

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Visit our website - *Click HERE*

OMEGA
ENGINEERING, INC.

An OMEGA Technologies Company

CN6070A SERIES
Microprocessor-Based Temperature Controllers

Operator's Manual

WARRANTY

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 our customers receive maximum coverage on each product. If the unit should malfunction, it must be returned to the factory for evaluation. Our 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.

THESE UNITS ARE INHERENTLY DANGEROUS AND ARE INTENDED TO BE INSTALLED AND USED ONLY BY QUALIFIED PERSONNEL. NO WARRANTY EXTENDED HEREIN WILL APPLY IF SUCH UNIT IS INSTALLED OR USED BY UNQUALIFIED PERSONNEL. THERE ARE NO WARRANTIES EXCEPT AS STATED HEREIN. THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR A PARTICULAR PURPOSE. OMEGA ENGINEERING, INC. IS NOT RESPONSIBLE FOR ANY DAMAGES OR LOSSES CAUSED TO OTHER EQUIPMENT, WHETHER DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL, WHICH THE PURCHASER MAY EXPERIENCE AS A RESULT OF THE INSTALLATION OR USE OF THE PRODUCT. THE BUYER'S SOLE REMEDY FOR ANY BREACH OF THIS AGREEMENT BY OMEGA ENGINEERING, INC. OR ANY BREACH OF ANY WARRANTY BY OMEGA ENGINEERING, INC. SHALL NOT EXCEED THE PURCHASE PRICE PAID BY THE PURCHASER TO OMEGA ENGINEERING, INC. FOR THE UNIT OR UNITS OR EQUIPMENT DIRECTLY AFFECTED BY SUCH BREACH.

EVERY PRECAUTION FOR ACCURACY HAS BEEN TAKEN IN THE PREPARATION OF THIS MANUAL, HOWEVER, OMEGA ENGINEERING, INC. NEITHER ASSUMES RESPONSIBILITY FOR ANY OMISSIONS OR ERRORS THAT MAY APPEAR NOR ASSUMES LIABILITY FOR ANY DAMAGES THAT RESULT FROM THE USE OF THE PRODUCTS IN ACCORDANCE WITH THE INFORMATION CONTAINED IN THE MANUAL.

OMEGA ENGINEERING, INC.
An OMEGA Technologies Company

One Omega Drive, Box 4047
Stamford, Connecticut 06907-0047

Call OMEGA Toll Free*

Sales: 1-800-82-66342 / 1-800-TC-OMEGA
Customer Service: 1-800-622-2378 / 1-800-622-BEST
Engineering Assistance: 1-800-872-9436 / 1-800-USA-WHEN

*In CT: (203) 359-1660 And International
CABLE: OMEGA TELEX: 996404
EASYLINK: 62968934 FAX: (203) 359-7700

M531/0689

Return Requests/Inquiries

Direct all warranty and repair requests/inquiries to OMEGA Customer Service Department, telephone number (203) 359-1660. BEFORE RETURNING ANY INSTRUMENT, PLEASE CONTACT THE OMEGA CUSTOMER SERVICE DEPARTMENT TO OBTAIN AN AUTHORIZED RETURN (AR) NUMBER. The designated AR number should then be marked on the outside of the return package.

To avoid processing delays, also please be sure to include:

1. **Returnee's name, address, and phone number.**
2. **Model and Serial numbers.**
3. **Repair instructions.**

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. That way our customers get the latest in technology and engineering.

OMEGA® is a registered trademark of OMEGA ENGINEERING, INC.

Copyright 1990 OMEGA ENGINEERING, INC. All rights reserved including illustrations. Nothing in this manual may be reproduced in any manner, either wholly or in part for any purpose whatsoever without written permission from OMEGA ENGINEERING, INC.

