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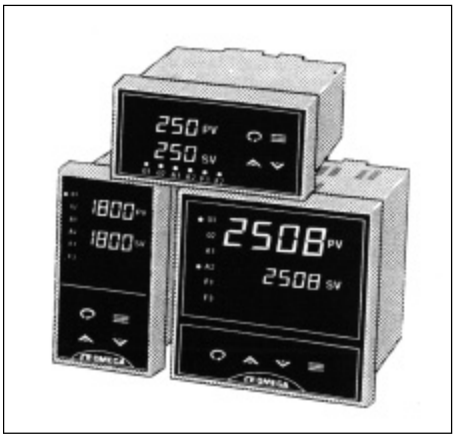

CN8540 & CN8560 Series

1/8 DIN and 1/4 DIN
Temperature/Process Controllers

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TABLE OF CONTENTS
CN8500 SERIES
1/8 & 1/4 DIN TEMPERATURE & PROCESS CONTROLLER

SECTION

TABLE OF CONTENTS (Cont'd)

SECTION 1 GENERAL INTRODUCTION

1.1 GENERAL DESCRIPTION AND CAUTIONS

The OMEGA® CN8500 Series 1/8 DIN and 1/4 DIN Temperature/ Process Controllers feature:

- ✓ "OMEGA LOGIC" (allows selection of various cooling and damping settings relative to single and multilag processes and storage effects)
- ✓ Single input, selectable, RTD, thermocouple, and linear input models available
- ✓ Non-volatile memory
- ✓ NEMA 4X front panel
- ✓ Adjustable hysteresis and heat-cool spread
- ✓ User selectable output configurations
- ✓ Auto-manual operation (bumpless)
- ✓ Selectable control modes (PID, PI, PD, P, and On/Off)
- ✓ User selectable ramp to setpoint
- ✓ Auto tuning heat or cool
- ✓ Dual output capability
- ✓ Twin branched, double wipe contacts
- ✓ Rugged molded housing with barriers and locking terminals
- ✓ 100mm depth behind panel
- ✓ Wide range power supply: 100 to 250Vac and 100 to 330Vdc

NOTES

1.2 AVAILABLE MODELS

PART NUMBER	DESCRIPTION
CN8541:F1	1/8 DIN vertical Single output controller
CN8542:F1	1/8 DIN vertical Dual output controller
CN8551:F1	1/8 DIN horizontal Single output controller
CN8552:F1	1/8 DIN horizontal Dual output controller
CN8561:F1	1/4 DIN Single output controller
CN8562:F1	1/4 DIN Dual output controller

OPTIONS

See Section 7 for information on the following options:

- RS-232 and RS-485 communications

See Section 9 for information on the following options:

- Remote setpoint
- Recorder output
- Transducer power supply
- Heater break alarm

CAUTION

High Voltage and High Temperature can cause injury and are a Fire Hazard. Please read all of the instructions, have only skilled professionals wire the unit, and use an approved temperature and/or pressure safety control. Even the best components can be damaged or may not be fail-safe.

WARNING NOTES AND ERROR CODES

DISPLAY	PROBLEM	ACTION
Err.H	Open sensor	Check sensor and wiring
Err.L	Reversed sensor	Check sensor wiring
Err.O	A/D error	Return to factory
Err.J	A/D error	Return to factory
- - - -	Display out-of-range	Sensor over- or under-range

1.3 SPECIFICATIONS

PERFORMANCE

ACCURACY:	±0.2% of full scale, ± one digit
SETPOINT ACCURACY:	1°/0.1°
TEMPERATURE STABILITY:	5µV/°C maximum; 3µV/°C typical
TC COLD END TRACKING:	0.05°C/°C ambient
NOISE REJECTION:	Common mode >100 dB Series mode >70 dB
PROCESS SAMPLING:	10 Hz (100ms)

INPUTS

THERMOCOUPLE:	6 (K, J, N, R, T, S) Maximum lead resistance 100Ω for rated accuracy.
RTD:	Platinum 2 and 3 wire, 100Ω at 0°C, DIN curve standard (0.00385)
LINEAR:	0-50mV 10-50mV 0-5V 1-5V 0-20 /4-20mA

OUTPUTS: #1 reverse acting (heating) #2 direct acting (cooling)

R	Relay 5A @ 120Vac resistive 3A @ 240Vac
F	4-20mAdc, 500Ω max.
DC	20Vdc pulse
T	Optional solid state relay rated 1A continuous @ 120/240Vac

ALARMS:	Electromechanical relay, 5A @ 120Vac, 3A @ 240Vac. Solid state relay 120/240Vac, zero voltage switched, 1A continuous, 10A surge @ 25°C

CONTROL CHARACTERISTICS

SETPOINT LIMITS:	Limited to configured range
ALARMS:	Adjustable for high/low; selectable process or deviation
RATE:	0 to 900 seconds
RESET:	0 to 3600 seconds
CYCLE TIME:	0.2 to 120 seconds
GAIN:	0 to 400
GAIN RATIO:	0 to 2.0 (in 0.1 increments)
CONTROL HYSTERESIS:	1 to 100°F/C (ON/OFF configuration)
COOL SPREAD (OUTPUT 2):	0 to 100°F/C (above setpoint)
DAMPING:	Selectable (low, normal or high)
RAMP TO SETPOINT:	1 to 100 minutes, or OFF
AUTOTUNE:	Operator initiated from front panel

GENERAL

LINE VOLTAGE:	115 to 230Vac ± 10%, 50-60 Hz 115 to 300Vdc ± 10% (Auto-Polarity)

SPECIFICATIONS (Cont'd)

DISPLAY:	
1/8 DIN	Dual, 4-digit, 0.36" (9.2 mm) LED display; process/orange, menu-parameter/ green
1/4 DIN	Dual, 4-digit LED display; process/orange, 0.55" (14 mm) menu-parameter/green, 0.36" (9.2 mm)
POWER CONSUMPTION:	Less than 6VA (@ 120Vac)
WEIGHT:	< 8oz (<226.8 g)
PANEL CUTOUT:	
1/8 DIN	3.622" x 1.772" (92 mm x 45 mm)
1/4 DIN	3.622" (92 mm) square
DEPTH BEHIND PANEL:	3.937" (100mm)
FRONT PANEL RATING:	NEMA 4X
OPERATING TEMP.:	32 to 131°F (0 to 55°C)
HUMIDITY CONDITIONS:	90% RH maximum, non-condensing
PARAMETER RETENTION:	Solid state non-volatile memory
CONNECTIONS:	Input and output via barrier strip with locking terminals
CONTACTS:	Twin bifurcated

SECTION 2 INSTALLATION INSTRUCTIONS

2.1 UNPACKING

Remove the Packing List and verify that you have received all equipment. 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 any signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

NOTE

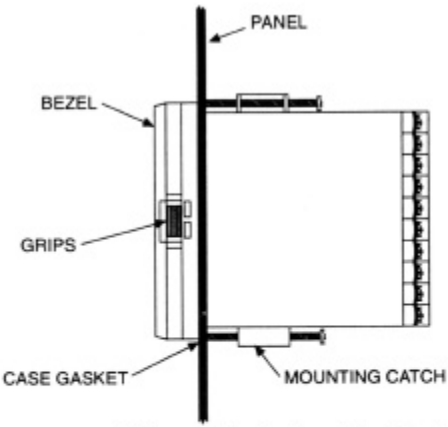
The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

2.2 LOCATING

Select a location for the controller where it will not be subject to excessive shock, vibration, dirt, moisture, oil or other liquids. The ambient temperature of the area should be 32 to 131°F (0 to 55°C).

2.3 REMOVING THE CONTROLLER

Removal of the controller chassis from the housing is accomplished by simultaneously pressing the grips on both sides of the front bezel and pulling forward. Refer to Figure 2-1.



Note: The 1/8 DIN and 1/4 DIN have identical side dimensions and profiles

Figure 2-1. Parts of the Controller

2.4 MOUNTING

1. Mount the controller in a 1.771" x 1.771" cutout using the mounting catch supplied:

   1/8 DIN: 3.622" x 1.772" (92mm x 45mm)

   1/4 DIN: 3.622" x (92mm) square

   A minimum of 4" (100mm) behind panel depth is required.

