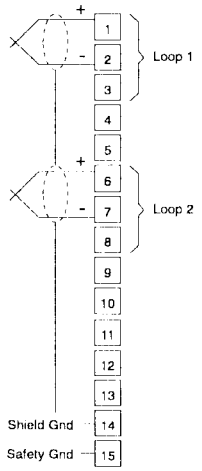
Thermocouple Inputs

It is important to observe polarity (+, -) when connecting thermocouple leadwires. The table below shows ANSI color coding for the thermocouples used with this instrument.

T/C Type	Material	Polarity (+)	Polarity (-)
J	Iron/Constantan	White	Red
K	Chromega/Alomega	Yellow	Red

Make the thermocouple wiring connections to terminals as shown in Figure 2.5.

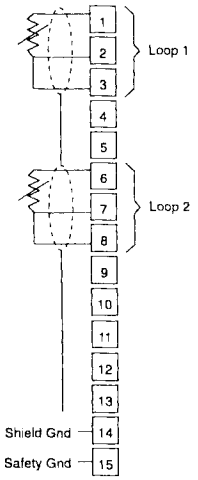
Figure 2.5
Thermocouple
Connections



3-Wire RTD Inputs

When making the 3-wire RTD input connection, it is important to make the resistance of all three extension leadwires equal by using the same gauge and same length of wire for optimum leadwire compensation. OMEGA recommends 3-wire RTDs for greatest accuracy, and standard shielded copper wire for RTD extensions. Make 3-wire RTD connections to terminals 1, 2 and 3 as shown in Figure 2.6 on the following page.

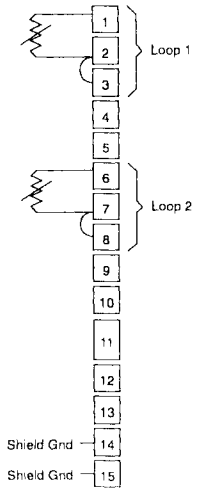
Figure 2.6
3-Wire RTD
Connections



2-Wire RTD Inputs

If using a 2-wire RTD input, use heavier gauge leadwires to reduce leadwire resistance. Any leadwire resistance adds directly to sensor resistance, thus adding error to the process temperature measurement. It is also necessary to jumper terminals 2 and 3 (Loop 1) and terminals 7 and 8 (Loop 2) on the instrument to complete a 2-wire hookup.

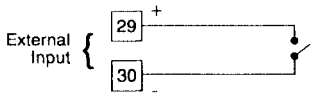
Figure 2.7
2-Wire
Connections



Event Input Connections

The event input can be used to execute a set point change or to interface the timing function with the controller's ramp/soak capability. This input can be setup as a contact closure or a momentary switch input. For momentary operation a momentary contact closure of at least 100 milliseconds, or a semiconductor switching device capable of sinking 1 mA at 0.8 Vdc max. may be connected to terminals 29 and 30 to actuate the event input. Use isolated switches only. Do not tie the Event Input Terminals to ground.

Figure 2.8
Event Input
Connections



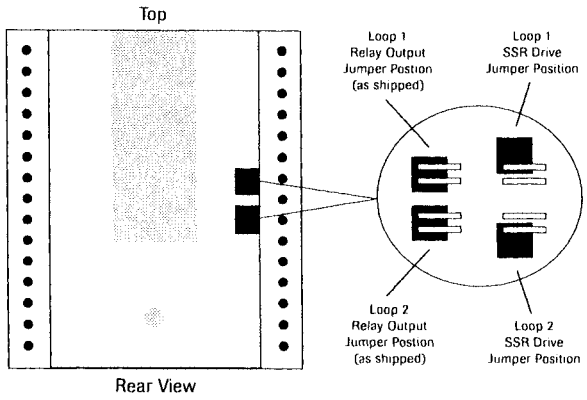
Output Wiring

Each of the two control loops has a 5 Amp relay output, which may be changed to a solid state relay (SSR) drive output by moving an internal jumper. The cycle time is set for 30 seconds (recommended for relay outputs). For SSR drive output, a cycle time of 1 second will result in more precise control. See PAGEs 2-3/MENU 7 for cycle time settings.

Relay or Solid State Relay Drive Jumper Selection

When shipped from the factory, the CN3240 is configured for relay output(s). To change the output type to solid state relay drive, internal jumpers must be moved (one jumper for each output, Loop 1 and Loop 2). To locate the output jumpers, remove the CN3240 instrument chassis from the instrument case as shown in Figure 2.1, page 3. The two jumpers are located on the right circuit board (facing the rear of the controller) as shown on the following page.

Figure 2.9
Output
Jumpers

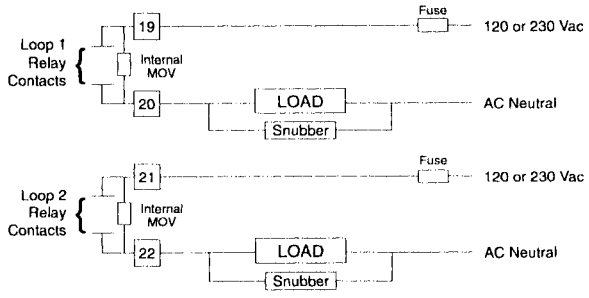


To change the output from relay to solid state relay drive, remove the jumper. It is recommended that you *replace the jumper on one pin only*, to retain it for future use if needed.

Relay Output Connections

A relay output is generally used to drive small resistive loads (< 5 amps) or a contactor. Even though the CN3240 relays have internal surge suppression (MOV), when driving a contactor coil or other inductive load, we recommend that you install an appropriately rated AC. snubber circuit (OMEGA P/N 1821-101) in parallel with the contactor coil to protect the controller from electrical noise.

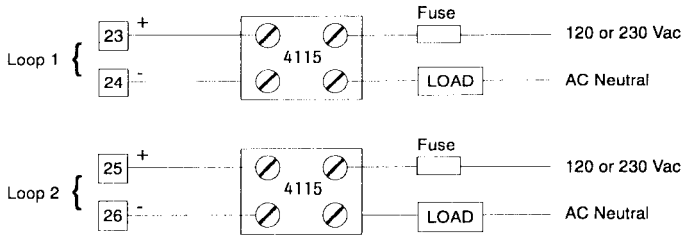
Figure 2.10
Relay Output
Connections



Solid State Relay Drive Connections

The solid state relay drive output drives solid state relays, such as the OMEGA SSR240DC10 power modules, which accept 3 to 32 Vdc input ON signals and 0 Vdc OFF signals. See Figure 2.11 for solid state relay drive output connections.

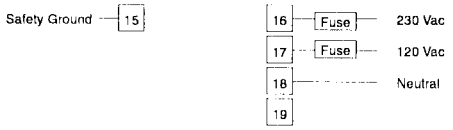
Figure 2.11
Solid State Relay Output Connections



Instrument Power Wiring

Make 120 Vac or 230 Vac instrument power connections to terminals 16-18 as shown in Figure 2.12.

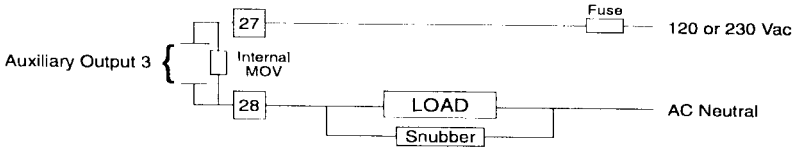
Figure 2.12
Instrument Power Connections



Alarm Outputs

The auxiliary alarm (output #3) relay is connected as shown in Figure 2.13.

Figure 2.13
Auxiliary Alarm Output



Notes:

Section 3
Operation

Pushbuttons and Indications

All of the program control steps and configuration entries are easily accomplished with the front panel pushbuttons. The digital displays and status lights provide a constant overview of the process. Figure 3.1 summarizes the functions of the pushbuttons and displays.

Normal Display Mode

At power-up, and for typical control operation, both process temperatures are displayed; Loop #1 process temperature in the upper display and Loop #2 process temperature in the lower display. The lower display can be programmed to display other values (see PAGE 1/MENU 20).

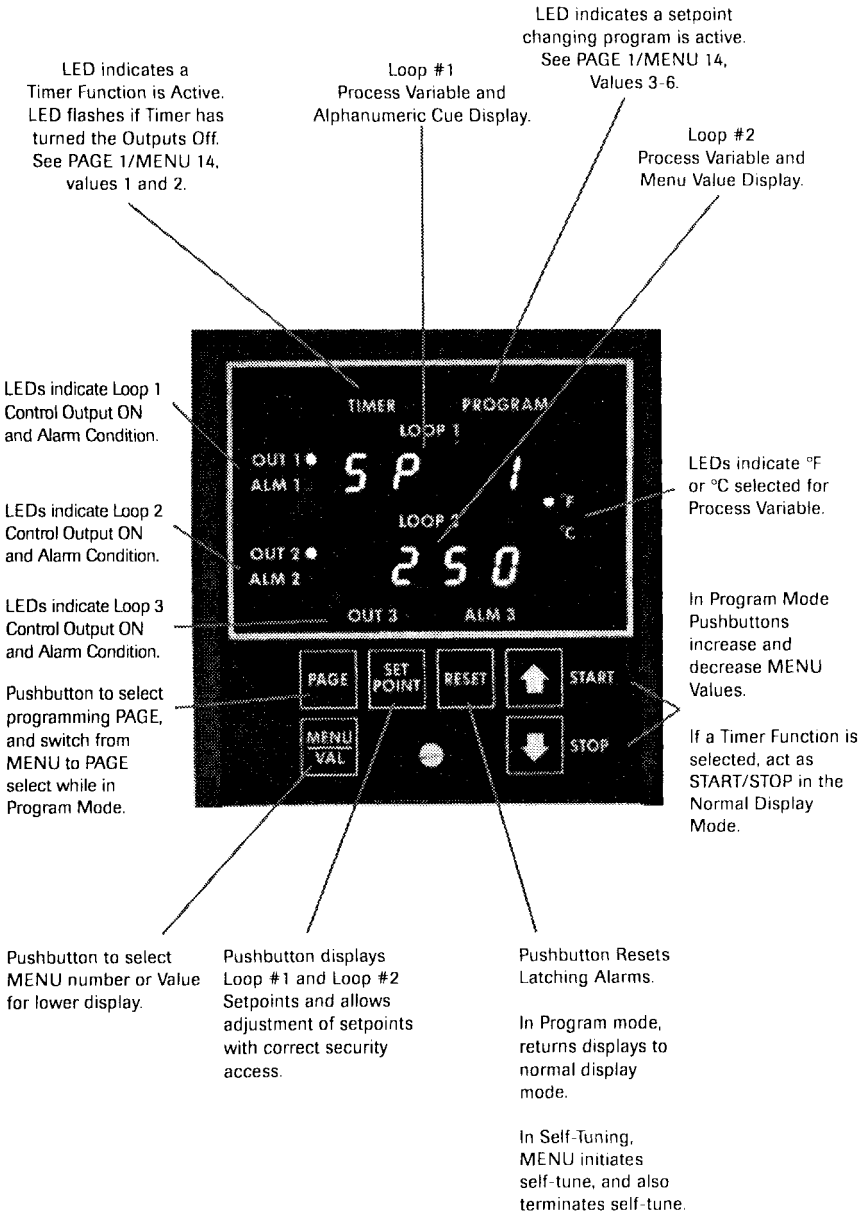
If a timer function has been selected, the ▲ and ▼ pushbuttons act as "START" and "STOP" pushbuttons and the RESET pushbutton acknowledges a latching alarm.

Setpoint Mode

To allow quick access to the setpoints for both Loops 1 and 2, the SETPOINT pushbutton is used to enter the setpoint mode. When first pressed, Loop 1 setpoint is displayed. When pressed again, Loop 2 setpoint is displayed. To return to the Normal Display Mode, the SETPOINT pushbutton should be pressed again, or RESET may be pressed to return to Normal Display.