Printed in U.S.A

SERIES CN6070A
AUTO-TUNING PID TEMPERATURE CONTROLLER

CONTENTS

PAGE

SECTION 1 GENERAL INTRODUCTION 1
1.1 General Description and Cautions 1
1.2 Specifications 2
1.3 Model Number Identification 4
SECTION 2 INSTALLATION INSTRUCTIONS 5
2.1 Unpacking 5
2.2 Locating 5
2.3 Mounting 5
2.4 Removing Unit 5
2.5 Case Dimensions 6
SECTION 3 OUTPUT MODULES 7
3.1 Module Description 7
SECTION 4 BASIC WIRING 8
4.1 Typical Wiring Examples 8
4.2 Wiring Thermocouple and RTD Circuits 9
SECTION 5 OPERATION 12
5.1 Front Panel Features 13
5.2 Setup 14
5.3 Tuning The Controller 20
5.3.1 Introduction 20
5.3.2 Automatic PID Tuning Procedure 20
5.3.2.1 Damping Settings 20
5.3.2.2 Operating Instructions 21
5.3.3 Manual Tuning Procedure 22
5.4 Heating Only Processes 26

SECTION 6 COMMUNICATIONS 27
6.1 Communications Modules 27
6.1.1 RS485 27
6.1.2 RS232C 27
6.1.3 20 mA Current Loop 28
6.2 Installing the Communications Modules 29
6.3 Interface Examples 31
6.3.1. Read Data 31
6.3.2 Modify (Temporary) 32
6.3.3 Modify and Store 33
SECTION 7 CALIBRATION 34
7.1 Zero and Span Adjustments
(Factory Set) 34
SECTION 8 TROUBLESHOOTING 35
8.1 Troubleshooting - General 35
8.2 Troubleshooting - Communications 36

FIGURES

1.1 Ordering Code - Model Number 4
2.1 Dimensions 6
4.1 Wiring Examples 8
5.1 Front Panel Features 13
5.2 Configuration Code Chart 17
5.3 Ziegler - Nichols Graph 23
6.1 Connector Pin Identification 29
6.2 Wiring for Communications 30

GENERAL INTRODUCTION

SECTION 1

1.1 General Description and Cautions

The OMEGA® Models CN6071A and CN6072A are microprocessor-based controllers that provide the most advanced features in heating and cooling control. They can be addressed and monitored from any make computer-based central or remote station to control temperature.

CAUTION

High Voltage and High Temperature can cause injury and are a Fire Hazard. Please read all 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 fail-safe.

Warning Notes:

1. Mechanical Relay Output for resistance load only.
2. An open thermocouple will disable the INDEX function.
3. Note also that in units utilizing only heating output, the cooling gain should be set by user to the equivalent heating gain. The inverse is also true.
4. A unique algorithm in the Model CN6071A, CN6072A prevents continual build-up of oscillation due to grossly misadjusted rate/reset (-rt-) or gain. When this occurs the unit will control at some point higher or lower than set point, outside the proportional band. If this occurs -rt- was probably set too low and/or gain set too high.
5. -rt- sets Rate (Derivative) and Reset (Integral) action. The number displayed is the Rate time in seconds. This is tracked by the Reset time in seconds (1:6 ratio).
6. The auto-tune function should be limited to applications where the set point is 100°F or more above ambient.

7. The computer interface board must be removed from the unit when not connected to a remote terminal or computer, or interference may occur.
8. Calibration Positions -cL- and -cH- must not be changed unless a calibrator is connected to the unit by an experienced technician and the output and sensor are disconnected (refer to Section 7).

1.2 Specifications

Line Voltage:	120/240 Vac $^{+10\%}_{-15\%}$ 50-60 Hz
Power Consumption:	Less than 6 VA (instrument)
Input:	Thermocouple Type: "J" or "K", "R" or "S", or "T". Maximum lead resistance 100Ω for rated accuracy. Cold junction compensation standard. Linearization: continuously calculated and updated using ROM based algorithm. RTD Type: Platinum 3-wire, 100Ω at 0°C, DIN curve standard (.00385)
Sensor break protection:	Upscale standard
Accuracy:	±0.2% of full scale, ± one digit
Temperature stability:	5μV/°C maximum 3μV/°C typical
T/C Cold end tracking:	0.05°C/°C ambient
Operating ambient for rated accuracy:	32 to 131°F (0 to 55°C)
Series mode noise rejection:	80 dB
Common mode noise rejection:	120 dB
Dual display:	Process temperature or parameter code is shown on upper display; set point or parameter value can be selected on lower display.
Update rate:	Process display updated 2.5 times per second; digitally filtered to eliminate noise fluctuation.
°F/°C:	Front panel selectable, set point and alarms affected.