2. Remove the unit from the case. Press the grips on each side of the bezel firmly until the tabs release and pull the chassis out.
3. Verify that the foam center gasket is in place on the housing and slide the assembly through the front of the panel. The gasket should be between the panel cutout and the case bezel.
4. From the back of the panel, slide the case clip evenly onto the controller until the tabs of the collar line up with the mounting ridges. Press the tabs of the case clip into the ridges of the housing. The tabs on each side of the case clip are staggered and the tabs should be flat at all times for a correct seal. Make sure that you cannot move the case within the cutout. If you can, then you do not have a correct seal.

   NOTE

   To remove the case clip, slide a thin screwdriver under all three tabs on each side at once and pull it off the case.

5. Verify that the solid rubber gasket is not twisted and that it is behind the chassis bezel. Insert the controller into the housing and make sure that the side grips are securely latched.

2.5 PANEL CUTOUTS

Figures 2-2a and 2-2b show the panel cutouts.

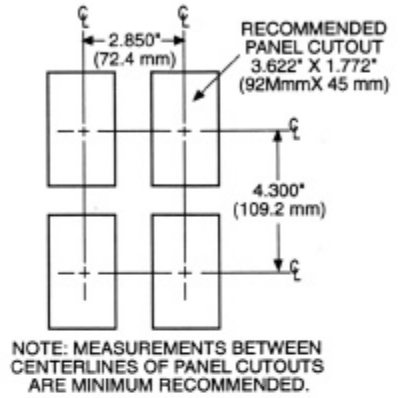


Figure 2-2a. Panel Cutout Dimensions, 1/8 DIN

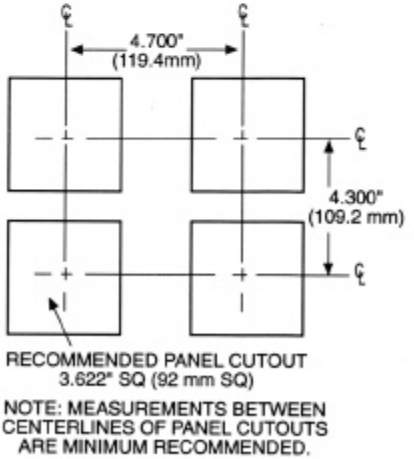


Figure 2-2b. Panel Cutout Dimensions, 1/4 DIN

2.6 CASE DIMENSIONS

Figure 2-3 shows the case dimensions.

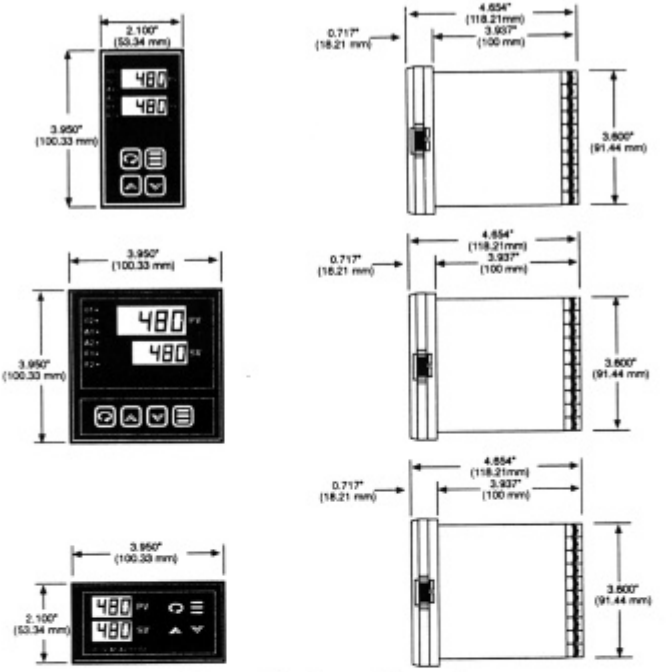


Figure 2-3. Case Dimensions

2.7 WIRING

Make all connections in accordance with the National Electrical Code and local regulations.

Wire in accordance with the wiring diagrams for your specific output module.

2.7.1 Contact Identification

Figure 2-4 shows contact information.

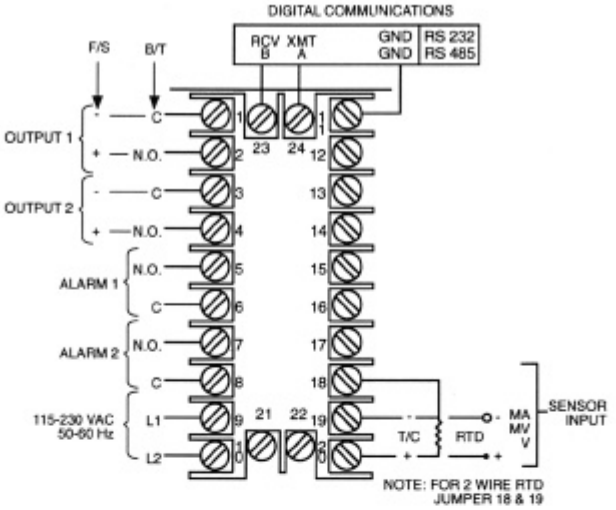


Figure 2-4. Contact Information

2.7.2 Thermocouple Wiring

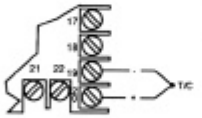


Figure 2-5. Thermocouple Wiring

Figure 2-5 shows thermocouple wiring. Before wiring, check thermocouple and extension wire to be sure that they conform to the appropriate thermocouple type. With ISA type thermocouples, the negative lead (generally colored red) is wired to terminal #19 and the positive lead is wired to terminal #20. Extension wires must be the same alloy and polarity as the thermocouple. The thermocouple circuit resistance should not exceed 100W for rated accuracy. Errors will occur if resistance is higher.

CAUTION

DO NOT RUN THERMOCOUPLE LEADS IN THE SAME CONDUIT AS THE POWER LINES. IF SHIELDED THERMOCOUPLE WIRE IS USED, TERMINATE THE SHIELD ONLY AT THE PANEL GROUND.

2.7.3 RTD Wiring

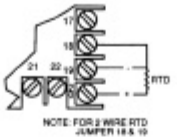


Figure 2-6. RTD Wiring

Figure 2-6 shows RTD wiring. The unit accepts 2 and 3 wire 100 Ω Platinum RTD's. 2-wire RTD's are connected to terminals #19 and #20 with a jumper connecting terminals #18 and #19. Keep leads short and use heavy gauge copper extension wires, if necessary, to minimize lead resistance. For long runs, use 3-wire RTD's and wire gauge sufficient that resistance does not exceed 10 Ω. An error of 0.2°F will result for each additional 10 Ω.

CAUTION

DO NOT RUN RTD LEADS IN THE SAME CONDUIT AS THE POWER LINES. IF SHIELDED RTD WIRE IS USED, TERMINATE THE SHIELD ONLY AT THE PANEL GROUND.

2.7.4 Sensor Configuration

NOTE

You may configure the unit for various temperature ranges or various process inputs.

FRONT PANEL SETUP

Temperature:

1. Select MENU 05.
2. Advance to SnSr parameter.
3. Select appropriate T/C or RTD range.
4. Advance to Unit parameter.
5. Select appropriate units C or F.
6. Return to main display (MODE ≡ key).

Process:

1. Select MENU 05.
2. Advance to Sn00.
3. Select suppressed or unsuppressed,
   e.g.: 1-5V, 0-5V.
4. Advance to FiLt parameter.
5. Select desired filter time constant,
   0.1s, 1.0s, 10s.
6. Select MENU 03.

7. Advance to L.Scl.
8. Select desired low scale reading e.g., 0-5V 0V = 0 counts.
9. Advance to H.Scl parameter.
10. Select desired value for full scale counts.
11. Return to main display (MODE KEY) ≡

HARDWARE SETUP (See table in Figure 2-7)

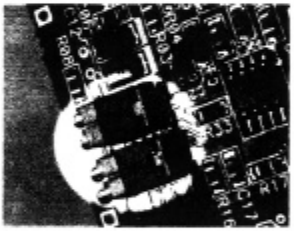
1. Remove controller from case.
2. Locate jumpers (JMP01 and JMP02) on PCB #560A260U01 near sensor input terminals.
3. Set Jumpers according to chart for desired input type.

NOTE

Calibration is necessary when changing between RTD and thermocouple (see Section 8).