The setpoints may be adjusted (when displayed) if correct security access is established.

Figure 3.1
Front Panel
Identification



PAGE/MENU Programming

All control parameters, selections and calibration procedures for the CN3240 are accomplished through simple MENU selections. These MENU selections are organized into PAGES. On each PAGE you will find a specific set of related functions, and each of these functions has a corresponding MENU number.

This organization allows you to go directly to the parameter to be adjusted, without stepping through a long series of unrelated entries. Figure 3.2 illustrates the concept behind the PAGE/MENU structure.

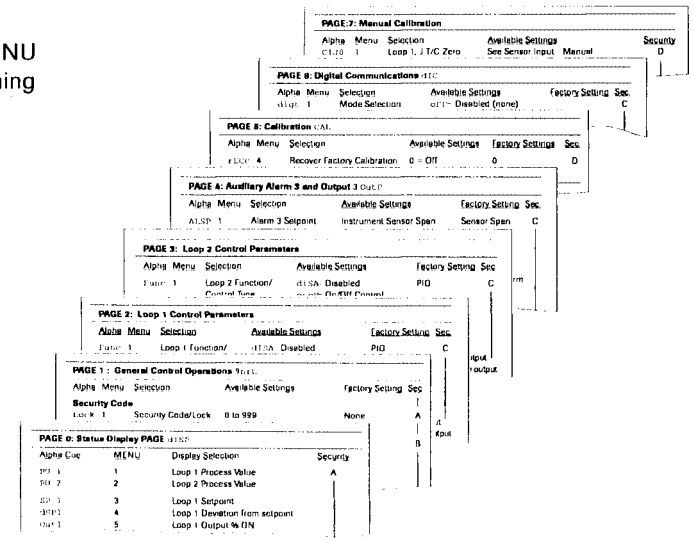


Figure 3.2
PAGE/MENU
Programming
Structure

Figure 3.3 PAGE/MENU Contents

PAGE	PAGE Name	PAGE Contents
0	Status Display	Allows you to monitor any of 15 real time variables in the lower digital display: set point; process temperatures; outputs; timers and alarm status. This is useful during troubleshooting or brief trending periods. Values on this page are for display only and cannot be changed on this PAGE.
1	General Operations	Security Code Set Points (Loops 1 and 2) Idle Set Point (Loops 1 and 2) Alarm Parameters (Loops 1 and 2) Timer/External Input Functions Lower Display Selection
2	Loop 1 Control Parameters	Control Mode PID and On/Off Control Parameters Set Point Limits Out-of-Range Responses Offset of Process Variable Self-Tuning
3	Loop 2 Control Parameters	Same as Loop 1 parameters above
4	Auxiliary Alarm and Output #3	Set Point (Auxiliary) Process Source for Output #3 Alarm Type / Parameters for Output #3
5	Sensor Setup Calibration	Scale (°F or °C) Sensor Type CJC and Quickstep Calibration
6	Digital Communications	Operation Mode Baud Rate Controller Address
7	Manual Calibration	Manual Calibration

Figure 3.4
Sample of
PAGE/MENU
Table

PAGE 3: Loop 2 Control Parameters

Alpha	Menu	Selection	Description and Available Settings
Func	1	Loop 2 Function/ Control Type	dISA = Disabled onoF = On/Off Control Pid = PID Control ALAr = Alarm
For ON/OFF Control:		Setup MENU 8-14	
For PID Control:		Setup MENU 2-8, 10-15	
For ALARM:		Setup PAGE 1/MENU 10-13 for Loop 2 using Output #2 as an alarm output, P3/M2-13 not active.	
oFSt	2	Manual Reset (Offset)	Only active if P2/M4 = 0 -99.9 to 99.9%
Pb	3	Proportional Band	0.1 to 999.9%
Ar	4	Automatic Reset	0.00 to 99.99 repeats/min.
rAtE	5	Rate	0 to 500 seconds
outL	6	Output Limit	0 to 100%
cYcL	7	Cycle Time	0.1 to 60.0 seconds
dr	8	Control Action	d = direct (cooling) r = reverse (heating)
db	9	Deadband	1 to 99°F
SPUL	10	Setpoint Upper Limit	Sensor Span Limits, P1/M3 and 5
SPLL	11	Setpoint Lower Limit	Sensor Span Limits, P1/M3 and 5

Security Levels

Every parameter or selection in the CN3240 controller has an identifying PAGE/MENU number. Each PAGE/MENU number is assigned one of four Security Levels, A-D. In each level you may *view* certain PAGE/MENU numbers, and *adjust* certain PAGE/MENU numbers. This allows you to set the Security level that is appropriate for your operating environment, prohibiting unauthorized access to or accidental changing of control parameters.

Entering the Security Code

The Security Code is entered in **PAGE 1/MENU 1** to determine which PAGE/MENUs may be viewed and which may be adjusted.

The controller is set at Security Level A (no code necessary) when you receive it from OMEGA.

Figure 3.5, on the following page, defines the Security Levels, showing which PAGE/MENUs may be adjusted in each of the levels.

Figure 3.5
Security Levels and PAGE/MENU Contents

Level	Code	Allows Adjustment of:	PAGE/MENU
A	- - -	Status Display (View only)	P0 / M1-20
		Security Code	P1 / M1
B	123	Security Level A settings, plus...	
		Process Set Points, Loops 1 & 2	P1 / M2-3
		Idle Set Points	P1 / M4-5
C	458	Security Levels A and B settings, plus...	
		Alarm Types	P1 / M6-13
		Timer / Event Input Functions	P1 / M14-18
		Guaranteed Soak Differential	P1 / M19
		Lower Digital Display Selection	P1 / M20
		Loop 1 Control Type	P2 / M1
		Loop 1 Manual Reset	P2 / M2
		Loop 1 PID Control Parameters	P2 / M3-5
		Loop 1 Output Limit	P2 / M6
		Loop 1 Cycle Time	P2 / M7
		Loop 1 Control Action	P2 / M8
		Loop 1 Deadband	P2 / M9
		Loop 2 (same parameters and MENUs as shown above for Loop 1, except PAGE 3)	
		Output 3/Alarm Parameters	P4 / M1-6
		Scale °F or °C	P5 / M1
		Sensor Types	P5 / M2-3
		Digital Communications	P6 / M1-3
D	736	Security Levels, A, B, and C settings, plus....	
		Loop 1 Set Point Limits	P2 / M10-11
		Loop 1 Out-of-Range	P2 / M12-13
		Loop 1 Calibration Offset	P2 / M14
		Loop 1 Self-Tuning	P2 / M15
		Loop 2 (same parameters and MENUs as shown above except PAGE 3)	
		Factory Calibration Recovery	P5 / M6
		Quickstep Sensor Calibration	P5 / M7-9
		CJC Calibration	P5 / M5,6,10
		Manual Calibration	P7 / M15

Figure 3.6 lists the Security Codes for each of the four Security Levels, along with the levels that may be viewed and adjusted.

Figure 3.6
Security Codes & View/Adjust Levels

Security Level	Security Code	View Level	Adjust Level
A	- - -	A, B	A
B	123	A, B, C	A, B
C	458	A, B, C	A, B, C
D	736	A, B, C, D	A, B, C, D

Any other number (code) entered at PAGE 1/MENU 1 will lock out adjustment of all PAGE/MENU values.

Section 4
PAGE/MENU Tables

This section contains detailed information for PAGE 0 through PAGE 3.
PAGE 0 - Status Display PAGE
PAGE 1 - General Control Operations
PAGE 2 - Loop 1 Control Parameters
PAGE 3 - Loop 2 Control Parameters
PAGE 5 - Sensor Setup

Programming PAGEs specific to certain functions are located in the section of this manual that addresses the function.

Section	Topic	Programming PAGEs
5	Auxiliary Alarm & Output #3	4
6	Timer and Event Input	1
7	Digital Communications	6
8	Sensor Setup and Calibration	5, 7

PAGE 0: Status Display PAGE diSP

Alpha Cue	MENU	Display Selection	Security
PU1	1	Loop 1 Process Value	A
PU2	2	Loop 2 Process Value	
SP1	3	Loop 1 Setpoint	
dSP1	4	Loop 1 Deviation from setpoint	
Out1	5	Loop 1 Output % ON	
AlR1	6	Alarm 1 Status 0 = Off 1 = On	
SP2	7	Loop 2 Setpoint	
dSP2	8	Loop 2 Deviation from setpoint	
Out2	9	Loop 2 Output % ON	
ALR2	10	Alarm 2 Status 0 = Off 1 = On	
Out3	11	Output 3 Status % ON	
ALR3	12	Alarm 3 Status 0 = Off 1 = On	
tStA	13	Timer Status diSA = Disabled COFF = Control Off rPA = Ramp to Run Setpoint rPI = Ramp to Idle Setpoint SoA = Soak at Run Setpoint SoI = Soak at Idle Setpoint	
Actt	14	Time Remaining in Active Timer	
CJCt	15	Cold Junction Terminal Temp.	

All Parameters on PAGE 0 are real time values and not adjustable.

PAGE 1 : General Control Operations 9nrL

Alpha	Menu	Selection	Description and Available Settings
Security Code			
LocK	1	Security Code/Lock	0 to 999 See Section 3 for details. Appropriate Security Code must be set to change any parameter.
Run Setpoints			
SP 1	2	Loop 1 Run Setpoint	Instrument Sensor Range
SP 2	3	Loop 2 Run Setpoint	Instrument Sensor Range
Idle Setpoints: Only used if PAGE 1/MENU 14 values 3-6 are selected.			
ISP1	4	Loop 1 Idle Setpoint	Instrument Sensor Range
ISP2	5	Loop 2 Idle Setpoint	Instrument Sensor Range
Alarms			
Alarms can be assigned to their matching control loops output, for example, Alarm 1 can activate Loop #1 Output if the Loop #1 function is set up as an Alarm (only) at PAGE 2/ MENU 1. Likewise, Alarm 2 can activate Loop 2 output if the Loop #2 function is set up as Alarm (only) at PAGE 3/MENU 1. Alarms 1 and 2 can also be assigned to activate Output #3, as described in Section 5 of this manual. The ALM 1 and ALM 2 LEDs will indicate if ALM 1 or ALM 2 condition exists, even if these alarms are not assigned an output.			
ALt1	6	Alarm 1 Type	Hi = High Lo = Low PdE = + Deviation -dE = - Deviation dE = +/- Deviation
Alarm 1 Relay (MENU 7) is active only when PAGE 2/MENU 1 = AlAr			
rL41	7	Alarm 1 Relay Action	ndE = Normally de-energized, ndE non-latching nE = Normally energized, nE non-latching ndEL = Normally de-energized, latching nEL = Normally energized, latching
ASP1	8	Alarm 1 Setpoint or Deviation Setpoint	Loop 1 Sensor Range
inh1	9	Alarm 1 Inhibit at Power-Up	oFF = Off on = On
At2	10	Alarm 2 Type	Hi = High Lo = Low PdE = + Deviation -dE = - Deviation dE = +/- Deviation
Alarm 2 Relay (MENU 11) is active only when PAGE 3/MENU 1 = Al Ar			
rL42	11	Alarm 2 Relay Action	ndE = Normally de-energized, non-latching nE = Normally energized, non-latching ndEL = Normally de-energized nEL = Normally energized nEL latching
ASP2	12	Alarm 2 Setpoint or Deviation	Loop 2 Sensor Range
inh2	13	Alarm 2 Inhibit at Power Up	oFF = Off on = On

PAGE 1 : General Control Operations (continued)