Alarms:	1 and 2, auxiliary on/off, adjustable for high or low temperature triggering; LED on front panel displays alarm status; process/deviation mode selectable; optically isolated solid-state relays, rated 1 A at 120/240 Vac (on/off)
Outputs, primary set point:	
Mech. Relay (time proportional)	SPST relay, 7 amps resistive at 120 Vac, 5 amp resistive at 240 Vac, 50 VA inductive
"F" Current Proportional	4-20 mA dc into 500 Ohms maximum.
"DC" Pulsed Voltage	20 Vdc pulsed time proportional signal for driving solid-state relays
"T" Triac (time proportional)	Solid-state plug-in relay output zero voltage switched; rated 1 amp holding and 10 amps inrush for inductive or resistive loads
Communications:	
Digital Format:	7 bit ASCII, asynchronous with 1 start and 1 stop bit, odd parity, selectable baud (300, 600, 1200, 2400)
Electrical:	Isolated RS232C, RS485, 20 mA loop on plug-in cards
Mechanical:	9 pin "D" connector, DB-9 Type on rear of unit
Analog Output (RTD)	1 m V/°C; 0 mV = bottom of range
Connections:	Inputs and outputs via barrier strips with UL listed locking terminals; communication via 9 pin sub miniature "D" connector
Dimensions:	Front panel: 3.780"^{2} (96 mm^2) Case: 5.646" (143.4 mm) Depth behind panel: 4.78" (121.4 mm) Panel Cut-out: 3.622"^{2} (92 mm^2)
Mounting:	Channel slides and screws
Weight:	2 lbs (0.9 kg)

All specifications subject to change.

1.3 Model Number Identification

HOW TO ORDER:

MODEL NUMBER†	DESCRIPTION
CN6071A-(*)	Single Output
CN6072A-(*)	Dual Output
6070A-C1	Plug-in RS-232C Board
6070A-C2	Plug-in RS-422/485 Board
6070A-C3	Plug-in 20mA Board

*Insert Input Code: J, K, P1, P2, R, S, or T input
† To order unit with Communication Option factory installed, add suffix C1, C2 or C3 to Model No. Example: CN6071A- J-F1-C1; CN6071A controller for type J thermocouple with 4-20mA output and RS-232C communication.

INPUT CODE	INPUT TYPE	RANGE	RESOLUTION
J	Iron-Constantan	0° to 1400°F -17° to 760°C	1°F 1°C
K	Chromel-Alumel	0° to 2000°F -17° to 1093°C	1°F 1°C
P1	100 Ω PT RTD	-200° to 1200°F -128° to 600°C	1°F 1°C
P2	100 Ω PT RTD	-199.9° to 199.9°F -128° to 93.3°C	0.1°F 0.1°C
T	Copper-Constantan	−200° to 600°F −128 to 315°C	1°F 1°C
R	Pt-Pt13% Rhod	0 to 3200°F −17° to 1745°C	1°F 1°C

OUTPUT OPTIONS		
Output Type	First Output	Second Output (6072A Only)
1A SSR	T1	T2
4-20mA	F1	F2
Pulsed DC	DC1	DC2

ALARM OPTIONS	
Order Code	Description
AL1	Single Alarm
AL2	Dual Alarm

NOTE: Alarm relay is 1A SSR; can be High or Low; process or deviation mode selectable

Add input type "S" Pt-Pt10% Rhod Range and Resolution Same as Type R.

SECTION 2 INSTALLATION INSTRUCTIONS

2.1 Unpacking

Unpack the instrument and inspect for shipping damage. Report any damage to the carrier immediately.

2.2 Locating

Select a location for the controller where it will not be subject to excessive shock, vibration, dirt, moisture or oil. The ambient temperature of the area should be between 32 and 131 F.