WARNING

STATIC SENSITIVE DEVICES ARE PRESENT. PROPER HANDLING IS MANDATORY.



INPUT TYPE	JMP01	JMP02
Thermocouple	Out	Out
RTD	Out	Out
Voltage <100 mV	Out	Out
Voltage >100 mV	In	Out
Current Process	In	In

Figure 2-7. Jumper Configuration

2.7.5 Electrical Noise Suppression

Electrical noise is unwanted electrical signals which produce undesirable effects in measurement and control circuits. Microprocessor based equipment is especially sensitive to the effects of electrical noise. The controller has built-in circuits to reduce the effects of electrical noise from various sources. To further reduce these effects:

- Separate External Wiring: seperate connecting wires into bundles; power input and output, signal, low level alarms and outputs. Then route the individual bundles through separate conduits or metal trays.

- Use suppression devices: for additional protection, you may want to add suppression devices like an R.C. snubber at the external noise source. The R.C. snubber kit (part number 1821-101) is available for this purpose.

2.7.6 Power Wiring and Output Wiring

The CN8500 power supply accepts 100 to 250Vac and 100 to 330Vdc without any switch settings or polarity considerations. Make all wiring connections in accordance with the National Electrical Code and local regulations. Use N.E.C Class 1 wiring for all power terminals. It is advisable to fuse the incoming power line, terminals #9 and #10, with 2AG, 0.5 Amp maximum rated fuses . Be sure that only the instrument power input is fused and not the load.

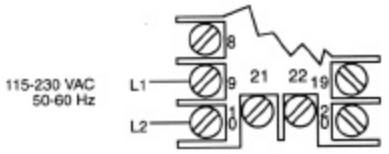
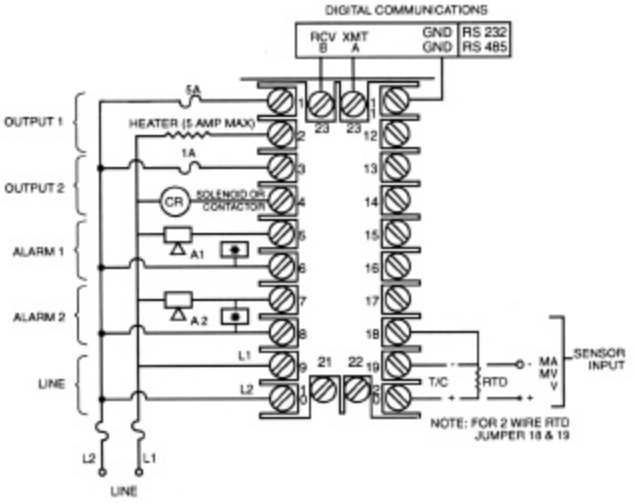


Figure 2-8. Power Wiring

2.7.7 Typical Application

Figure 2-9 shows a typical wiring application.



SECTION 3 OPERATOR INTERFACE

3.1 FRONT PANEL CONTROLS AND INDICATORS

Upon power initialization, all LED's and displays will momentarily illuminate. Within 3 seconds, the upper display will indicate either "AT48" (temperature controller) or "AP48" (process controller). The bottom display will indicate either "tFnn", "tCnn", or "PCnn", depending upon controller configuration. The last two digits "nn" indicate the software revision supplied with your controller.

NOTE
PLEASE PROVIDE THIS REVISION NUMBER WHEN CONTACTING OMEGA.

Figure 3-1. Front Panel Controls and Indicators

O1 = Output 1 present, reverse acting control
O2 = Output 2 present, direct acting control
A1 = Alarm driver for alarm 1 energized
A2 = Alarm driver for alarm 2 energized
F1 = Indicates option 1 energized
F2 = Indicates option 2 energized

= *PARAMETER/ACCESS KEY*:

a. Press for 3 seconds to enter Menu 01.
b. Allows scrolling through menu parameters.
c. Press for 2 seconds to abort ramp startup.

= *RAISE KEY*: increases selected parameter value and setpoint temperature; fast step progression after delay

= *LOWER KEY*: decreases selected parameter value and setpoint temperature; fast step progression after delay

= *MODE KEY*: (Operating, standby, autotune, manual, unlatching alarm)

a. Press any time in menu to return to setpoint.
b. Press for 3 seconds to enter standby mode
c. Press for 6 seconds to enter autotuning or manual mode, depending on damping selection (refer to Section 4.1.3).
d. Deactivation of latching alarms.

PV = PROCESS VALUE DISPLAY
A steady state display of actual process value or error codes.

SV = SETPOINT/PARAMETER DISPLAY

a. A steady state display of setpoint
b. A steady state display of manual % output
c. An alternating display indicating Standby mode
d. An alternating display indicating the controller is tuning
e. An alternating display of parameters and their set values.

SECTION 4 MENU ORGANIZATION AND PARAMETER DESCRIPTION

4.1 MENU OPERATION

This controller has five MENU levels, in which specific parameters can be set. Before operating, set parameters fitted to the controller system according to the procedure detailed in Section 5 to ensure correct operation of the controller. Place the system in "StandBy" by pressing and holding in the *MODE* (☰) key for approximately 3 seconds while setting parameters. While the parameter label and value are displayed, change the parameter by using the *RAISE* (⮝) and *LOWER* (⮟) keys.

The controller is configured using five menus. This eliminates the confusion and bulkiness of one long menu and enables accessing only the relevant parameters.
Refer to the flow charts on the following pages.

4.1.1 MENU "00"

When in this menu, all keys are temporarily disabled.

Press the *PARAMETER/ACCESS* (↻) key for 3 seconds. This allows you to enter the access code selection area. When in this menu, no parameters can be changed except the access code to select a different menu. Also, note that the only active button is the *PARAMETER/ACCESS* (↻) key. The unit cannot be placed in standby or manual operation. However, if a latching alarm is triggered, you can deactivate the alarm by pressing the *MODE* (☰) key (provided the alarm condition has been cleared).

4.1.2 MENU "01"

This menu allows total operation of all keys. When in this menu, only the setpoint can be changed using the appropriate *RAISE* (⮝) or *LOWER* (⮟) keys. Standby, tuning and/or manual operation are now also available.

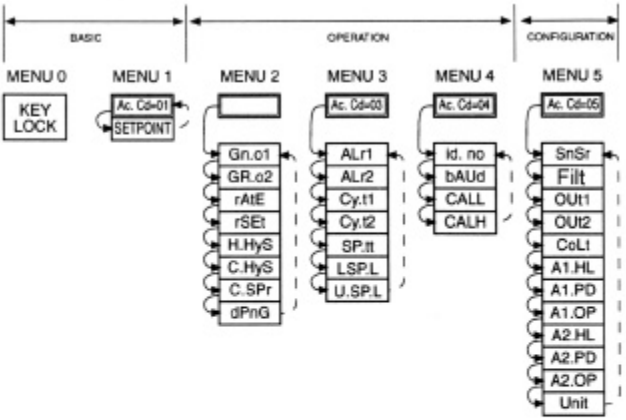


Figure 4-1. Temperature Controller Menu Hierarchy

4.1.3 MENU "02" (Temperature Controller)

Gn.o1 = Gain output 1 (PID heat gain) adjustable from 0 to 400

Gr.o2 = Gain ratio output 2 (PID cool gain ratio) adjustable from 0.0 to 2.0

rAtE = Rate, (PID rate) adjustable from 0 to 900 seconds

rSEt = Reset, (PID reset) adjustable from 0 to 3600 seconds

H.HyS = Heat hysteresis (ON/OFF cool hysteresis) adjustable from 1 to 100°

C.HyS = Cool hysteresis (ON/OFF cool hysteresis) adjustable from 1 to 100°

SPr = Spread, adjustable from 0 to 100°. Separation of cooling activation from setpoint.

dPnG = Damping (autotune damping select) adjustable, Lo, Normal, Hi, Off

Lo = Fast recovery from process upset with slight overshoot. Single lag processes, e.g., adequately powered with excellent coupling between load and sensor; require quick response and the tightest possible temperature control.

Normal = Normal recovery from process upsets with no overshoot. Two lag processes, e.g., heaters that are properly sized; good coupling between load and sensor.

Hi = Slow recovery from process upsets, no overshoots. Three lag processes, i.e., are overpowered; have multiple lags; poor coupling between heater and probe.