Alpha	Menu	Selection	Description and Available Settings
Timer Functions: Read "Timer and External Input Functions" in Section 6 before attempting to adjust menus.			
tFun	14	Timer / External Input Functions	0 = Disabled 1 = On delay timer 2 = Off delay timer 3 = Change setpoint on remote contact input 4 = Change setpoint on momentary switch or CN3240 START/STOP Pushbuttons 5 = Ramp/Soak on remote contact input 6 = Ramp/Soak on momentary switch or CN3240 START/STOP Pushbuttons
drtr	15	Delay or Ramp to Run Timer	0.00 to 50.00 (hr..minutes) P1 M21 = 0 0.0 to 300.0 (hours) P1 M21 = 1 0 to 3000 (hours) P1 M21 = 2
Srtr	16	Soak at Run Timer	0.00 to 99.59 (hr..minutes) P1 M21 = 0 0.0 to 999.9 (hours) P1 M21 = 1 0 to 9999 (hours) P1 M21 = 2
rltr	17	Ramp to Idle Timer	0.00 to 50.00 (hr..minutes) P1 M21 = 0 0.0 to 300.0 (hours) P1 M21 = 1 0 to 3000 (hours) P1 M21 = 2
Sltr	18	Soak at Idle SP Timer	0.00 to 99.59 (hr..minutes) P1 M21 = 0 0.0 to 999.9 (hours) P1 M21 = 1 0 to 9999 (hours) P1 M21 = 2
95db	19	Guaranteed Soak Differential	0.00 to 99.99% of sensor span 0.00
Lower Display Selection			
LdSP	20	Lower Display Selection	L2PV = Loop 2 Process Value L1SP = Loop 1 Setpoint L2SP = Loop 2 Setpoint L2AL = Loop 2 Alarm Setpoint
tUnt	21	Timer Unit selection	Timer units selected in this Menu determine available timer settings for MENUs 15, 16, 17 and 18 (above). 0 = HR. MN 1 = 000.0 hours 2 = 0000 hours

PAGE 2: Loop 1 Control Parameters

Alpha	Menu	Selection	Description and Available Settings
Func	1	Loop 1 Function/ Control Type	dISA = Disabled OnOF = On/Off Control Pid = PID Control AlAr = Alarm

For ON/OFF Control: Setup MENU 8-14
For PID Control: Setup MENU 2-8, 10-15
For ALARM: Setup PAGE 1/MENU 6-9 for Loop 1 using Output #1 as an alarm output, P2/M2-13 not active.

oFSt	2	Manual Reset (Offset)	Only active if P2/M4 = 0 -99.9 to 99.9% 0.0
Pb	3	Proportional Band	0.1 to 999.9%
Ar	4	Automatic Reset	0.00 to 99.99 repeats/min.
rAtE	5	Rate	0 to 500 seconds
outL	6	Output Limit	0 to 100%
cYcL	7	Cycle Time	0.1 to 60.0 seconds
dr	8	Control Action	d = direct (cooling) r = reverse (heating)
db	9	Deadband	1 to 99°F
SPUL	10	Setpoint Upper Limit	Sensor Span Limits, P1, M2 and 4
SPLL	11	Setpoint Lower Limit	Sensor Span Limits, P1, M2 and 4
orco	12	Sensor Out-of-Range	If sensor reading is out of range, high or low, this Menu enables which condition will turn on the control output set in P2/M13. If disabled, the control output will be 0%. For ON/OFF control, output will be 100% for "enabled" out-of-range conditions. dHL = Disabled High/Low dHi = Disabled High/Low Enabled dLo = Disabled Low/High Enabled EnHL = Enabled High/Low
orPL	13	Control Output for Out-of-Range	0 to 100%

PAGE 2: Loop 1 Control Parameters (continued)

COFF	14	Calibration Offset	Sensor Span
Alpha	Menu	Selection	Description and Available Settings
tunE	15	Self-Tuning	This MENU initiates self-tuning and selects the self-tuning mode. Standard (Std) is used for most processes. Use Slow (Slo) to slow down fast-reacting process and Fast (FASt) to speed up slow-reacting processes. While viewing the selection, immediately press RESET pushbutton to initiate self-tune. If RESET is not pushed, self-tuning will initiate on the next power-up. "tunE" will flash in the upper display during self-tuning cycle. Press RESET again to discontinue self-tuning. When self-tuning is initiated, controller turns off the control output until the process temperature is at least 50°F below setpoint. If the process temperature cannot reach 50°F below setpoint in 30 minutes, a "tErr" (tune error) will occur and the original PID settings will be saved. OFF = Manual (none) Std = Standard SLo = Slow down fast-responding process FASt = Speed up slow responding process

PAGE 3: Loop 2 Control Parameters

Alpha	Menu	Selection	Description and Available Settings
Func	1	Loop 2 Function/ Control Type	diSA = Disabled onoF = On/Off Control Pid = PID Control ALAr = Alarm

For ON/OFF Control: Setup MENU 8-14
For PID Control: Setup MENU 2-8, 10-15
For ALARM: Setup PAGE 1/MENU 10-13 for Loop 2 using Output #2 as an alarm output, P3/M2-13 not active.

oFSt	2	Manual Reset (Offset)	Only active if P2/M4 = 0 -99.9 to 99.9%
Pb	3	Proportional Band	0.1 to 999.9%
Ar	4	Automatic Reset	0.00 to 99.99 repeats/min.
rAtE	5	Rate	0 to 500 seconds
outL	6	Output Limit	0 to 100%
cycL	7	Cycle Time	0.1 to 60.0 seconds
dr	8	Control Action	d = direct (cooling) r = reverse (heating)
db	9	Deadband	1 to 99°F
SPUL	10	Setpoint Upper Limit	Sensor Span Limits, P1/M3 and 5
SPLL	11	Setpoint Lower Limit	Sensor Span Limits, P1/M3 and 5

PAGE 3: Loop 2 Control Parameters (continued)

Alpha	Menu	Selection	Description and Available Settings
orco	12	Sensor Out-of-Range	If sensor reading is out of range, high or low, this Menu enables which condition will turn on the control output set in P3/M13. If disabled, the control output will be 0%. For ON/OFF control, output will be 100% for "enabled" out-of-range conditions. dHL = Disabled High/Low dHi = Disabled High/Low Enabled dLo = Disabled Low/High Enabled EnHL = Enabled High/Low
orPL	13	Control Output for Out-of-Range	0 to 100%
COFF	14	Calibration Offset	Sensor Span
tunE	15	Self-Tuning	This MENU initiates self-tuning and selects the self-tuning mode. Standard (Std) is used for most processes. Use Slow (Slo) to slow down fast-reacting process and Fast (FASt) to speed up slow-reacting processes. While viewing the selection, immediately press RESET pushbutton to initiate self-tune. If RESET is not pushed, self-tuning will initiate on the next power-up. "tunE" will flash in the lower display during self-tuning cycle. Press RESET again to discontinue self-tuning. When self-tuning is initiated, the controller turns off the control output until the process temperature is at least 50°F below setpoint. If the process temperature cannot reach 50°F below setpoint in 30 minutes, a "tErr" (tune error) will occur. OFF = Manual (none) Std = Standard SLo = Slow down fast-responding process FASt = Speed up slow responding process

PAGE 5: Sensor Setup

Alpha	Menu	Selection	Description and Available Settings
Unit	1	Sensor Units	°F/°C
SEn1	2	Input 1 sensor Type	J TC = Type J TC H TC = Type K TC 385 = .00385 RTD
SEn2*	3	Input 2 Sensor Type	J TC = Type J TC H TC = Type K TC 385 = .00385 RTD

*If not using Loop 2 input, disable "HHHH" error by setting MENU 3 to J TC and then jumpering together input pins 6 and 7.

Notes:

Section 5
Auxiliary Alarm & Output 3

General Description

Output #3, a ten amp (10A) relay and the Auxiliary Alarm function can be used in several different ways:

- Common Alarm Output for Loop #1 and Loop #2
- PID or On/Off Control Output for Loop #2
- Low or High Alarm for Loop #1 or #2
- Process Enable for Loop #1 or #2

The Auxiliary Alarm and Output 3 are configured in PAGE 4 of the PAGE/MENU programming structure. To use these features, you must specify the sensor(s) to be used, alarm type, alarm function, and relay output type.

The Auxiliary Alarm and Output #3 applications possibilities are described in Programming, PAGE 4/ MENU 5.

Wiring

Wiring connections for Output #3 are given in Figure 2.13, page 11 in the Installation section.

Programming

PAGE 4: Auxiliary Alarm 3 and Output 3 OutP

Alpha	Menu	Selection	Description and Available Settings
MENUs 1-4 are active when an Auxiliary Alarm function is selected in MENU 5.			
AL3P	1	Alarm 3 Setpoint	Instrument Sensor Span
AL3c	2	Alarm 3 Sensor Input	Sn1 = Loop 1 Sensor Sn2 = Loop 2 Sensor Sn12 = Both Sensors
AL3t	3	Alarm 3 Type	Hi = High Alarm Lo = Low Alarm
inhb	4	Alarm 3 Power-Up Inhibit	Off On

Output #3 Function

The MENU 5 setting determines how Output #3 is used.

Output #3 functions are determined by which Alarm settings are selected:

- **Auxiliary Alarm 3** is set in PAGE 4/MENUs 1-4
- **Alarm 1** is set on PAGE 1/MENU 6, 8 & 9
- **Alarm 2** is set on PAGE 1/MENU 10,12 & 13
- **Common Alarm** for Alarm 1 and 2 activates Output #3 if either Alarm 1 or Alarm 2 is in an alarm.
- **Loop 2, On/OFF or PID,** gives the user the option to use the Out #3 (10 amp) relay instead of, or with, the Out #2 (5 amp) relay. Loop 2 setpoints are on PAGE 1/MENUs 3 and 5, and control settings are on PAGE 3/MENUs 2-9. When this function is selected, Output #3 switches as a control output for Loop #2 sensor. Loop 2 function (P3/M1) can be set as another control output or as an Alarm for Loop #2. When set as another control output, Out #2 switches with Out #3.
- **Process Enable** uses settings from PAGE 4/MENUs 1 and 2. On start-up conditions, Out #3 will be open. If both sensors are selected, Out #3 will not be energized until both inputs reach Alarm 3 setpoint (PAGE 4/MENU 1). Process enable acts as a normally-energized low alarm if Loop #1 control action (PAGE 2/MENU 8) is reverse acting (heating), and acts as a high alarm if Loop #1 control action is direct acting (cooling). Output #3 is always normally de-energized if used as Process Enable.
- **Common Event for Alarm 1 and 2** uses PAGE 1/MENU 6, 8 and 9 (ALM 1) and PAGE 1/MENU 10, 12 and 13 (ALM 2). When this function is selected, both Alarm 1 and Alarm 2 must be in alarm before Output #3 is active.