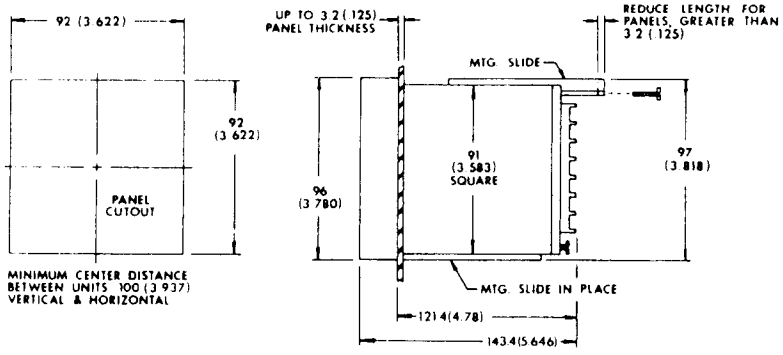
2.3 Mounting

Mount the controller into a 92 mm (3 5/8") square cutout. See figure for the cutout and case dimensions. The plug-in controller does not have to be removed from its housing for mounting. Remove two screws that hold the mounting slides and then remove the slides. Insert case from front panel and re-install the two slides and two screws. **Do not overtighten screws.** The length of the slides must be reduced if the controller is to be mounted in an extra thick panel. If the controller has been unplugged from its housing, the top of the housing can be determined because it features the serial tag.

2.4 Removing Unit

The unit can be removed from its housing by pulling firmly on the black front bezel. If a communication port is connected, it should be removed first.

2.5 Figure 2.1 CASE DIMENSIONS



NOTE
ALL DIMENSIONS ARE IN MILLIMETERS;
INCHES ARE SHOWN IN PARENTHESIS.

SECTION 4 OUTPUT MODULES

4.1 Module Description

The OMEGA CN6070A offers field interchangeable output modules. This unique feature makes it possible to fill output requirements for a variety of applications with a single controller model.

NOTE:
Do not use the standard relay output with mechanical contactors because they generate an excessive EMI field which can interfere with CN6070A's micro-processor. Instead, we recommend "T" output modules for this application.

Option F: This 4-20mA output module can deliver full output to loads having an input impedance of 500 Ohms or less. The cycle time setting must be ZERO for smooth current output.

Option DC: Similar to F, but pulsed 20Vdc output for driving solid state relays. Up to 6 (input series connected) solid state relays can be used. Cycle time can be set to optimize the load response time requirements.

F and DC OPTION NOTE:

A push-on terminal is utilized as a return for ground currents of the milliamp source. It is connected internally by the mating lug on the circuit board. To avoid ground loops, drive floating (ungrounded) loads.

Option T: This solid state relay is capable of 1 amp at 120/240 Vac. It is zero voltage switched and optically isolated from the drive signal. With it, resistive loads up to 120 watts at 120 Vac and 240 Vac may be controlled directly. Using direct con-

controlled directly. Using direct control there is no lower limit on the cycle time setting (down to 200 milliseconds). Larger loads may be controlled utilizing an external contactor. In this case, it is advisable to use cycle settings of ten seconds or greater to minimize contactor wear. **External suppression of the contactor is mandatory.** See Section on electrical noise.

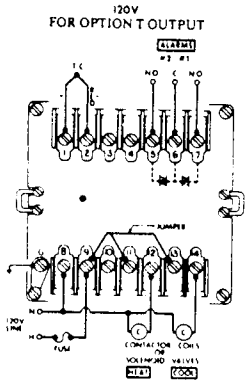
SECTION 4 BASIC WIRING

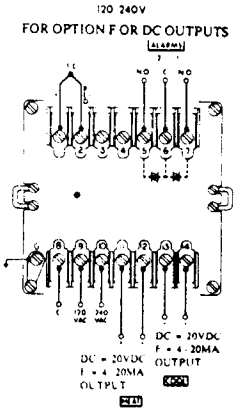
4.1 Figure 4.1 TYPICAL WIRING EXAMPLES

NOTES:

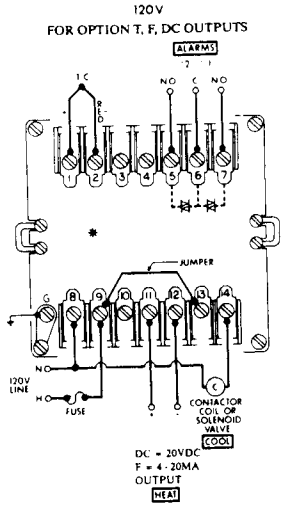
1) For 240Vac supply move connection shown to terminal 9 over to terminal 10 and fuse both of the supply legs.
2) Mechanical Relay output for use on small resistive heaters only, see specifications for rating. Use the "T" wiring diagram.
3) The Plug-in outputs allow users to have any combination of output types. Consult factory if additional definition is needed.