Off = Autotune feature is de-selected and enables manual output control capability.

4.1.4 MENU "03" (Temperature Controller)

ALr1 = Alarm 1 (Alarm 1 preset). Adjustable over sensor range

ALr2 = Alarm 2 (Alarm 2 preset). Adjustable over sensor range

Cy.t1 = Cycle time output 1 (PID output 1 cycle time) adjustable from 0 to 120 seconds. Setting to "0" initiates 200ms timebase.

Cy.t2 = Cycle time output 2 (PID output 2 cycle time) adjustable from 0 to 120 seconds. Setting to "0" initiates 200ms timebase.

NOTE

Cycle time setting is required for smooth proportional operation of valves and phase fired controllers. Setting the cycle time too long will cause ripple in the process, whereas too short a setting will decrease relay contactor life.

OUTPUT MODULE	RECOMMENDED SETTING RANGE
R	5 to 120
F	Must be set to "0"
DC	0 to 120
T	0 to 120

SP.tt = Setpoint target time (ramp-to-setpoint) adjustable from 1 to 100 minutes. Select OFF to disable.

L.SP.L = Lower setpoint limit, adjustable over sensor range.

U.SP.L = Upper setpoint limit, adjustable over sensor range.

4.1.5 MENU "04" (Temperature Controller)

id.no = Identification number (communication ID number) from 0 to 99.

bAUd = Baud, parity, and data bit selection

3.o.7 = 300 baud/odd parity/7 data bits/2 stop bits

6.o.7 = 600 baud/odd parity/7 data bits/2 stop bits

12.o.7 = 1200 baud/odd parity/7 data bits/2 stop bits

24.o.7 = 2400 baud/odd parity/7 data bits/2 stop bits

3.n.8 = 300 baud/no parity/8 data bits/1 stop bit

6.n.8 = 600 baud/no parity/8 data bits/1 stop bit

12.n.8 = 1200 baud/no parity/8 data bits/1 stop bit

24.n.8 = 2400 baud/no parity/8 data bits/1 stop bit

CAL.L = Calibration low (offset adjustment ±10% of range)

CAL.H = Calibration high

4.1.6 MENU "05" (Temperature Controller)

NOTE

As a precaution, all outputs are turned OFF in this menu. Therefore, these parameters must be selected prior to startup.

MENU	DESCRIPTION	SUBMENU	DESCRIPTION
SnSr	= Sensor Type	Code	Sensor
		c.A	K thermocouple
		J	J thermocouple
		n	N thermocouple
		r	R thermocouple
		t	T thermocouple
		S	S thermocouple
		P	RTD
		d	RTD (decimal range)
Filt	= Digital Filtering		0.1 - 10.09
OUt1	= Output 1 action	Ht.P	Heat PID
		Ht.0	Heat ON/OFF
OUt2	= Output 2 action	CL.P	Cool PID
		CL.0	Cool ON/OFF
CoL.t	= Cooling type	H20	Water (non linear output relative to temp. deviation)
		nor	Normal (linear output relative to temp. deviation)
A1.HL	= Alarm 1 High/Low Select	Lo	Low
		HI	High
A1.PD	= Alarm 1 Type	Pr	Process
		dE	Deviation
A1.OP	= Alarm 1 Output	Off	Off
		nor	Normal
		LAt	Latch
A2.HL	= Alarm 2 High/Low Select	Lo	Low
		HI	High
A2.PD	= Alarm 2 Type	Pr	Process
		dE	Deviation
A2.OP	= Alarm 2 Output	Off	Off
		nor	Normal
		LAt	Latch
Unit	= Degrees	C	Celsius
		F	Fahrenheit

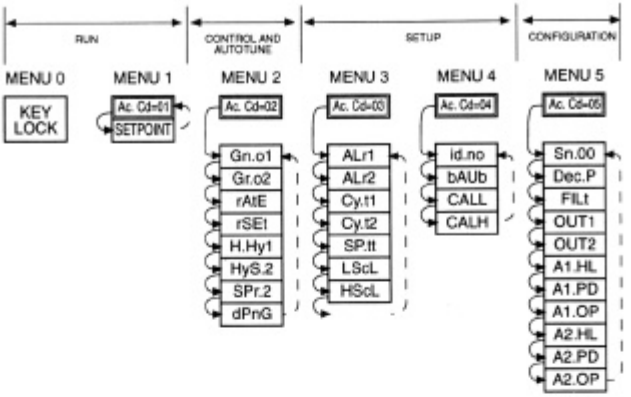


Figure 4-2. Process Controller Menu Hierarchy

4.1.7 MENU "02" (Process Controller)

Gn.o1 = Gain output 1, adjustable from 0 to 400
Gr.o2 = Gain ratio output 2, adjustable from 0.0 to 2.0
rAtE = Rate, (derivative) adjustable from 0 to 900 seconds
rSEt = Reset, (PID reset) adjustable from 0 to 3600 seconds
HyS1 = Output #1 hysteresis adjustable from 1 to 100 units
HyS2 = Output #2 hysteresis adjustable from 1 to 100 units
SPr.2 = Spread adjustment output #2, adjustable from 0 to 100 units
dPnG = Damping (autotune damping select) adjustable, Lo, Normal, Hi, Off

Lo = Fast recovery from process upset with slight overshoot. Single lag processes, e.g., adequately powered with excellent coupling between load and sensor; require quick response and the tightest possible process control.

Normal = Normal recovery from process upsets with no overshoot. Two lag processes, e.g., heaters that are properly sized; good coupling between load and sensor.

Hi = Slow recovery from process upsets, no overshoots. Three lag processes, i.e., are overpowered; have multiple lags; poor coupling between load and sensor.

Off = Autotune feature is de-selected and enables manual output control capability.

4.1.8 MENU "03" (Process Controller)

ALr1 = Alarm 1 (Alarm 1 preset). Adjustable over sensor range

ALr2 = Alarm 2 (Alarm 2 preset). Adjustable over sensor range

Cy.t1 = Cycle time output 1 (PID output 1 cycle time) adjustable from 0 to 120 seconds. Setting to "0" initiates 200ms cycle time

Cy.t2 = Cycle time output 2 (PID output 2 cycle time) adjustable from 0 to 120 seconds. Setting to "0" initiates 200ms cycle time.

NOTE

Cycle time setting is required for smooth proportional operation of valves and phase fired controllers. Setting the cycle time too long will cause ripple in the process, whereas too short a setting will decrease relay contactor life.

OUTPUT MODULE	RECOMMENDED SETTING RANGE
B	5 to 120
E	0 to 120
F	Must be set to "0"
S	0 to 120
T	0 to 120

SP.tt = Setpoint target time (ramp-to-setpoint) adjustable from 1 to 100 minutes. Select OFF to disable.

L.ScL = Low end engineering units, adjustable from -1999 to 9999.

H.ScL = High end engineering units, adjustable from -1999 to 9999.

4.1.9 MENU "04" (Process Controller)

id.no = Identification number (communication ID number) from 0 to 99.

bAUd = Baud, parity, and data bit selection

3.o.7 = 300 baud/odd parity/7 data bits/2 stop bits

6.o.7 = 600 baud/odd parity/7 data bits/2 stop bits

12.o.7 = 1200 baud/odd parity/7 data bits/2 stop bits

24.o.7 = 2400 baud/odd parity/7 data bits/2 stop bits

3.n.8 = 300 baud/no parity/8 data bits/1 stop bit

6.n.8 = 600 baud/no parity/8 data bits/1 stop bit

12.n.8 = 1200 baud/no parity/8 data bits/1 stop bit

24.n.8 = 2400 baud/no parity/8 data bits/1 stop bit

CAL.L = Calibration low (offset adjustment ±10% of range)

CAL.H = Calibration high

4.1.10 MENU "05" (Temperature Controller)

NOTE

As a precaution, all outputs are turned OFF in this menu. Therefore, these parameters must be selected prior to startup.