PAGE 4: Auxiliary Alarm 3 and Output 3 OutP

Alpha	Menu	Selection	Description and Available Settings
Ot3F	5	Output #3 Function	0 = Disabled 1 = **Auxiliary Alarm 3** only (set in MENUs 1-4) 2 = **Common Alarm for Alarm 1 and the Auxiliary Alarm 3** 3 = **Common Alarm for Alarm 2 and the Auxiliary Alarm 3** 4 = **Alarm 1** only 5 = **Alarm 2** only 6 = **Common Alarm for Alarm 1 and Alarm 2**, NE or NDE 7 = **Loop 2 On/Off Control Output** 8 = **Loop 2 PID Control Output** 9 = **Process Enable,** Out 3 active, using MENUs 1 and 2. 10 = **Common Event Output for Alarm 1 and Alarm 2**, relay active when both Alarms 1 and 2 are in alarm condition.
Ot3r	6	Output 3 Relay	ndE = Normally De-energized (NDE), non-latching nE = Normally Energized (NE), non-latching ndEL = NDE Latching nEL = NE Latching

Notes:

Section 6
Timer and Event Input

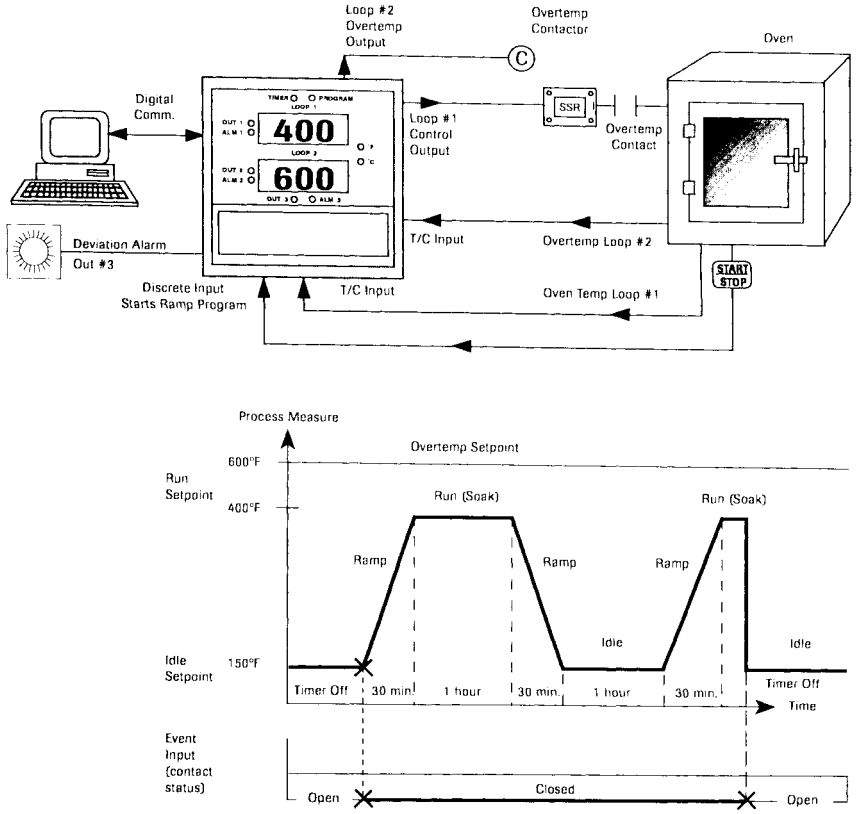
Timer and Event Input

The CN3240 features a simple countdown timer selectable in hour/minute increments, tenths of an hour or hours. The timer can be used to enable the process (turn on the outputs) at a preset time, or disable the process (turn off the outputs) after a specified amount of time, avoiding the additional expense, space requirements and installation costs of a separate timer. There are a total of four timers which are used to set up a simple ramp/soak program.

The Event Input allows an operator to use a remote switch to switch between Idle and Run Setpoints, or to initiate or stop a Ramp/Soak program. A contact closure or a semiconductor switching device capable of sinking 1 mA at 0.8 Vdc (max) should be connected to the event input terminals to provide the input switching.

The Event Input can be programmed as a contact closure (i.e. closed contacts = select the Run Setpoint, open contacts = select the Idle Setpoint). It can also be programmed as a momentary input, where closing the contacts for at least 100 milliseconds will make the Setpoint change from Idle to Run. Another momentary contact closure would then change the Setpoint from Run to Idle.

Figure 6.1
Application1: Ramp/Soak Oven Control - Loop #1 PID, Loop #2 Overtemperature



This application uses Loop #1 for continuous ramp/soak oven cycling. Loop #1 has a positive deviation alarm set for 50°F, which turns on a warning light, and Loop #2 is used for overtemperature control. The Event Input/ Contact Closure initiates the continuous Ramp/Soak program. The On/Off switch on the oven control panel activates the CN3240 event input (closes contact), starts ramping the setpoint and begins the ramp/soak cycle. When the On/Off switch is turned off, the idle setpoint is in effect until Start is initiated again. The timer is set for:

- Ramp up to Run Setpoint (soak) = 30 minutes
- Soak = 1 hour
- Ramp down to Idle Setpoint = 30 minutes
- Idle = 1 hour

This program repeats until the event input contact is opened (Stop). The idle setpoint is always used when the event input contact is open.

CN3200-SOFT remote operator interface software and the digital communications interface monitors and data logs the oven temperature.

Application #1 PAGE/MENU Settings

PAGE 1: General Control Operations

Alpha	Menu	Selection	Application Settings
Idle/Run Setpoints			
SP1	2	Loop 1 Run Setpoint	400°F
SP2	3	Loop 2 Run Setpoint	Not used. Alarm Setpoint on P1/M12
ISP1	4	Loop 1 Idle Setpoint	150°F
ISP2	5	Loop 2 Idle Setpoint	Not used. Alarm Setpoint on P1/M12
Process Alarm Settings			
ALt1	6	Alarm 1 Type	+ Deviation
rLY1	7	Alarm 1 Relay Action	Not used. Will be using Output #3 Relay
ASP1	8	Alarm 1 Setpoint	50°F
inh1	9	Alarm 1 Inhibit at Power-Up	Off
Overtemp Alarm Settings			
ALt2	10	Alarm 2 Type	High (functioning as overtemp alarm)
rLY2	11	Alarm 2 Relay Action	Normally energized, latching
ASP2	12	Alarm 2 Setpoint	600°F
inh2	13	Alarm 2 Inhibit	Off
Timer Settings			
tFUN	14	Timer/External Input Functions	5 = Continuous ramp/soak
drtr	15	Ramp Timer	00.30 (30 minutes)
Srtr	16	Soak at Run Timer	01.00 (1 hour)
rItr	17	Ramp to Idle Timer	00.30 (30 minutes)
Srtr	18	Idle Timer	01.00 (1 hour)
SSdb	19	Guaranteed Soak Differential	0.00 (Off)
tUnt	21	Timer Units	0 (Hours. Minutes)

PAGE 2: Loop 1 Control Parameters

Alpha	Menu	Selection	Application Settings
Func	1	Loop 1 Control Type	PID Control
PID Control: Setup MENU 2-8, 10-15			
oFSt	2	Manual Reset (Offset)	0.00
Pb	3	Proportional Band	5%
Rr	4	Automatic Reset	0.50 repeats/min.
rAtE	5	Rate	5 seconds
outL	6	Output Limit	100%
cYcL	7	Cycle Time	1 second
dr	8	Control Action	Reverse
db	9	Deadband	Not used (for ON/OFF control only)

PAGE 3: Loop 2 Control Parameters

Alpha	Menu	Selection	Application Settings
Func	1	Loop#2 Function/Control Type	Alarm
oFSt	2-9	Not used when Loop #2 functions as an alarm	

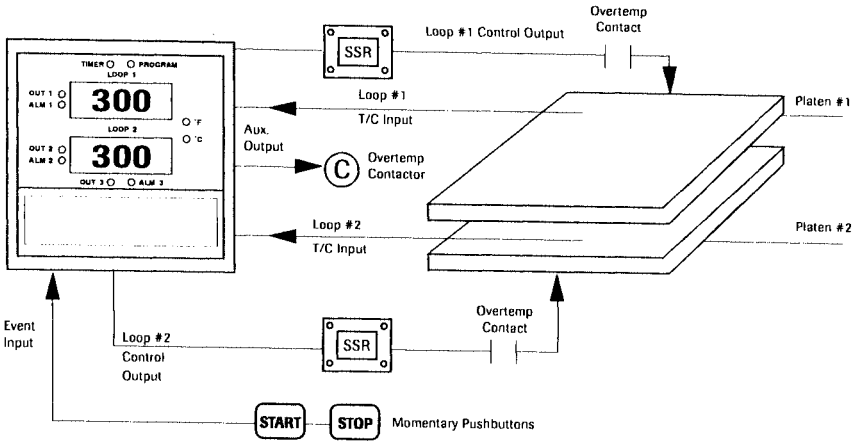
PAGE 4: Auxiliary Alarm 3 and Output 3

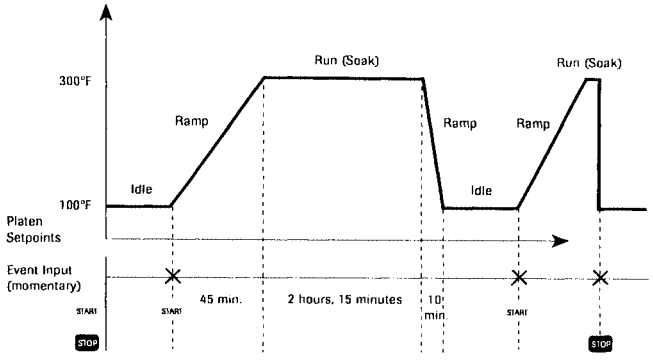
Alpha	Menu	Selection	Application Settings
	1-4	Not used	
Ot3F	5	Output #3 Function	4 = Loop 1, +Deviation Alarm
Ot3r	6	Output #3 Relay	Normally de-energized (closed on alarm)

PAGE 5; Digital Communications

Alpha	Menu	Selection	Application Settings
di9t	1	Digital Communications	CPIF, computer interface with CN3200-SOFT
bAud	2	Baud Rate	19.2
Addr	3	Address	1

Figure 6.2
Application 2: Platen Control - Two Independent PID Control Loops





In this application, Loop #1 controls Platen 1 and Loop #2 controls Platen #2. when using the Idle Setpoint, both platens are controlled at 100°F. When using the Run Setpoint, they are controlled at 300°F. Both platens are using Output #3 as an Auxiliary Shutdown Alarm at 350°F.

The CN3240's Run/Idle feature is used for a single ramp up and ramp down heating cycle, triggered by an external momentary switch or the controller's Start and Stop pushbuttons. The idle timer is set to "continuous." Times are set to ramp up to Run, soak (at the run setpoint), and then ramp down to Idle. The platen temperature remains at the idle setpoint until the external momentary switch or Start/Stop pushbuttons activates the program. The platens ramp to the run temperature, soak and ramp down to idle, thus completing the cycle.

Application #2 PAGE/MENU Settings

PAGE 1: General Control Operations

Alpha	Menu	Selection	Application Settings
Idle/Run Setpoints			
SP 1	2	Loop 1 Run Setpoint	300°F
SP 2	3	Loop 2 Run Setpoint	300°F
ISP1	4	Loop 1 Idle Setpoint	100°F
ISP2	5	Loop 2 Idle Setpoint	100°F
Process Alarm Settings			
	6-13	Not used since Loop #1 and Loop #2 will have the same high alarm setpoints. The process alarm will be set on PAGE 4.	
tFUN	14	Timer/External Input	6 = Continuous ramp/soak on momentary switch
drtr	15	Ramp to Run Setpoint	00.45 (45 minutes)
Srtr	16	Soak at Run Timer	02.15 (2 hours, 15 minutes)
rltr	17	Ramp to Idle Timer	00.10 (10 minutes)
Srtr	18	Idle Timer	Continuous, stays at idle until STOP is pushed or momentary contact closure, START or a momentary contact closure restarts process ramp up to run.
	19-20	Not used	
tUnt	21	Timer Units	0 (Hours. Minutes)

PAGE 2: Loop 1 Control Parameters

Alpha	Menu	Selection	Application Settings
Func	1	Loop 1 Control Type	PID Control
PID Control: Setup MENU 2-8			
oFSt	2	Manual Reset (Offset)	0.0%
Pb	3	Proportional Band	5.0%
Ar	4	Automatic Reset	2.00 repeats/min.
rAtE	5	Rate	8 seconds
outL	6	Output Limit	100%
cYcl	7	Cycle Time	1.0 seconds
dr	8	Control Action	Reverse
db	9	Deadband	Not used (for ON/OFF control only)

PAGE 3: Loop 2 Control Parameters

Alpha	Menu	Selection	Application Settings
Func	1	Loop 2 Ctrl Type	PID Control
PID Control: Setup MENU 2-8			
oFSt	2	Manual Reset (Offset)	0.0%
Pb	3	Proportional Band	5.0%
Ar	4	Automatic Reset	2.00 repeats/min.
rAtE	5	Rate	8 seconds
outL	6	Output Limit	100%
cYcL	7	Cycle Time	1.0 seconds
dr	8	Control Action	Reverse
db	9	Deadband	Not used (for ON/OFF control only)

PAGE 4: Auxiliary Alarm #3 and Output #3

Alpha	Menu	Selection	Application Settings
ALSP	1	Alarm #3 Setpoint	350°F
ALSc	2	Sensor Input	Sn12 = Both Sensors, Loop #1 and Loop #2 (if either loop goes into alarm, the system will shut down)
ALtP	3	Alarm Type	Hi = High Alarm
inhb	4	Alarm Power-Up Inhibit	Off
Ot3F	5	Output #3 Function	1 = Auxiliary Alarm #3
Ot3r	6	Output #3 Relay	NEL = Normally energized, latching

Timer and External Input Functions

The timer and external input function is selected at PAGE1/ MENU 14 in the General Operations setup. Following is a description of the available selections. If values 1 (ON Delay Timer) or 2 (OFF Delay Timer) are selected, the TIMER LED is lit. If values 3-6 (setpoint changing) are selected, the PROGRAM LED is lit.