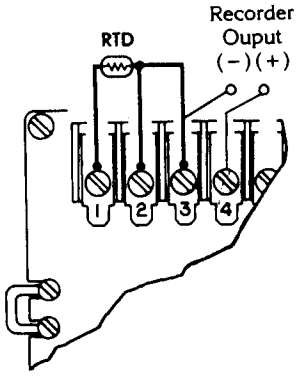
*Denotes location of communication connector.





Section 4.1 (continued) TYPICAL WIRING EXAMPLES





4.2 Wiring Thermocouple Circuits

Before wiring, check thermocouple and extension wire to make sure that they conform to the appropriate thermocouple type. In thermocouple circuits, the negative lead is colored red. Extension wires must be the same alloy and polarity as the couple. The thermocouple circuit resistance should not exceed 100 Ohms for rated accuracy. Slight errors will occur if resistance is higher.

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 controller end using the corner screw provided for that purpose.

Standard Thermocouples

I.S.A. Type	Materials	Color Code
J	Iron-Constantan (I/C)	White(+) Red(−)
K	Chromel-Alumel	Yellow(+) Red(−)
T	Copper-Constantan	Blue(+) Red(−)
R	Platinum-Platinum 13% Rhodium	-
S	Platinum-Platinum 10% Rhodium	-

Wiring RTD Circuits

P1 and P2 units are designed for 100 Ohm Platinum RTD's. 2-wire RTD's are connected to terminals 1 and 2 with a jumper connecting 2 to 3. Keep leads short and use heavy gauge copper extension wires if necessary, to minimize lead resistance. For long runs 3-wire RTD should be used and wire gauge should be sufficient that resistance does not exceed 10 Ohms. An error of 0.2°F will result for each additional 10 Ohms per lead.

DO NOT RUN RTD LEADS IN THE SAME CONDUIT AS POWER LINES.

If shielded RTD wire is used, terminate the shield only at the controller end, using the corner screw provided for that purpose.

NOTE: RTD's tend to be shock sensitive and require extra care in handling and installation.

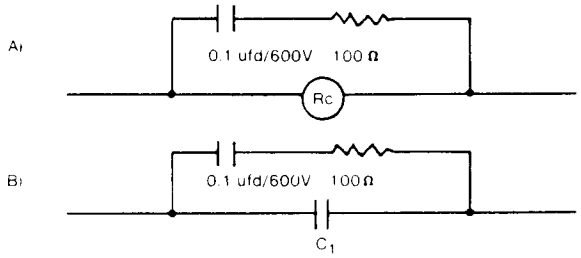
THERMOCOUPLE PLACEMENT (or RTD)

Proper thermocouple placement can eliminate many problems in the system. The probe should be placed so that it can detect any temperature change with minimal thermal lag. In a process that requires fairly constant heat output, the probe should be placed close to the heater. In processes where heat demand is variable, the probe should be close to the work area. Some experimenting with probe location is often needed to find its optimum position.

A WORD ON ELECTRICAL NOISE

Microprocessor are essentially small computers. As such they can randomly be interferred with by large electrical spikes, even with elaborate

watchdog circuits and filtering built into the unit. Contacts and coils must be suppressed! One very effective filter is a .1ufd/600V capacitor in series with a 100 Ohm, 1/2 watt (min.) resistor. This network must be put on all contacts, especially across hard contacts that are switching coils and across the coils themselves. The filter should be placed as close to the noise source as possible i.e. right on a contactors coil etc.



Other recommended practices include:

* Run sensor wires separately, shield if possible and ground only one end of the shield.
* Install .01 ufd/100V or greater capacitors from each sensor terminal to case ground (the green screw).
* Connect each unit's ground (the green case screw) directly to the machine (ground). Do not connect it to the panel. Paint and corrosion can cause poor signal transmission. Do not connect ground wires in series from unit to unit. Ground wires must be connected from each unit directly to ground.
* Make sure the machine is connected to earth ground. Do not assume it is.