Sn.00	= Input zero level	U.SU	Unsuppressed range, identifies input signal from 0 to span, i.e., 0-20mA vs. 4-20 mA
		Su	Suppressed
Dec.P	= Decimal Point	999	No Decimal Point
		99.9	One Decimal Point
		9.99	Two Decimal Points
Filt	= Digital Filtering	0.1s	.1 Second
		10.0s	10.0 Seconds
OUt1	= Output 1 action	Pid	PID
		ON.F	ON/OFF
OUt2	= Output 2 action	Pid	PID
		ON.F	ON/OFF
A1.HL	= Alarm 1 High/Low Select	Lo	Low
		HI	High
A1.PD	= Alarm 1 Type	Pr	Process
		dE	Deviation
A1.OP	= Alarm 1 Output	Off	Off
		nor	Normal
		LAt	Latch
A2.HL	= Alarm 2 High/Low Select	Lo	Low
		HI	High
A2.PD	= Alarm 2 Type	Pr	Process
		dE	Deviation
A2.OP	= Alarm 2 Output	Off	Off
		nor	Normal
		LAt	Latch

SECTION 5 OUTPUTS AND ALARMS

5.1 OUTPUTS

NOTE

Temperature controller: Units with "Heat" only set "Cool" to ON/OFF. Units with "Cool" only set "Heat" to ON/OFF.

Process controller: Units with "Out 1" only set "Out 2" to ON/OFF. For units with "Out 2" only set "Out 1" to ON/OFF.

The controller offers various preselected output configurations which are:

R: This 5A/3A (120/240Vac) relay is used for switching resistive loads.

WARNING NOTE

This output should not be used with mechanical contactors or solenoids because they generate an excessive EMF field which can interfere with the controller's microprocessor. Instead, the "T" output is recommended for these applications.

F: This 4-20mA output can deliver full output to a load having an input impedance of 500 Ω maximum. The cycle time setting must be ZERO when utilizing this output.

DC: Pulsed 20Vdc output for driving solid state relays. Cycle time can be set to optimize load response time requirements.

T: This solid state relay is zero voltage switched and optically isolated from the drive signal. Resistive loads up to 1 amp at 120/240Vac may be controlled directly. Using direct control there is no limit on the cycle time setting (down to 200 milliseconds [i.e., Setting "0" in parameters "Cy.t1" and "Cy.t2"]). Larger loads may be controlled using an external contactor. In this case, it is advisable to use cycle settings of 10 seconds or greater to minimize contactor wear. External suppression of the contactor is recommended.

See Section 2.7.5 on electrical noise.

5.2 ALARMS

The alarm output(s) can be of two types: a mechanical relay similar to the "R" output or a solid state relay similar to the "T" output. The configuration will be selected according to the following criteria:

NOTE

"T" solid state relays are not capable of switching dc loads.

5.2.1 Alarm Types

Two types of alarms are configurable:

Process = Settable over the range of the controller. Will alarm at one preset temperature setting.

Deviation = Adjustable from 1 to 100 degrees. Will trip at the difference from setpoint.

5.2.2 Alarm Operation

Process/Deviation

Set the unit's alarms independently as process and/or deviation alarms in Menu "05".

Latching/Non-Latching

Configure the unit latching alarms by selecting "latch" in the alarm output section of Menu "05".

Unlatching

When a latching alarm has been activated and the alarm condition has been removed, press and hold the mode key for a few seconds in order to unlatch the alarm.

SECTION 6 OPERATION

6.1 OPERATION

When the unit is first energized, all LED segments and indicators illuminate to verify proper operation. The display then identifies the temperature display units and the software revision number. Refer to Section 3.1.

After the unit has been energized for 3 seconds, the upper display will indicate the process temperature and the lower display will indicate the setpoint temperature.

Press the *PARAMETER/ACCESS* (↻) key one time. If the display does not change, continue pressing for 3 seconds (this signals that you are in "Menu 00". Refer to Section 4.1.1). The bottom display now alternately displays "Ac.Cd". and a value from 00 to 05. This value identifies the menu selected. To change the menu, use the *RAISE* (∧) or *LOWER* (∨) key.

Pressing the *PARAMETER/ACCESS* (↻) key will now take you through the parameters of the selected menu.

The unit is shipped with initial setups determined by the ordering code, i.e., sensor type, temperature units, output functions, etc. The following explains how you would change the unit in the field.

After the unit completes the turn on diagnostics, press the *PARAMETER/ACCESS* (↻) key.

Select Access code 05 via the RAISE (∧) or LOWER (∨) key.

Press the *PARAMETER/ ACCESS* (↻) key and the sensor display (SnSr) will be alternately displayed with the sensor type.

Again, use the RAISE (∧) or *LOWER* (∨) key to select the appropriate sensor.

Pressing the *PARAMETER/ACCESS* (↻) key will now alternately display "OUt1" with the output type selected, i.e. Ht.P, Ht.0, or ALr representing heat PID, heat ON/OFF, or Alarm. Select the desired function using the RAISE (∧) or *LOWER* (∨) key. Continue through Menu 05 and select the other functions as required. Once you have selected and modified the parameter values of interest, you can return to the normal display by depressing the *MODE* (☰) key. You do not have to scroll through the complete menu. When you return to the normal display, you can now select another menu. When all parameters have been adjusted, return to Menu 01. Now, press the *MODE* (☰) key to display the process temperature and setpoint.

NOTE

If certain functions are not selected, the parameters associated with those functions will not be displayed.

6.2 TUNING THE CONTROLLER

6.2.1 Introduction

Utilizing "OMEGA LOGIC" and "on demand" auto tuning, the controller automatically sets proportional band, rate and reset before the process reaches setpoint. "OMEGA LOGIC" allows the operator to select various damping settings relative to single and multilag process and storage effects. Refer to Section 4.1.3. These selections provide quick stabilization of both the heating and cooling process without overshoot, hunting or cycling.

6.2.2 Automatic PID Tuning Procedure

For optimum results...

1. Generally speaking, the wider the temperature or process variable spread, the better the results.
2. Multi-zone applications require Auto-tune units on each zone and simultaneous tuning.
3. Loss of power or a turn-off during the Auto-tune cycle requires a restart for reliable PID values.
4. Change of state process (i.e., solid to liquid or liquid to gas) may introduce erroneous tuning parameters during process warm-up. Tuning should be done after the change has occurred.
5. Non PID outputs must be disabled or configured not to interfere with tuning.

When the damping selection (dPnG, Menu 02) is set to HI, Lo, or nL the *MODE* (☰) key will function as a standby-tune select key.

Press and hold the *MODE* (☰) key for 3 seconds to initiate Stand-by mode. Continue holding the key to initiate Auto-tune mode. Upon initiating the tune mode, all PID parameters will be engaged: Auto-tune is now in progress and tunE will be alternately displayed with the setpoint until tuning is complete.

To abort Auto-tune mode when in Auto-tune, press and hold the *MODE* (☰) key again for a few seconds.

If desired, the parameters can be altered manually after Auto-tune.

6.2.3 Manual Tuning Procedure

The following procedure can be used for tuning instead of Auto-tune.

Ziegler-Nichols PID Tuning Method

This has been an accepted method of tuning PID (3-Mode) controllers using a minimum of time and setup to reach effective tuning parameters. OMEGA suggests using a recording device for maximum results.

1. On Heat/Cool process, disable the cooling device.
2. Apply power to the process and immediately place the controller in Stand-by by pressing the *MODE* (☰) key for 3 seconds. The display will alternate between the setpoint and Stby.
3. Adjust SP to desired setpoint setting.
4. Adjust rate (rAtE) and reset (rSEt) to "00" (Menu 02).
5. Set heating gain (Gn.o1) to "01".
6. Enter cycle time for heating (Cy.t1) and cooling (Cy.t2) outputs appropriate for the devices being controlled.
7. Set gain ratio (Gr.o2) to "1.0".
8. Set cooling type (CoL.t) to "nor".
9. Place controller in operation by pressing the *MODE* (☰) key until the setpoint value appears.
10. Double the gain (Gn.o1) until a small sustained oscillation is present.
11. Measure the period of one cycle of oscillation "T". Refer to Figure 6-1.