MENU 14 Selection

0 = Disabled, no timer or external input functions will be used. MENUs 15-19 are not used.

1 = On Delay Timer. The START pushbutton initiates a timer countdown that must elapse before the process will begin (control outputs are OFF until the timer elapses or the stop button is pressed). Timer value, in hours and minutes, is entered at MENU 15. When On Delay is selected, the external input is ineffective. MENUs 16-19 are not used. The Timer LED flashes when the control outputs are OFF, and is continuously lit to indicate Timer function enabled.

2 = Off Delay Timer. The START pushbutton initiates a timer countdown (entered at MENU 15) and keeps the control outputs ON, controlling, until the timer elapses or the STOP button is pressed, at which point the control outputs turn OFF. Timer value, in hours and minutes, is entered at MENU 15. When Off Dela/ is selected, the external input is ineffective. MENUs 16-19 are not used. The Timer LED flashes when the control outputs are OFF, and is continuously lit to indicate Timer function enabled.

3 = Setpoint Change on Contact Closure. The external input is used to select which setpoint Run or Idle will be used for control. When the external input contacts are open, the Idle setpoint is used. When the contacts are closed, the Run set point is used. The controller START/STOP pushbuttons are ineffective when this selection "3" is made.

4 = Setpoint Change on Momentary Switch or Controller START/STOP Pushbuttons.. The external input is used to select which setpoint will be used for control; however, the setpoint changes from Run to Idle, and Idle to Run, by a momentary normally-open switch connected to the external input contacts. To switch between setpoints, the switch must be closed for at least 100 milliseconds. The controller START key will return the process to Run setpoint and STOP will return the process to Idle setpoint. The transition between the two setpoints will ramp up or down only if the delay/ramp timer (MENU 15) is set to a value greater than zero. If instantaneous setpoint changes are desired, MENU 15 should be set at zero.

5 = Continuous Ramp/Soak with Contact Closure. Using the four timer selections/setting in MENUs 15 - 18, a ramp/soak program can be configured. When the external contacts are open, the IDLE setpoint is active. The program is started by closing the external input contacts. The setpoint immediately ramps from the IDLE setpoint to the RUN setpoint, dependent on the Delay Timer setting (MENU 15), then soaks at the RUN setpoint for the amount of time specified for the SOAK at RUN timer (MENU 16). It then ramps down to the IDLE setpoint over the time specified in the Ramp Idle timer (MENU 17), and remains at IDLE for the Soak at Idle Timer duration (MENU 18). Once this final soak interval is complete, the program will restart by ramping to the process RUN setpoint. If a continuous soak is desired, both IDLE and RUN soak (Menus 16 and 18) can be set to continuous "Cont." The program will continue to run until the external input contacts are opened. Any time the contacts are opened, the controller uses the IDLE setpoint.

Menu 14 Selection (continued)
6 = Continuous Ramp/Soak on Momentary Switch or Controller START/ STOP Pushbuttons. The ramp/soak program configuration and timer settings are the same as for selection "5" on the previous page, except that the program is started via the START pushbutton or by a momentary switch input. The program runs continuously until the STOP pushbutton, or momentary switch input, is activated.*

***Note:** All program state (Ramp, Run, Idle) and timer settings are stored in EEPROM, so that in the event of power failure or power interruption, the program resumes where it was when power was removed.

Wiring Connections

Wiring instructions for the Event Input are given in Figure 2.8 on page 9. No wiring is necessary to implement the timer functions.

Programming and Setup

PAGE 1: General Operations GnRL

Alpha	Menu	Selection	Description and Available Settings	
			See page 36 for details	
tFUn	14	Timer/External Input Functions	0 = Disabled 1 = On Delay 2 = Off Delay 3 = Change Setpoint on Contact Closure 4 = Change Setpoint on Momentary Switch or Key Pad 5 = Continuous Ramp/Soak with Contact Closure 6 = Continuous Ramp/Soak on Momentary Switch or Key Pad	
drtr	15	Delay or Ramp to Run Timer	0.00 to 50.00 (hrs.minutes) 0.0 to 300.0 (hours) 0 to 3000 (hours)	P1 M21 = 0 P1 M21 = 1 P1 M21 = 2

If Continuous is selected for MENU 16, the setpoint will stay at the Run setpoint until the program is stopped.

Srtr	16	Soak at Run Timer	0.00 to 99.59 (hrs.min) or 0.0 to 999.9 (hours) 0 to 9999 (hours)	P1 M21 = 0 P1 M21 = 1 P1 M21 = 2
rItr	17	Ramp to Idle Timer	0.00 to 50.00 (hrs.min) 0.0 to 300.0 (hours) 0 to 3000 (hours)	P1 M21 = 0 P1 M21 = 1 P1 M21 = 2

If Continuous is selected for MENU 18, the setpoint will stay at the Idle setpoint until the program is stopped.

SItr	18	Soak at Idle Timer	0.00 to 99.59 (hrs.min) or 0.0 to 999.9 (hours) 0 to 9999 (hours)	P1 M21 = 0 P1 M21 = 1 P1 M21 = 2

Alpha	Menu	Selection	Description and Available Settings
GSdb	19	Guarantee Soak Differential	0.00 to 99.99% of sensor span
LdSP	20	Lower Display	L2PV = Loop 2 Process Variable L1SP = Loop 1 Setpoint L2SP = Loop 2 Setpoint L2AL = Loop 2 Alarm Setpoint
tUnt	21	Timer Units for Menus 15-18	0 = 00.00 (Hours. minutes) 1 = 000.0 hours 2 = 0000 hours

Section 7
Digital Communications

The Digital Communications option gives the CN3240 the ability to interface with computers using either OMEGA's Computer Interface mode or ASCII Line mode. These modes implement communications that can address up to 255 OMEGA controllers on an RS422A/RS485 multidrop line. The protocols for these two modes are described in the Digital Communications User's Manual (M1596) that is supplied with controllers containing the Digital Communication option.

CN3200-SOFT

If a prepackaged software program is preferred for multidrop digital communication with up to 255 OMEGA controllers, OMEGA offers *CN3200-SOFT* remote operator interface software. *CN3200-SOFT* operates on an IBM-PC or compatible computer and communicates with the controllers via a serial interface port. Instructions for using *CN3200-SOFT* are given in the User's Manual provided with the software purchase.

Hardware Setup

When shipped from the factory, the isolated digital communications interface is set for RS232-C. If you are using RS422 or RS485, internal jumpers in the controller hardware must be positioned for the communications interface.

To expose the digital communications card, remove the controller from its case as shown on page 3. The digital communications card location is shown in Figure 7.1 on the following page.

Figure 7.1
Digital
Communications
Circuit Card

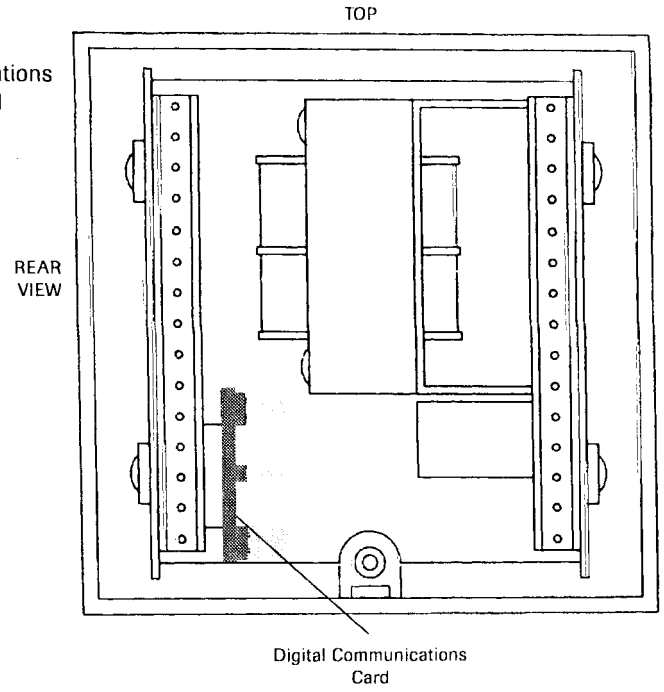


Figure 7.2
RS232
Jumper
Positions
(as shipped
from factory)

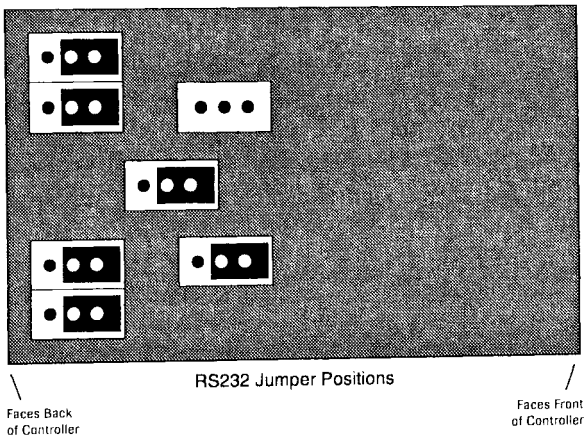


Figure 7.3
RS422
Jumper
Positions

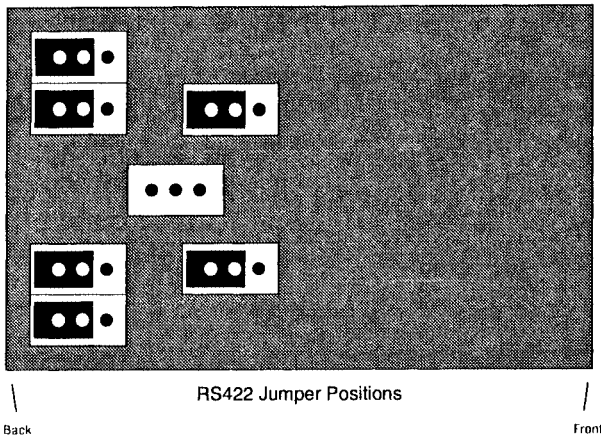
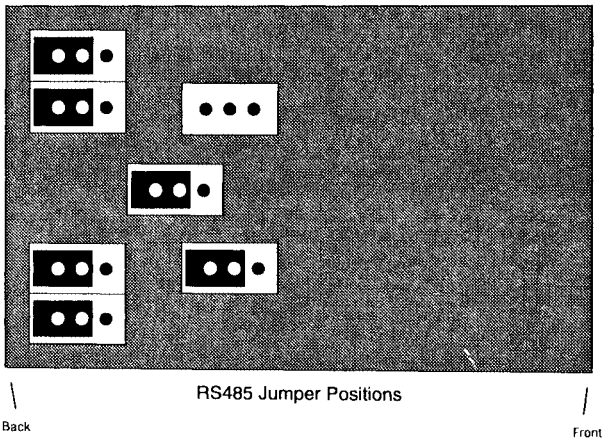