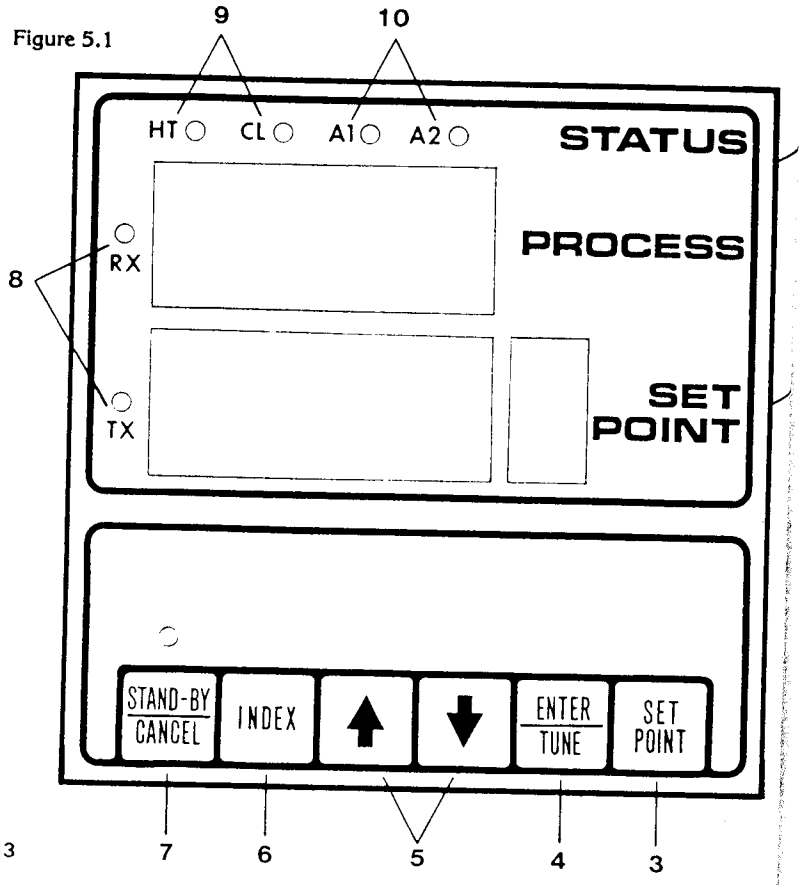
SECTION 5 OPERATION

5.1 Front Panel Features

Touch Key and Indication Operation Layout

1. Process Temperature or Parameter code is viewed on the upper display.
2. Set Point or Parameter setting is viewed on the lower display. Degrees F and C is also displayed.
3. Set Point Key: Allows user to return to set point.
4. ENTER/TUNE Key: Enters a selected value into non-volatile memory. Also initiates Auto-Tuning when used in the correct sequence.
5. Up and Down Keys: Raises and lowers setting respectively. 2 Step scan rate: Slow and Faster (after 5 seconds).
6. Index Key: Selects Parameters to be addressed.
7. STAND-BY/CANCEL Key: Disables outputs. Unit is put in idle mode. LED above switch lights in STAND-BY mode. STAND-BY is also used as the position from which AUTO-TUNE is accessed. If the key is pressed during Auto-Tuning the unit will cancel the Auto-Tuning procedure and return to the STAND-BY mode.
8. Receive (RX) and transmit (TX) lights: Indicate a signal is present at the communication port. Lights only momentarily.
9. Heat (HT) and Cool (CL) Output Lights: Lights when output drive signal is present.
10. Alarm Lights (A1 and A2): Lights when unit is in alarm. (Programmable Hi, Low, process or deviation.)

Figure 5.1


9
10
HT
CL
A1
A2
STATUS
PROCESS
8
RX
TX
SET POINT
STAND-BY CANCEL
INDEX
ENTER TUNE
SET POINT
13
7
6
5
4
3

5.2 Basic Series CN6070A Setup

1. The CN6070A has dual-input ranges which allow selection of one of two ranges and T/C types, by simply moving the position of the internal jumper.

To set unit to proper range, remove unit from case and position jumper on top board. Front position is range A, rear position is range B.