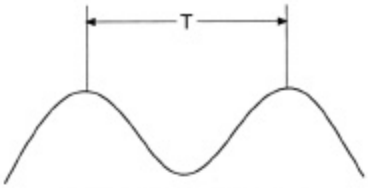


Figure 6-1. One Cycle

12. Divide the period of oscillation by 8. The resulting number is the rate time (rAtE) in seconds. Multiply this number by 4, and this is the reset time (rSEt) in seconds.
13. Enter the rate (rAtE) and reset (rSEt) times.
14. Multiply the gain (from step #10) by 0.6 and enter the number as gain (Gn.o1).
15. Enable the cooling device. If over cooling exists, decrease the gain ratio (Gr.o2) in steps of 0.1 until temperature oscillation decreases. If cooling is sluggish, increase the cooling gain (Gr.o2) in steps of 0.1 until the desired result is achieved.
16. The controller is now tuned and will compensate for changes in:
    Setpoint
    Line voltage
    Ambient temperature
    Process load

6.2.4 Notes on Rate and Reset Adjustments

1. When rate and reset are set to zero, the derivative and integral terms are disabled.
2. The minimum ratio for non-zero settings of rate to reset is limited to 1:4. Therefore, as rate is increased, reset will automatically increase at 4 times the rate value.

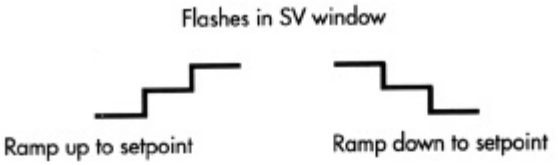
6.3 RAMP-TO-SETPOINT

In Menu 03, the parameter SP.tt allows the operator to enter a target time from 1 to 100 minutes for the controller to reach setpoint. This ramp setpoint can be initiated by two methods:

1. If, during initial turn on, a target time has been entered into this parameter, the controller will ramp to this value.
2. The operator can initiate Ramp-to-Setpoint by returning to setpoint after entering a value in SP.tt and the setpoint is a minimum of 5°F from the existing process temperature.

Example:

When power is applied to the controller, the target setpoint is loaded from "NOVRAM". Then an initial setpoint is automatically selected based on the process temperature on power up (i.e., initial setpoint is equal to the process temperature on power up). The initial setpoint is then gradually incremented towards the target setpoint.



NOTES

1. Setpoint target time is adjustable from OFF to 100 minutes.
2. While in ramp startup, the setpoint will not be adjustable. (All front panel keys are disabled).
3. While in ramp startup, if the *PARAMETER/ACCESS* (⟲) key is pressed in and held for 3 seconds, the ramp startup will be aborted and the target setpoint will be the setpoint.
4. Minimum of 5°F deviation between setpoint and process is required to initiate a ramp to setpoint.

6.4 AUTO/MANUAL FUNCTION

When the damping selection (Menu 02 dPnG) is set to OFF, the *MODE* (☰) key will function as a manual select key.

Holding the *MODE* (☰) key for a few seconds puts the controller into standby (Stby).

Continuing to press in the *MODE* (☰) key initiates manual mode.

Upon initiation of manual mode, the % value of the PID output will be preloaded in the % power output. The % power output will be adjustable from 100% to -100% (" - " is for the cool output). While in manual mode the setpoint display will alternate between the % output selected and the output controlled, Cool or HEAt.

NOTE

Manual control mode will continue output even when an error condition, such as ERR.J, ERR.H, EFF.L, or ERR.O is detected.

SECTION 7 DIGITAL COMMUNICATIONS

7.1 COMMUNICATIONS MODULES

Two communication options are available for the unit to allow interfacing to the most common industry standards.

7.1.1 RS-232

This method allows bi-directional data transfer via a three conductor cable consisting of signal ground, receive input, and transmit output. It is recommended for less than fifty feet between computer terminal and the instrument. Note that multiple instruments cannot be connected to the same port. The RS-232 port is optically isolated to eliminate ground loop problems. Note that in a typical installation, "data out" of the computer/terminal connects to the "RCV" terminal. "Data In" connects to the "XMT" terminal.

If shielded cable is used, it should be connected to the frame ground at one end only. Signal ground is to be connected at appropriate ground terminals (see Wiring Diagram, Section 2.7.7).

7.1.2 RS-485

The RS-485 multipoint capability allows up to thirty-two (32) controllers to be connected together in a half duplex network. This method allows bi-directional data transfer over a shielded twisted pair. The twisted pair is a transmission line and terminating resistors are required at the most distant ends of the line to minimize reflections (Typically 60 Ω from each line to signal ground). The RS-485 circuit is fully optically isolated, eliminating ground loop problems. Parallel drops from the transmission lines should be kept as short as possible. Alternately, the line could be daisy chained at each controller. Note that the polarity of the line is important and each device will specify an "A" or "B" connection (see Wiring Diagram, Section 2.7.7).

7.2 INTERFACE EXAMPLES

Introduction

This section describes the protocol for communication between a CN8500 controller and either a video display terminal or computer (referred to below as "the host"). Message strings can be of two types - commands from host to controller or responses from controller to host.

General Considerations

One host and many controllers may be interconnected on a single bus. The host may send commands to any controller and may receive responses from any controller. Each controller on the bus is assigned an identification code between 0 and 99. No two controllers on a bus may have the same identification code. Controllers are not capable of communicating with other controllers.

Every valid message begins with a pound-sign ("#") character.

Every valid message ends with a "<CR>". Transmission of a backspace character by the host causes all controllers to 'forget' the most recently received character.

A valid message is composed of start message, controller ID code, command, parameter, and data.

Every response begins with a line-feed ("<LF>") character and ends with a carriage-return line-feed pair ("<CRLF>").

CAUTION

Modifying parameter #19 by host may cause loss of data link.

7.2.1 General Message Format

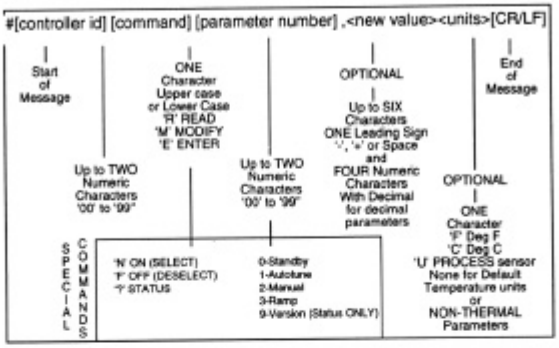


Figure 7-1. General Message Format

7.2.2 Serial Communication Data Format

BAUD CODE	BAUD	PARITY	DATA	STOP
0	300	ODD	7	2
1	600	ODD	7	2
2	1200	ODD	7	2
3	2400	ODD	7	2
4	300	NONE	8	1
5	600	NONE	8	1
6	1200	NONE	8	1
7	2400	NONE	8	1

Figure 7-2. Serial Communication Data Format

7.2.3 Communications Notes

1. The controller will respond with "<LF>ERROR<CR><LF>" for messages containing invalid/incorrect commands, parameter number, or data (with decimal, if needed).
2. Process Value is a READ-only parameter. Therefore, a modify or enter command for Process Value will result in the following response from the controller:

   "<LF>ERROR<CR><LF>"
3. For MODIFY or ENTER command: if the new value is out of the parameter's range, the controller will set the new value to the highest or lowest allowable parameter value.
4. Parameters with DECIMAL data *must* contain a decimal character in the DATA portion of the message.
5. RAMP "ON" command will not be executed if RAMP time is set to ZERO or Absolute Deviation between setpoint and process value is less than 5°F.
6. Autotune, Manual, and Ramp commands are mutually exclusive, i.e., selecting Manual while AUTOTUNE is selected will abort Autotune and select Manual.
7. If the controller is in stand-by mode, selecting Autotune, Manual, or Ramp will de-select Standby.
8. Setpoint should not be modified while the controller is in AUTOTUNE or Ramp-to-Setpoint mode.
9. The Setpoint ENTER command should not be executed while the controller is in MANUAL mode.