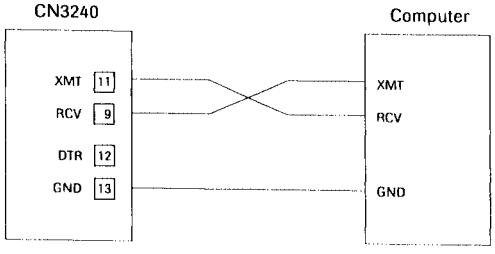
Figure 7.4
RS485
Jumper
Positions



Digital Communications Wiring

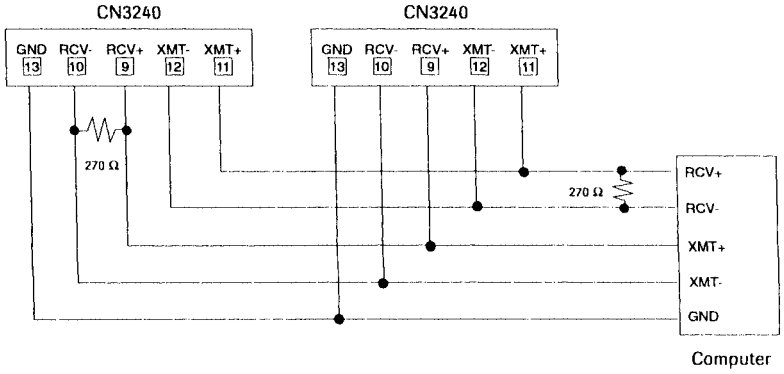
Wiring connections for the digital communications interface are made on terminals 9-13 using shielded serial interface cable.

Figure 7.5
RS232 Wiring
Connections



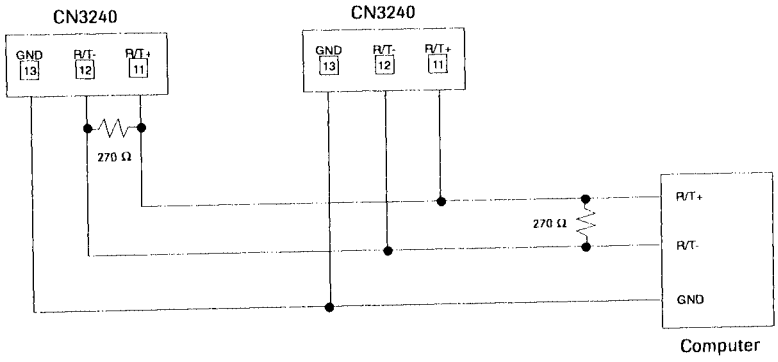
Note: The DTR output is always enabled when the CN3240 power is on.

Figure 7.6
RS422A Wiring Connections (4-wire)



Note: 270 Ω resistors recommended across receive line on computer and last controller.

Figure 7.7
RS485 Wiring Connections (2-wire)



Note: 270 Ω resistors recommended across receive line on computer and last controller.

Digital Communications Programming and Setup

All programmed selections are made on PAGE 6 in the controller.

PAGE 6: Digital Communications dIG

Alpha	Menu	Selection	Available Settings	Factory Setting	Sec.
dIGt	1	Mode Selection	oFF = Disabled (none) CPtF = Computer Interface LInE = ASCII Line Mode	oFF	C
bAUd	2	Baud Rate	1200 2400 4800 9600 19.2 (K)	19.2 (K)	
AddR	3	Address	0 to 255	1	

Notes:

Section 8
Calibration

When is Calibration Required?

The CN3240 controller is factory calibrated before shipment to you, therefore, it is not necessary to calibrate the controller when you receive and install it. Periodic calibration checks or adjustments of the unit should not be required under normal operating conditions. OMEGA recommends that you recalibrate the controller in the following instances:

- all instruments in your facility are periodically calibrated to one device (metrology)
- a measurement system component fails

User Calibration

All calibration is performed in the PAGE/MENU programming. A simple calibration of the full range sensor input is performed via PAGE 5/MENUs 2, 3 and 5-9. Manual Calibration, PAGE 7/MENU 1-20, is provided for manual calibration of the sensor inputs in applications where the process requires extremely fine tuning over a limited range. If an offset on the temperature reading is desired, to match another instrument or an inferred temperature in another part of the system, change the calibration offset on MENU 14 of PAGEs 2 and 3.

Factory Calibration Recovery

This option allows you to recalibrate the controller back to its factory calibration settings, in the event that it is severely out of calibration due to poor technique or unauthorized calibration. Although the factory calibration settings are recovered, this does not guarantee original calibration accuracy. The Factory Calibration Recovery should be used as a "starting point" for recalibration, should the unit become severely out of calibration.

Factory Calibration Recovery Procedure

Factory Calibration Recovery is performed on PAGE 5/MENU 4. This portion of the PAGE 5 PAGE/MENU Table is presented on the following page.

PAGE 5: Calibration CAL

Alpha	Menu	Selection	Available Settings	Factory Settings	Sec.
rECc	4	Recover Factory Calibration	0 = Off 1 = Recover Calibration	0	D

To reestablish the factory calibration constants:

1. **Disconnect load power.**
2. Advance to PAGE 5/MENU 4 and select the value "1". The controller will automatically recalibrate and the value of MENU 4 will be reset to zero.
3. The lower display shall cycle from "- - - -" to "DONE". Press the RESET pushbutton to exit program mode.

Important Calibration Notes

1. **Disconnect load power when calibrating.**

2. RTD inputs should be calibrated using copper (Cu) wire, and thermocouple inputs should be calibrated using thermocouple extension wire of the same type as the thermocouple you are calibrating. (Thermocouples can be calibrated using copper wire, but the calibration procedure is more complex, and equivalent microvolt values are used for range minimum and maximum instead of temperature values in °F).

3. Substitute a precision sensor simulator (thermocouple simulator or resistance decade box) for the sensor inputs. The controller should be allowed to warm-up with the appropriate sensor simulator connected for at least one hour prior to calibration.

4. To access the calibration, you will need to be at LEVEL D Security. Enter Security Code "736" at PAGE 1/MENU 1.

Instructions for Cold Junction Compensation Calibration

In most cases, the Cold Junction Compensation (CJC) Calibration is necessary only after repair to the CJC circuit or a drastic change in ambient operating conditions. CJC Calibrations are not required for RTD inputs.

1. Enter the controller terminal #4 temperature in PAGE 5/MENU 5 (measure with an independent and accurate thermometer).
2. Enter a "1" in MENU 6 to select CJC calibration for the Cold Junction Compensation offset based on the temperature entered in MENU 5.
3. MENU will cycle to "DONE", indicating successful calibration to value entered in MENU 5.

PAGE 5: Sensor Setup and Calibration CAL

Alpha	Menu	Selection	Available Settings	Factory Setting	Sec.
Unit	1	Sensor Units	°F / °C	°F	C
SEn1	2	Input 1 Sensor Type	J TC = Type J TC H TC = Type K TC 385 = .00385 RTD	J T/C	
SEn2	3	Input 2 Sensor Type	J TC = Type J TC H TC = Type K TC 385 = .00385 RTD	J T/C	
rECc	4	Factory Recovery	0 = Off 1 = Recover calibration	0	D
Unct	5	Cold Junction temp. at Cal.	0.0 to 150.0 °F	75.0	
CJCc	6	CJC Calibration Command	rdY = Ready donE = finished	RDY	
CALt	7	Sensor Cal. Type	SiLt = Simulator CuSr = Copper CuSr wire, millivolt source	SiLT	
CAL1	8	Input 1 Sensor Cal. Command	inLo = Ready for inLo range minimum inHi = Ready for inHi range maximum donE = finished	inLo	
CAL2	9	Input 2 Sensor Cal. Command	inLo = Ready for inLo range minimum inHi = Ready for inHi range maximum donE = finished	inLo	

Instructions for Sensor Input Calibration (PAGE 5)

1. Enter the Calibration Procedure Code at MENU 2 or 3. For example, if you are using a type J thermocouple simulator, enter the code "JtC" for the input type.
2. Enter the calibration type "SiLt" in MENU 7, if using a thermocouple simulator and Type J thermocouple wire.
3. Set the sensor simulator to the minimum range value for the sensor (sensor "zero") and wait 30 seconds for the electronics to fully stabilize. Sensor minimum ranges are:
   - J TC = -100°F
   - K TC = -100°F
   - RTD = -200°F
4. View MENU 8 or 9 for calibration of input 1 or 2 respectively. It will display "inl o". Once the input has settled, press the ▲ key. Wait for the lower display to cycle to "inhi".
5. Set the sensor simulator to the maximum range value for the sensor (sensor "span"). Sensor minimum ranges are:
   - J TC = 1400°F
   - K TC = 2100°F
   - RTD = 1000°F

   Wait 30 seconds for the electronics to stabilize.
6. Once the input has again settled, press the ▲ key a second time. Wait for the lower display to cycle to "donE".

Manual Calibration

If you have already completed the sensor input calibration, you do not need to perform manual calibration unless your application requires calibration over a limited range, for an offset from actual process input, see PAGEs 2-3/MENU 14, Calibration Offset.

Manual calibration is very much like manual trimmer pot adjustments of other instruments, except that a "pot" is not turned. Instead of turning a "pot", the sensor input value, which is displayed in the upper and lower digital display, is adjusted with the ▲ and ▼ pushbuttons until the sensor input

(continued on next page)

Manual Calibration (continued)

value and the displayed value are equal. For each sensor type there are 2 corresponding MENU numbers, one for zero and one for span. It is usually necessary to repeat the zero and span calibration adjustments several times until the displayed values equal their respective input values.

The PAGE/MENU table (page 50) gives the MENU numbers and sensor ranges for all sensor input types.

Sensor Input Manual Calibration Instructions

In these instructions, assume that J thermocouple input is used. From the PAGE/MENU table, PAGE 7 (page 46), you can see that MENU 1 is for zero calibration and MENU 2 is for span calibration. The desired range for calibration is 200 to 400°F.

1. Access PAGE 7/MENU 1 and select the value to be displayed in the lower display by pressing MENU/VAL.
2. Set the sensor simulator to the zero calibration value of 200°F. Wait 30 seconds to allow the electronics to stabilize.
3. Press the ▲ or ▼ pushbutton until the loop PV value in the "normal display mode" equals the sensor input value.
4. Access PAGE 7/MENU 2 and select the value to be displayed in the lower display by pressing MENU/VAL.
5. Set the sensor simulator to the span calibration value of 400°F. Wait 30 seconds to allow the electronics to stabilize.*
6. Press ▲ or ▼ until the loop PV value in the "normal display mode" equals the sensor input value.
7. Repeat steps 2-6 until **both** values equal their respective sensor input values.

* When performing manual calibration on an RTD input, the equivalent resistance value (ohms) should be used for the zero and span values.

PAGE:7: Manual Calibration

Alpha	Menu	Selection	Available Settings	Security
C1 J0	1	Loop 1, J T/C Zero	See Sensor Input - Manual	D
C1 J5	2	Loop 1, J T/C Span	Calibration Instructions pp. 48 & 49.	
C1 K0	3	Loop 1, K T/C Zero	0 to FFFF	
C1 K5	4	Loop 1, K T/C Span		
C1 r0	5	Loop 1, RTD Zero		
C1 r5	6	Loop 1, RTD Span		
C1 c0	7	Loop 1, CJC Zero		
C1 c5	8	Loop 1, CJC Span		
C2J0	9	Loop 2, J T/C Zero		
C2J5	10	Loop 2, J T/C Span		
C2K0	11	Loop 2, K T/C Zero		
C2K5	12	Loop 2, K T/C Span		
C2r0	13	Loop 2, RTD Zero		
C2r5	14	Loop 2, RTD Span		
C2c0	15	Loop 2, CJC Zero		
C2c5	16	Loop 2, CJC Span		

Section 9
Troubleshooting

The following Troubleshooting Guide gives simple solutions to common problems, and explains the CN3240's Error Messages. Should you have a problem with your controller, it is a good idea to check this Guide for possible corrections before contacting the factory. The corrections are listed in the order in which they should be performed.