A = J B = K	No Jumper = T	A = S B = R	A = P2 B = P1

Consult Serial Tag for actual range and sensor type ordered. Ranges are defined in Section 1.3, Model Number Indentification

J and K are Switchables	P1 and P2 are Switchables
R and S are Switchables	T is not switchable

The Series CN6070A is shipped from the factory with the following settings:

SP = 100		CG = 30		Id = 01	
A1 = 105		CC = 05 (F = 00)		bd = 02	
A2 = 95		cd = 08		cL = Range dependent	
rt = 00		AT = 00		cH = Range dependent	
HG = 30		cF = 08 (05 for C ranges)			
HC = 05 (F = 00)		ct = 00			

2. Range of Adjustments (Parameters)

All parameters are accessed by pressing the INDEX key. They are listed in the order they are displayed when the INDEX key is pressed.

The front panel contains a lower display of 5 digits which displays the set point temperature, the other parameter values and degrees F or C. The upper display consists of 4 digits which display the process value or the parameter abbreviations; e.g. -A1- identifies Alarm 1. As the INDEX key is pressed the second column abbreviations appear in the upper display. To the right of the ENTER Key

is an EXIT Key labelled "SET POINT" which allows the user to EXIT parameters 2 thru 16 back to parameter #1 (set point). After changing a value the ENTER Key must be pressed. This enters the new value in memory. If it is not pressed and power is removed, the last value entered for that parameter will be set up for that parameter.

NUMBER	DISPLAYED CODE	PARAMETER	RANGE
0	-	Process Temperature	Zero to span of unit (F or C)
1	-	Set Point	Zero to span of unit (F or C)
2	·A1·	Alarm One	Zero to span of unit (F or C)
3	·A2·	Alarm Two	Zero to span of unit (F or C)
4	·rt·	Rate/Reset (1:6 ratio)	0 to 255 Seconds (See Note 6)
5	·HG·	Heat Gain	1 to 400 (See Note 2)
6	·HC·	Heat Cycle Time	0 to 120 Seconds (See Note 7)
7	·CG·	Cool Gain	0 to 400 (See Note 2)
8	·CC·	Cool Cycle Time	0 to 120 Seconds (See Note 7)
9	·cd·	Access Code	0 to 255 (See Note 3)

Locally Adjustable only (Not by Remote Keyboard)

10	·At·	Auto-Tune Damping	0=Low, 1=normal, 2=High
11	·cF·	Configuration (See Note 4)	0 to 15
12 xx	·ct·	Cooling Type	O-Oil or none, 1-Air, 2-Water
13	·Id·	Unit ID CODE	0 to 99 (See Note 5)
14	·bd·	Baud Rates	300(0), 600(1) 1200(2), 2400(3)
15	·cL·	Calibration, Low (ZERO)	±3% Span (°F/°C)
16	·cH·	Calibration, High (SPAN)	±3% Span (°F/°C)

xx Not on RTD units.

3. When setting up the unit for the first time, push the "STAND BY" key (LED above button is on), and the unit will be placed into an idle condition. Outputs and alarms will be off. On completion of inital setup, push the key again (LED off) for normal operation.
4. Press the INDEX key until parameter #9 (·cd·) appears in the process display area.
   a. Set 14 in lower display to gain access to configuration code, by pressing the up or down arrow and then pressing the ENTER key.
5. Press the INDEX key until parameter #11 (·cF·) appears in the process display area.
   a. Refer to the configuration code chart and select a number that represents the desired configuration of the alarms and display units; e.g., #06 = °F, Deviation Alarms, Alarm 1=Low Acting, Alarm 2=High Acting.
   b. Set this number into the lower display, using the keys.
   c. Press the ENTER key.