7.3 PARAMETER LISTS & SAMPLE COMMANDS

7.3.1 Parameter List (Temperature Controller)

TEMPERATURE CONTROLLER PARAMETER LIST

PARAMETER NUMBER	PARAMETER	MIN	MAX
00	PROCESS VALUE	SENSOR RANGE	SENSOR RANGE
01	SETPOINT	LOW SP LIMIT	HIGH SP LIMIT
02	ACCESS CODE	0	5
03	GAIN OUTPUT 1	0	400
04	GAIN RATIO 2	0.0	2.0
05	RATE	0	900
06	RESET	0	3600
07	HEAT HYSTERESIS	1	100
08	COOL HYSTERESIS	1	100
09	COOL SPREAD	0	100
10	DAMPING (SEC 4.1.3)	0	3
11	ALARM #1	SENSOR RANGE	SENSOR RANGE
12	ALARM #2	SENSOR RANGE	SENSOR RANGE
13	CYCLE TIME 1	0	120
14	CYCLE TIME 2	0	120
15	SETPOINT TARGET TIME	0 (0=OFF)	100
16	LOW SETPOINT LIMIT	SENSOR RANGE	SENSOR RANGE
17	HIGH SETPOINT LIMIT	SENSOR RANGE	SENSOR RANGE
18	CONTROLLER ID	0	99
19	BAUD RATE (FIG 7-2)	0	7

Figure 7-3. Parameter List (Temperature Controller)

7.3.2 Requesting a Parameter from a Controller

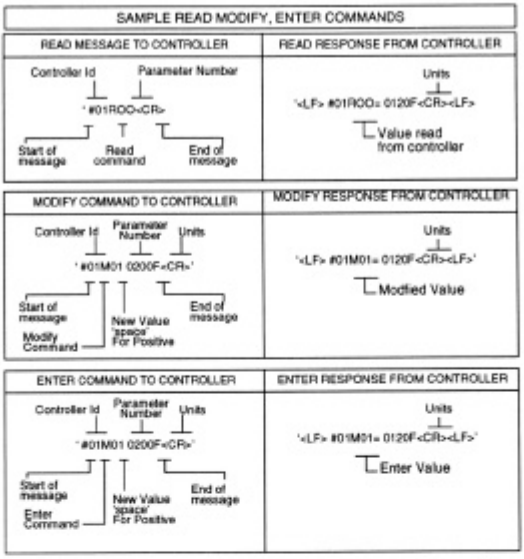


Figure 7-4. Requesting a Parameter from a Controller

7.3.3 Parameter List (Process Controller)

PROCESS CONTROLLER PARAMETER LIST

PARAMETER NUMBER	PARAMETER	MIN	MAX
00	PROCESS VALUE	LOW SCALE	HIGH SCALE
01	SETPOINT	LOW SCALE	HIGH SCALE
02	ACCESS CODE	0	5
03	GAIN OUTPUT 1	0	400
04	GAIN RATIO 2	0.0	2.0
05	RATE	0	900
06	RESET	0	3600
07	HYSTERESIS 1	1	100
08	HYSTERESIS 2	1	100
09	SPREAD 2	0	100
10	DAMPING (SEC 4.2.3)	0	3
11	ALARM #1	LOW SCALE	HIGH SCALE
12	ALARM #2	LOW SCALE	HIGH SCALE
13	CYCLE TIME 1	0	120
14	CYCLE TIME 2	0	120
15	SETPOINT TARGET TIME	0 (0=OFF)	100
16	LOW SCALE	-1999	9999
17	HIGH SCALE	-1999	9999
18	CONTROLLER ID	0	99
19	BAUD RATE (FIG 7-2)	0	7

Figure 7-5. Parameter List (Process Controller)

4. Wire the millivolt source and digital thermometer to terminals 20 (+) and 19 (-), observing polarity. Use thermocouple extension wire. Wire RTD to terminals 18, 19, and 20 as per RTD label.

NOTE

Calibration of one thermocouple will calibrate all the thermocouples (+/ -)%).

- The statement above also applies to RTD calibration.
- The units must be calibrated for either RTD OR thermocouple.
- Use an ambient compensating calibrator for the calibration procedure.

8.1.3 Procedure

1. Select sensor type in Menu "05" of controller.
2. Set calibration sensor input to low calibrate sensor temperature.
3. Adjust the calibration low (Menu "04") until the calibrator and the controller process temperature agree.
4. Set calibration sensor input to high calibrate sensor temperature.
5. Adjust the calibration high (Menu "04") until the calibrator and the controller process temperature agree.
6. Set the calibration sensor input to an arbitrary temperature and check to see if the controller agrees. If the controller disagrees with the calibrator (greater than + 1°), repeat Steps 2 through 6.

CALIBRATION TABLE
(in °F)

THERMOCOUPLE	CAL LOW	CAL HIGH
K	0	2460
J	0	1400
N	0	2370
R	0	3200
T	0	600
S	0	3200
RTD (PLATINUM 100Ω)	**CAL LOW**	**CAL HIGH**
P	-190	1562
D	-190	450

7. Set LSPL and usPL to appropriate values.

INITIAL PARAMETER VALUES			
PARAMETER NUMBER	PARAMETER	LABEL	INITIAL VALUE
00	PROCESS	-	100
01	SET POINT	-	-
02	ACCESS CODE	Ac.Cd.	-
03	HEAT GAIN	Gn.01	20
04	GAIN RATIO	Gr.02	1.0
05	RATE	rate	0
06	RESET	rSet	0
07	HEAT HYSTERESIS	H.HyS	2
08	COOL HYSTERESIS	C.HyS	2
09	COOL SPREAD	C.Spr	20
10	TUNE SELECT	dPnG	Off
11	ALARM 1 S.P.	ALr1	105
12	ALARM 2 S.P.	Alr2	95
13	CYCLE TIME OUT 1	Cy.t1	5
14	CYCLE TIME OUT 2	Cy.t2	5
15	SP RAMP TIME	SP.ti	Off
16	LOWER SP LIMIT	L.SP.L	0
17	HIGHER SP LIMIT	U.SP.L	1400
18	COMM ID	id.no	01
19	BAUD RATE	baud	12.0.7.

Figure 8.1. Parameters and Initial Values

MENU "05"
(Temperature Controller)

Sensor Type	SnSr	J
Output 1 Function	Out 1	Ht.P
Output 2 Function	Out 2	C.L.P.
Cool Type	Col.t	Nor
Alarm 1 Hi/Low	A1.H.l	H1
Alarm 1 Proc/Dev	A1.P.d	Lo
Alarm 2 Hi/Low	A2.H.L	PR
Alarm 2 Out Sel	A2.O.P	Off
Temperature units	Unit	F

8.1.4 Functions Test (Temperature Controller)

Using the chart below, observe the proper actuation of outputs on the unit by changing process:

Process Value	Heat Output	Cool Output	Alarm 1	Alarm 2
94	Cycling	Off	Off	On
95	Cycling	Off	Off	-
96	Cycling	Off	Off	Off
100	-	-	Off	Off
104	Off	Cycling	Off	Off
105	Off	Cycling	-	Off
106	Off	Cycling	On	Off

INITIAL PARAMETER VALUES

PARAMETER NUMBER	PARAMETER	LABEL	DEFAULT VALUE
00	PROCESS	----	1.00
01	SETPOINT	----	1.00
02	ACCESS CODE	Ac.Cd	02
03	GAIN	Gn.o1	20
04	GAIN RATIO	Gr.o2	1.0
05	RATE	rAtE	0
06	RESET	rSEt	0
07	HEAT HYSTERESIS	HYS.1	0.02
08	COOL HYSTERESIS	HYS.2	0.02
09	COOL SPREAD	SPr.2	0.00
10	DAMPING	DPNG	3
11	ALARM 1	ALr1	1.05
12	ALARM 2	ALr2	0.95
13	CYCLE TIME 1	CY.t1	5
14	CYCLE TIME 2	CY.t2	5
15	SP TARGET LIMIT	SP.tl	0
16	LOW SETPOINT LIMIT	L.SCL	0.00
17	HIGH SETPOINT LIMIT	H.SCL	50.00
18	COMM ID	Id.no	01
19	BAUD RATE	bAUd	12.0.7

Figure 8.1 Parameters and Initial Values

MENU "05"
(Process Controller)

Sensor Zero	Sn.00	U.SP
Decimal Position	dEc.P	9.99
Filter Time	FILt	1
Output 1 Function	OUT1	Ht.p
Output 2 Function	OUT2	CL.P
Alarm 1 Hi/Low	A1.H.L	HI
Alarm 1 Proc/Dev	A1.P.d	Pr
Alarm 1 Output Select	A1.OP	Off
Alarm 2 Hi/Low	A2.H.L	LO
Alarm 2 Proc/Dev	A2.P.D	Pr
Alarm 2 Output Select	A2.OP	Off

8.1.5 Functions Test (Process Controller)

Using the chart below, observe the proper actuation of outputs on the unit by changing process:

Process Value	Heat Output	Cool Output	Alarm 1	Alarm 2
.94	Cycling	Off	Off	On
.95	Cycling	Off	Off	-
.96	Cycling	Off	Off	Off
1.00	-	-	Off	Off
1.04	Off	Cycling	Off	Off
1.05	Off	Cycling	-	Off
1.06	Off	Cycling	On	Off

8.1.6 Process Control Calibration

1. Determine the range, in order to set suppressed or unsuppressed and appropriate decimal point position.

EXAMPLE:	Suppressed range	10-50MV	4-20mA
	Unsuppressed	0-50MV	0-20Ma
	Decimal position	19.99	199.9

NOTE

Use Menu "05" to access these parameters.