Troubleshooting Guide

Symptom	Probable Cause	Correction
Power applied, display does not light and controller does not function	1. No power applied 2. Power loss transient	1. Check power wiring and fusing 2. Power down and repower up
Display reads "HHHH" or "LLLL"	1. Open sensor 2. Out of calibration	1. Check sensor wiring (page 6) 2. Check sensor type selected at PAGE 5/MENU 2-3 3. Attach sensor simulator and verify calibration (page 45) 4. Recover Factory Calibration (page 45)
Process does not heat up	1. No power being applied to the load	1. Verify output wiring (page 9) 2. Verify that load is not open and output jumpers are properly installed 3. Check "control action" entered at PAGEs 2-3/MENU 8 (r = heating) 4. Check "control type" entered at PAGEs 2 and 3 (should not be disabled) 5. Check "output limit" entered on PAGES 2 & 3, MENU 6
Erratic operation	1. Intermittent sensor connections 2. Controller failure (internal electronics)	1. Check sensor wiring or substitute sensor simulator 2. Power down and repower up 3. Contact factory
Process not in control	1. Incorrect "control action" selected 2. Not tuned correctly	1. Check "control action" entered at PAGEs 2 and 3 2. See Self-Tuning and PID settings, PAGEs 2 and 3, MENUs 2-9 and MENU 15
Instrument continually goes through power-up reset	1. Sensor incorrectly wired 2. Internal electronic failure 3. Drastic power line anomalies	1. Check sensor wiring (page 6) 2. Contact factory

continued on next page

Troubleshooting Guide

Symptom	Probable Cause	Correction
Err1 displayed	1. Internal RAM failure on power-up self-test	1. Power down and back up to retest RAM 2. Contact factory
Err2 displayed	1. Internal ROM failure on power-up self-test	1. Power down and up to retest ROM 2. Contact factory
Err3 displayed with PAGE/MENU number in lower	1. EEPROM failed redundancy check	1. Power down and back up to retest EEPROM 2. Reenter settings for PAGE/MENU number shown in lower display, power down, then repower up to clear error 3. If PAGE/MENU number is "0 0", contact factory
Err4 displayed	1. A to D electronics failure	1. Power down and up to reset 2. Consult factory
tErr flashing on upper or lower display	1. Self-tune was enabled, but unable to successfully tune because: a. process could not get 50°F below setpoint in 30 minutes b. over a 10 hour period, the process has not changed enough to initiate turning c. process went in and out of sensor range during tune. d. CN3240 is unable to calculate PID parameters	1. Press RESET to clear error Previous PID parameters are retained 2. Verify proper self-tune operation (PAGEs 2-3/MENU 14) 3. Consult factory

Section 10
Specifications

Control Modes	On/Off Proportional PID-proportional with automatic reset/integral and/or rate/derivative
Control Adjustments	All parameters independently adjustable for each loop
Dual Set Points	Instrument sensor range, °F or °C, with Ramp/Soak and Timer capabilities
Set Point Limits	Instrument sensor range
Deadband	1 to 99°F/1 to 55°C
Proportional Band	0.1 to 999.9%
Automatic Reset	0.00 to 99.99 repeats/minute
Rate	0 to 500 seconds
Output Cycle Time	0.1 to 60.0 seconds
Output Limit	0 to 100%
Control Outputs	One individual output per channel (jumper selectable relay or SSR drive)
Relay	Normally-open, Form A contact rated 5 amps at 120/230 Vac or 5 amps at 30 Vdc
Solid State Relay Drive	Transistor output of 20 Vdc at 40 mA
Auxiliary Alarm Output	Field Selectable Latching or Non-Latching Normally-energized or normally de-energized Power-up inhibit feature
Setpoint	Sensor span
Modes	High or Low alarm
Input Sensor	Loop #1 sensor, Loop #2 sensor or both
Relay	Normally open Form A contact rated 10 amps at 120/250 Vac or 10 amps at 30 Vdc
Auxiliary Event Input	One digital input accepts momentary or sustained contact closure, requires minimum 100 millisecond closure/opening
Timers	24 hours, in hour/minute increments 00.00 Adjustment (hours, minutes)
Sensor Input	Field Selectable J or K T/C, RTD

Input Specifications	Range °F	Range °C	Accuracy @ 77°F ambient
J T/C	-100 to 1400	-73 to 760	± 0.14% of span + 1 digit
K T/C	-100 to 2100	-73 to 1149	± 0.14% of span + 1 digit
RTD, 100 ohm Pt	-200 to 1000	-129 to 538	± 0.10% of span + 1 digit

Input Update Rate	600 msec/update
Readout Stability	± 1°F typical maximum for every ± 10°F change in ambient
Open Sensor and Out-of-Range Conditions	Programmable control action with display indicating condition "HHHH" for overrange and "LLLL" for underrange

Digital Communications	
RS232C	Single-drop, Isolated
RS422, RS485	Multi-drop, Isolated
Modes	Computer Interface, ASCII Line
Baud Rate	1200, 2400, 4800, 9600, 19,200
Instrument Power	120/230 Vac, 50/60 Hz Nominal power consumption 10 VA Power failure detection circuitry, watchdog timers
Operating Environment	30 to 130°F (0 to 55°C) ambient temperature with relative humidity less than 95%, non-condensing
Dimensions	
Overall	3.78 x 3.78 x 4.75 inches
Depth Behind Panel	4 inches (102 mm)
Front Panel Projection	0.75 inches (19 mm)
Panel Cutout	3.6 x 3.6 inches (92 mm x 92 mm)
Influence of Line Voltage Variation	Maximum change in readout is ± 0.1% for ± 10% nominal line voltage ± 0.1%
Noise Rejection	
Common Mode	Better than 120 db at 60 Hz
Series Mode	Less than ± 2°F (1°C) with 100 mV peak to peak, 60 Hz series mode noise
Radio-Frequency Interference (RFI)	Typically less than 0.5% of sensor span at 1 meter (3.1 ft.) from a transmitter (4W at 464 MHz)
Sensor Leadwire Effect	
Thermocouple	+1°F per 10 ohms
RTD, 3-wire	-1°F per 5 ohms, balanced
RTD, 2-wire	+1°F per 0.22 ohms

Appendix 1
PAGE/MENU Tables

PAGE	PAGE Name	PAGE Contents
0	Status Display	Allows you to monitor any of 15 real time variables in the lower digital display: set point; process temperatures; outputs; timers and alarm status. This is useful during troubleshooting or brief trending periods. Values on this page are for display only and cannot be changed on this PAGE.
1	General Operations	Security Code Set Points (Loops 1 and 2) Idle Set Points (Loops 1 and 2) Alarm Parameters (Loops 1 and 2) Timer/External Input Functions Lower Display Selection
2	Loop 1 Control Parameters	Control Mode PID and On/Off Control Parameters Set Point Limits Out-of-Range Responses Self-Tuning
3	Loop 2 Control Parameters	Same as Loop 1 parameters above
4	Auxiliary Alarm and Output #3	Set Point Process Sensor Source Alarm Type / Parameters
5	Sensor Setup Calibration	Sensor Type Scale (°F or °C) CJC and Quickstep Calibration
6	Digital Communications	Computer Interface ASCII Line Mode
7	Manual Calibration	Manual Calibration

Security Levels / Codes

See pages 16-18 for details.

Security Levels and PAGE/MENU Contents

Level	Code	Allows Adjustment of:	PAGE/MENU
A	- - -	Status Display (View only)	P0 / M1-20
		Security Code	P1 / M1
B	**123**	Security Level A settings, plus...	
		Process Set Points, Loops 1 & 2	P1 / M2-3
		Idle Set Points	P1 / M4-5
C	**458**	Security Levels A and B settings, plus...	
		Alarm Types	P1 / M6-13
		Timer / Event Input Functions	P1 / M14-18
		Guaranteed Soak Differential	P1 / M19
		Lower Digital Display Selection	P1 / M20
		Loop 1 Control Type	P2 / M1
		Loop 1 Manual Reset	P2 / M2
		Loop 1 PID Control Parameters	P2 / M3-5
		Loop 1 Output Limit	P2 / M6
		Loop 1 Cycle Time	P2 / M7
		Loop 1 Control Action	P2 / M8
		Loop 1 Deadband	P2 / M9
		Loop 2 (same parameters and MENUs as shown above for Loop 1, except PAGE 3)	
		Output 3/Alarm Parameters	P4 / M1-6
		Scale °F or °C	P5 / M1
		Sensor Types	P5 / M2-3
		Digital Communications	P6 / M1-3
D	**736**	Security Levels, A, B, and C settings, plus....	
		Loop 1 Set Point Limits	P2 / M10-11
		Loop 1 Out-of-Range	P2 / M12-13
		Loop 1 Calibration Offset	P2 / M14
		Loop 1 Self-Tuning	P2 / M15
		Loop 2 (same parameters and MENUs as shown above except PAGE 3)	
		Factory Calibration Recovery	P5 / M6
		Quickstep Sensor Calibration	P5 / M7-9
		CJC Calibration	P5 / M5,6,10
		Manual Calibration	P7 / M15

Security Codes

Security Level	Security Code	View Level	Adjust Level
A	- - -	A, B	A
B	**123**	A, B, C	A, B
C	**458**	A, B, C	A, B, C
D	**736**	A, B, C, D	A, B, C, D

PAGE 0
DISPLAY

See page 20 for details.

PAGE 0: Status Display PAGE diSP

Alpha Cue	MENU	Display Selection	Security
PU1	1	Loop 1 Process Value	A
PU2	2	Loop 2 Process Value	
SP1	3	Loop 1 Setpoint	
dSP1	4	Loop 1 Deviation from setpoint	
Out1	5	Loop 1 Output % ON	
RLr1	6	Alarm 1 Status 0 = Off 1 = On	
SP2	7	Loop 2 Setpoint	
dSP2	8	Loop 2 Deviation from setpoint	
Out2	9	Loop 2 Output % ON	
RLr2	10	Alarm 2 Status 0 = Off 1 = On	
Out3	11	Output 3 Status % ON	
RLr3	12	Alarm 3 Status 0 = Off 1 = On	
tStA	13	Timer Status diSA = Disabled COFF = Control Off rPA = Ramp to Run Setpoint rPI = Ramp to Idle Setpoint SoA = Soak at Run Setpoint SoI = Soak at Idle Setpoint	
Rctt	14	Time Remaining in Active Timer	
CJCt	15	Cold Junction Terminal Temp.	

All parameters on PAGE 0 are real time values and not adjustable.

PAGE 1
General Control

See pages 21 and 22 for details.