2. Set the range of the unit. Use Menu "03":

L.SCL	and	H.SCL
Lower	and	Upper scaling

3. After setting the range, follow the steps below:
   a. Determine the switch setting on the dip switch (on the processor board). See Figure 2-7.
   b. Apply proper units to input terms MA, MV, V.
   c. Set in low value on the calibrator. Adjust cal.L. to agree.
   d. Set in high value on the calibrator. Adjust cal.H. to agree.

4. Follow the standard procedures to set all other parameters (outputs, functions).

5. When calibrating all voltage inputs, you must measure sensor current (calibrator).

CURRENT:	0-10 V input	50 µa maximum
	0-50 Mv input	50 µa maximum

SECTION 9 AVAILABLE OPTIONS

9.1 REMOTE SETPOINT OPTION*

* 1 circuit board, no alarm solid state relay on circuit board

The following ordering suffixes are separately configured at the factory:

-RSP4	Switch Close & 0 - 5Vdc or (300 - 10k Ω) pot signal input
-RSP5	Switch Close & 1 - 5Vdc
-RSP6	Switch Close & 0 - 20mA dc
-RSP7	Switch Close & 4 - 20mA dc

These options require an external switch on pins 14 and 15 and a remote signal on pins 12 and 13 to change to the second setpoint value.

Maximum Volt Input Impedance = 20k Ω

Input Impedance = 250Ω

See Figures 9-1 and 9-2.

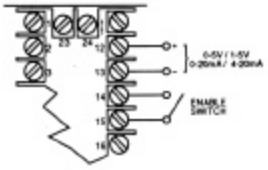


Figure 9-1. Remote Setpoint Wiring (Voltage/Current Analog Input)

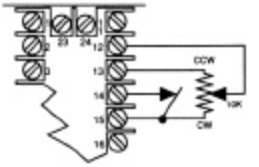


Figure 9-2. Remote Setpoint Wiring (Analog Pot with Enable Switch)

9.2 RECORDER OUTPUT OPTION

This option allows you to re-transmit the process variable (PV) signal to an external device:

- Chart recorder
- Process controller
- Indicator
- Data logger

This signal is generally used for keeping a log of data information with respect to time. It is a variable process signal dependent on sensor type (not a scaleable parameter).

I out (current output)	= 0 - 20 mA / 4 - 20 mA
V out (voltage output)	= 0 - 5 / 1 - 5 Vdc
Voltage compliance	= 7 Vdc
I out maximum	= 20 mA
Out impedance	= 255Ω

Ordering suffix: -PV3 = 4 - 20 mA

-PV4 = 0 - 5 Vdc

See Figure 9-3.

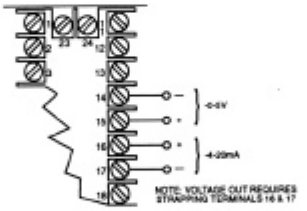


Figure 9-3. Recorder Output Wiring

9.3 TRANSDUCER POWER SUPPLY OPTION

This option is used to produce a constant dc voltage of 15 Vdc for an external device. This eliminates an additional external power supply. See Figure 9-4.

Maximum Current = 22 mA

Output Voltages = 15 Vdc

Ambient Temperature = 0 - 55°C, 32 - 131°F

Ordering suffix: -XP2 = 15 Vdc transducer

See Figure 9-5.

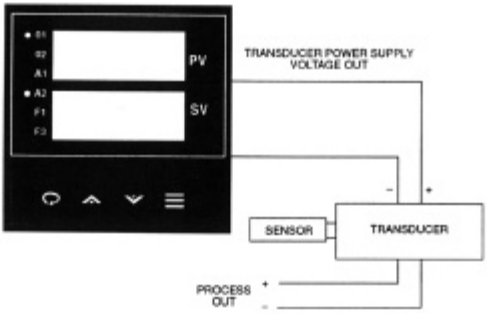


Figure 9-4. Transducer Excitation Voltage

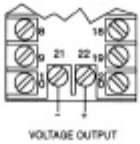


Figure 9-5. Transducer Power Supply Wiring

9.4 HEATER BREAK ALARM OPTION

The OMEGA temperature controller compares a sensor input signal with the setpoint and makes a power calculation which produces an output signal to the load. This is called a "closed loop" application. The heater break alarm (HB) detects failures in the load or external relay devices and provides an alarm output.

The HB uses an external current transformer (CT) to monitor the load current. This transformer is used for 15 and 30 amp applications. If the load current falls below a set current value, the alarm condition is met. See Figure 9-6.

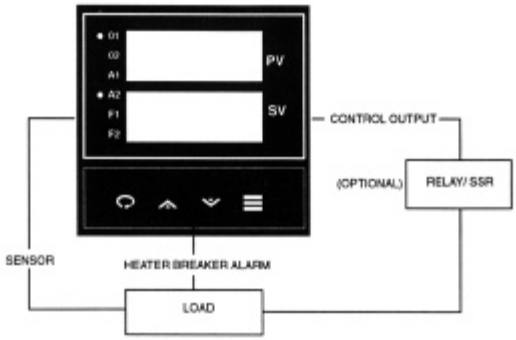


Figure 9-6. Heater Break Alarm

Using this option replaces the upper and lower setpoint limits in Menu "03". This option shows an open heater (not actual current), so the current displayed is not absolute.

9.5 HEATER BREAK ALARM SPECIFICATIONS

- Remote current transformer:

Indicating range:	2 - 100 A
Working class:	600 V, 50 - 60 Hz, single phase only
Max. transient current:	150 A for 5 seconds

- Heater current range: 5 - 30 A
  10 - 60 A
- Ordering suffixes: -HB1 5 - 30 A
  -HB2 10 - 60 A

The remote current sensing transformer is installed around the current carrying wire and is connected directly to the LED panel indicator. When the current exceeds the sensing transformer's turn-on point, the LED illuminates to indicate the presence of current. Two sizes of remote current sensing transformers are available for use with either of two types of LED indicators. See Figure 9-7.

Figure 9-7. Remote Current Transformer

Indicating range:	2 to 100 A (1 wire pass)
Minimum turn-on point:	2 A
Maximum continuous current:	100 A
Maximum transient current:	150 A for 5 seconds
Working class:	600 Vac, 50 - 60 Hz

See Figures 9-8, 9-9, 9-10, and 9-11.

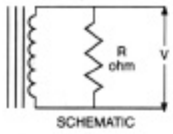


Figure 9-8. Schematic

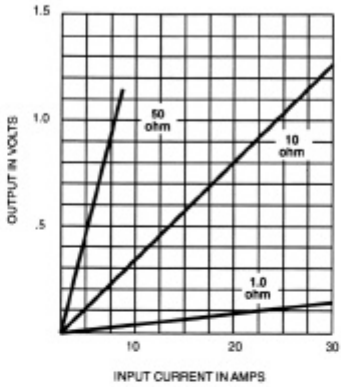


Figure 9-9. Output Versus Input

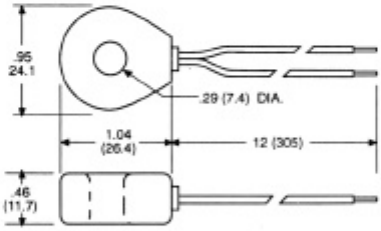


Figure 9-10. Current Transformer

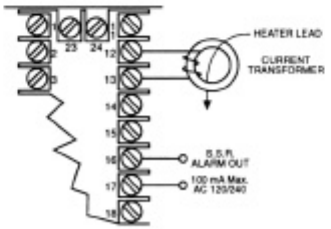


Figure 9-11. Heater Break Alarm

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA's 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 malfunctions, 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. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been 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 are not warranted, including but not limited to contact points, fuses, and triacs.

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RETURN REQUESTS / INQUIRIES

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

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

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order 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 OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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