PAGE 1 : General Control Operations GnrL

Alpha	Menu	Selection	Available Settings	Factory Setting	Sec.
Security Code					
LocK	1	Security Code/Lock	0 to 999	None	A
Idle/Run Setpoints					
SP1	2	Loop 1 Run Setpoint	Instrument Sensor Range	75°F	B
SP2	3	Loop 2 Run Setpoint	Instrument Sensor Range	75°F	
ISP1	4	Loop 1 Idle Setpoint	Instrument Sensor Range	75°F	
ISP2	5	Loop 2 Idle Setpoint	Instrument Sensor Range	75°F	
Alarms					
Alarms can be assigned to their matching control loops output, for example, Alarm 1 can activate Loop #1 Output if the Loop #1 function is set up as an Alarm (only) at PAGE 2/ MENU 1. Likewise, Alarm 2 can activate Loop 2 output if the Loop #2 function is set up as Alarm (only) at PAGE 3/MENU 1. Alarms 1 and 2 can also be assigned to activate Output #3, as described in Section 5 of this manual.					
ALt1	6	Alarm 1 Type	Hi = High Lo = Low PdE = + Deviation -dE = - Deviation dE = +/- Deviation	High	C
rLY1	7	Alarm 1 Relay Action	ndE = Normally de-energized, non-latching nE = Normally energized, non-latching ndEL = Normally de-energized, latching nEL = Normally energized, latching	NDE	
ASP1	8	Alarm 1 Setpoint or Deviation Setpoint	Loop 1 Sensor Range	Sensor Span	
inh1	9	Alarm 1 Inhibit at Power-Up	oFF = Off on = On	Off	
At2	10	Alarm 2 Type	Hi = High Lo = Low PdE = + Deviation -dE = - Deviation dE = +/- Deviation	High	
rLY2	11	Alarm 2 Relay Action	ndE = Normally de-energized, non-latching nE = Normally energized, non-latching ndEL = Normally de-energized latching nEL = Normally energized latching	NDE	

See pages 21 and 22 for details.

PAGE 1 : General Control Operations (continued)

Alpha	Menu	Selection	Available Settings	Factory Setting	Sec.
A5P2	12	Alarm 2 Setpoint or Deviation	Loop 2 Sensor Range	Sensor Span	
inh2	13	Alarm 2 Inhibit at Power Up	oFF = Off on = On	Off	
Timer Functions: Detailed information on the various timer applications and selections are given in Section 7 of this manual.					
tFun	14	Timer / External Input Functions	0 = Disabled 1 = On delay timer 2 = Off delay timer 3 = Change setpoint on remote contact input 4 = Change setpoint on momentary switch or START/STOP pushbutton 5 = Ramp/Soak on remote contact input 6 = Ramp/Soak on momentary switch or START/STOP pushbutton	0	
drtr	15	Delay or Ramp to Run Timer	0.00 to 50.00 (hours.minutes) 0.0 to 300.0 (hours) 0 to 3000 (hours)	P1 M21 = 0 P1 M21 = 1 P1 M21 = 2	C
Srtr	16	Soak at Run Timer	0.00 to 99.59 (hours.minutes) 0.0 to 999.9 (hours) 0 to 9999 (hours)	P1 M21 = 0 P1 M21 = 1 P1 M21 = 2	
rltr	17	Ramp to Idle Timer	0.00 to 50.00 (hours.minutes) 0.0 to 300.0 (hours) 0 to 3000 (hours)	P1 M21 = 0 P1 M21 = 1 P1 M21 = 2	
Sltr	18	Soak at Idle SP Timer	0.00 to 99.59 (hours.minutes) 0.0 to 999.9 (hours) 0 to 9999 (hours)	P1 M21 = 0 P1 M21 = 1 P1 M21 = 2	
9Sdb	19	Guaranteed Soak Differential	0.00 to 99.99% of sensor span	0.00	
Lower Display Selection					
LoSP	20	Lower Display Selection	L2PV = Loop 2 Process Val L1SP = Loop 1 Setpoint L2SP = Loop 2 Setpoint L2AL = Loop 2 Alarm Setpoint	Loop 2 Process Val. L2PV	
tUnt	21	Timer Unit Selection	0 = Hours, Minutes 1 = 000.0 Hours 2 = 0000 Hours		

PAGE 2
Loop #1

See page 23 for details.

PAGE 2: Loop 1 Control Parameters

Alpha	Menu	Selection	Available Settings	Factory Setting	Sec.
Func	1	Loop 1 Function/ Control Type	dISA = Disabled OnOF = On/Off Control Pid = PID Control AlAr = Alarm	PID	C
For ON/OFF Control: Setup MENU 8-14 **For PID Control**: Setup MENU 2-8, 10-15 **For ALARM**: Setup PAGE 1/MENU 6-9 for Loop 1 using Output #1 as an alarm output					
oFSt	2	Manual Reset (Offset)	-99.9 to 99.9%	0.0	
Pb	3	Proportional Band	0.1 to 999.9%	5.0	
Ar	4	Automatic Reset	0.00 to 99.99 repeats/min.	0.10	
rAtE	5	Rate	0 to 500 seconds	0	
outL	6	Output Limit	0 to 100%	100	
cYcL	7	Cycle Time	0.1 to 60.0 seconds	10.0	
dr	8	Control Action	d = direct (cooling) r = reverse (heating)	r = reverse (heating)	
db	9	Deadband	1 to 99°F	5°F	
SPUL	10	Setpoint Upper Limit	Sensor Span	Span Max Limits, P1/M2, 4	D
SPLL	11	Setpoint Lower Limit	Sensor Span	Span Min Limits, P1/M2, 4	
orco	12	Sensor Out-of-Range	dHL = Disabled High / Low dHi = Disabled High Enabled Low dLo = Disabled Low Enabled High EnHL = Enabled High / Low	EnHL = Enabled High/Low	
oAPL	13	Control Output for Out-of-Range	0 to 100%	0	
COFF	14	Calibration Offset	Sensor Span	0	
tunE	15	Self-Tuning	OFF = Manual (none) Std = Standard SLo = Slow down fast responding process FASt = Speed up slow responding process		

PAGE 3
Loop #2

See page 24 for details.

PAGE 3: Loop 2 Control Parameters

Alpha	Menu	Selection	Available Settings	Factory Setting	Sec.
Func	1	Loop 2 Function/ Control Type	diSA = Disabled onoF = On/Off Control Pid = PID Control ALAr = Alarm	PID	C
For ON/OFF Control: Setup MENU 8-14 **For PID Control**: Setup MENU 2-8, 10-15 **For ALARM**: Setup PAGE 1/MENU 10-13 for Loop 2 using Output #2 as an alarm output					
oFSt	2	Manual Reset (Offset)	-99.9 to 99.9%	0.0	
Pb	3	Proportional Band	0.1 to 999.9%	5.0	
Ar	4	Automatic Reset	0.00 to 99.99 repeats/min.	0.10	
rAtE	5	Rate	0 to 500 seconds	0	
outL	6	Output Limit	0 to 100%	100	
cYcL	7	Cycle Time	0.1 to 60.0 seconds	10.0	
dr	8	Control Action	d = direct (cooling) r = heat	r = reverse (heating)	
db	9	Deadband	1 to 99°F	5°F	
SPUL	10	Setpoint Upper Limits	Sensor Span	Span Max Limits, P1/M3, 5	D
SPLL	11	Setpoint Lower Limit	Sensor Span	Span Min Limits, P1/M3, 5	
orco	12	Sensor Out-of-Range	dHL = Disabled High / Low dHi = Disabled High dLo = Disabled Low EnHL = Enabled High / Low	EnHL = Enabled High/Low	
cAPL	13	Control Output for Out-of-Range	0 to 100% 0		
COFF	14	Calibration Offset	Sensor Span 0		
tunE	15	Self-Tuning	OFF = Manual (none) Std = Standard SLo = Slow down fast responding process FASt = Speed up slow responding process		

PAGE 4
Alarm & Output #3

See page 27 for details.

PAGE 4: Auxiliary Alarm 3 and Output 3 OutP

Alpha	Menu	Selection	Available Settings	Factory Setting	Sec.
AL3P	1	Alarm 3 Setpoint	Instrument Sensor Span	Sensor Span	C
AL3c	2	Alarm 3 Sensor Input	Sn1 = Loop 1 Sensor Sn2 = Loop 2 Sensor Sn12 = Both Sensors	Sn12 = Both	
ALtP	3	Alarm 3 Type	Hi = High Alarm Lo = Low Alarm	Hi = High	
inhb	4	Alarm 3 Power-Up Inhibit	Off On	Off	
Output #3 Function					
Ot3F	5	Output #3 Function	0 = Disabled 1 = Auxiliary Alarm 3 only 2 = Common Alarm for Alarm 1 & Auxiliary Alarm 3 3 = Common Alarm for Alarm 2 & Auxiliary Alarm 3 4 = Alarm 1 (only) 5 = Alarm 2 (only) 6 = Common Alarm for Alarms 1 & 2 7 = Loop 2 On/Off Control 8 = Loop 2 PID Control 9 = Process Enable 10 = Common Event for Alarms 1 and 2	0 = Disabled	
Ot3R	6	Output 3 Relay	ndE = Normally De-energized (NDE), non-latching nE = Normally Energized (NE), non-latching ndEL = NDE Latching nEL = NE Latching	ndE	

PAGE 5
Sensor Setup & Calibration

See page 47 for details.

PAGE 5: Sensor Setup and Calibration CAL

Alpha	Menu	Selection	Available Settings	Factory Setting	Sec.
Unit	1	Sensor Units	°F / °C	°F	C
SEn1	2	Input 1 Sensor Type	J TC = Type J TC H TC = Type K TC 385 = .00385 RTD	J T/C	
SEn2	3	Input 2 Sensor Type	J TC = Type J TC H TC = Type K TC 385 = .00385 RTD	J T/C	
rECc	4	Factory Recovery	0 = Off 1 = Recover calibration	0	D
Unct	5	Cold Junction temp. at Cal.	0.0 to 150.0 °F	75.0	
CJCc	6	CJC Calibration Command	rdY = Ready donE = finished	rdY	
CALt	7	Sensor Cal. Type	SiLt = Simulator CuSr = Copper wire, millivolt source	SiLt	
CAL1	8	Input 1 Sensor Cal. Command	inLo = Ready for inLo range minimum inHi = Ready for inHi range maximum donE = finished	inLo	
CAL2	9	Input 2 Sensor Cal. Command	inLo = Ready for inLo range minimum inHi = Ready for inHi range maximum donE = finished	inLo	

PAGE 6 Digital Communications

See page 39 for details.

PAGE 6: Digital Communications dIC

Alpha	Menu	Selection	Available Settings	Factory Setting	Sec.
diSt	1	Mode Selection	oFF = Disabled (none) CPiF = Computer Interface LinE = ASCII Line Mode	oFF	C
bAud	2	Baud Rate	1200 2400 4800 9600 19.2 (K)	19.2 (K)	
Addr	3	Address	0 to 255	1	

PAGE 7 Manual Calibration

See page 48 for details.

PAGE:7: Manual Calibration

Alpha	Menu	Selection	Available Settings	Security
CLJ0	1	Loop 1, J T/C Zero	See Sensor Input - Manual Calibration Instructions pp. 43 & 44.	D
CLJ5	2	Loop 1, J T/C Span		
CLK0	3	Loop 1, K T/C Zero	0 to FFFF	
CLK5	4	Loop 1, K T/C Span		
CLr0	5	Loop 1, RTD Zero		
CLr5	6	Loop 1, RTD Span		
CLc0	7	Loop 1, CJC Zero		
CLc5	8	Loop 1, CJC Span		
C2J0	9	Loop 2, J T/C Zero		
C2J5	10	Loop 2, J T/C Span		
C2K0	11	Loop 2, K T/C Zero		
C2K5	12	Loop 2, K T/C Span		
C2r0	13	Loop 2, RTD Zero		
C2r5	14	Loop 2, RTD Span		
C2c0	15	Loop 2, CJC Zero		
C2c5	16	Loop 2, CJC Span		

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OMEGA warrants this unit to be free of defects in materials and workmanship and to give satisfactory service for a period of **13 months** from date of purchase. OMEGA 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 OMEGA's customers receive maximum coverage on each product. If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, 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 OMEGA's control. Components which wear or which are damaged by misuse are not warranted. These include contact points, fuses, and triacs.

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