Figure 5.2 CONFIGURATION CODE CHART

Settings				
0	F	P	H1	H2
1	C	P	H1	H2
2	F	D	H1	H2
3	C	D	H1	H2
4	F	P	L1	H2
5	C	P	L1	H2
6	F	D	L1	H2
7	C	D	L1	H2
8	F	P	H1	L2
9	C	P	H1	L2
10	F	D	H1	L2
11	C	D	H1	L2
12	F	P	L1	L2
13	C	P	L1	L2
14	F	D	L1	L2
15	C	D	L1	L2

ABBREVIATION CODES

F - Fahrenheit
C - Celsius
P - Process Alarms
D - Deviation Alarms
H1 - High Alarm
L1 - Low Alarm
H2 - High Alarm
L2 - Low Alarm

6. If unit will interface with a computer:
   Press the INDEX key until parameter #13 (·Id·) identification code appears in the upper display area.
   a. If a digital communication option module is installed select a value between 00 and 99 and set into the lower display. This is the unit's address.
   b. Press the ENTER key.
7. Baud Rate: Index to position #14 (·bd·) and enter the code for the proper baud rate; e.g., 00 = 300, 01 = 600, 02 = 1200, 03 = 2400 baud. Press the ENTER key.
8. Press the return to set point key (SET POINT) and set in the desired temperature value on the lower display, then press ENTER. If you have

pressed the INDEX key, the unit will advance to the High and Low Calibration positions, but index no further until the SET POINT key is depressed.

CAUTION: DO NOT CHANGE THE CALIBRATION LOW [cL(Zero)] OR CALIBRATION HIGH [cH(Span)] ADJUSTMENT UNLESS YOU INTEND TO, ARE QUALIFIED AND HAVE A CALIBRATION TEST SET-UP CONNECTED.

9. Press Index and Alarm One (A1) appears in the upper display area. If this option is installed, set in the desired temperature value, then press ENTER.
10. Repeat for (-A2-) Alarm two, if installed.
11. Refer to the section on tuning for the remainder of the settings.

NOTE: When finished entering all parameters return to -cd- using the INDEX key. Select the level of security desired and enter the appropriate value into memory.

#1 - Allows changes to set point only.
#8 - Allows changes to first nine parameters only.
#14 - Allows changes to 9 parameters and calibration constants.

NOTE: Any other value only allows changes to -cd-.

Reference Notes

NOTE 1: Parameters #10 thru #16 are accessed from the front panel only, and can not be set from a remote terminal.

NOTE 2: The gain value (-HG-&-CG-) is multiplier used to increase the sensitivity of the controller according to the formula: Output = Gain (E + I + D) where E = Error, I = Integral, D= Derivative. Its relationship to proportional band is as follows:

$$\text{PROP BAND} = \frac{\text{Unit Span}}{\text{Heat Gain (HG) or Cool Gain (CG)}}$$

Note that proportional band is an inverse function of gain. The range of adjustment is 0 to 400 for Heat, 0 to 400 for Cool.

SPECIAL NOTE:

For Units utilizing only heating output, the cooling gain should be set by the user to the equivalent heat gain. The inverse is also true. **Setting CG to 0 initiates an on-off (narrow deadband) output for cooling, which is recommended for cooling-only applications. Setting HG to 0 disables the Heat output.**

NOTE 3: The auto-tune function should be limited to applications where the set point is 100°F or more above ambient.

NOTE 4: The access code is a number stored in ROM that upon entering in location -cd- allows user access to change parameters. Depending on the code entered the user may then alter calibration and configuration of the controller. When this is accomplished the code may be changed to prevent tampering with critical values. When the number is "1" only the set point can be changed. When the number is "8", changes are allowed to the first nine parameters. When the number is "14" all settings can be altered. When neither 1, 8 or 14 are entered only the access code can be altered.

NOTE 5: The configuration code allows the user to configure the alarms for process/deviation, high or low energizing. The code also selects F or C operation of the unit. SEE THE CONFIGURATION CODE CHART.

NOTE 6: -Id- is the unit identification code. It is variable from 00 thru 99 and is used with the communications interface to allow a remote device to identify which controller it is communicating with.

NOTE 7: Setting RT to 0 disables rate and reset action for proportional only control. This will cause an offset between set point and process termperature.

NOTE 8: Set the heat cycle (-HC-) and cool cycle (-CC-) according to power handler being used. 0 for "F" (4-20mAdc) outputs, 5-20 for contactors and solinoids. Setting HC or CC to 0 initiates 200 millisecond timebase for fast cycling of the respective output. Use with external solid state relays ("S" Modules) or SCR Power Controllers ("F" Modules).

5.3 Tuning the Controller

5.3.1 Introduction

The CN6071A/CN6072A is a state-of-the-art automatic tuning PID temperature controller. The user has the option of automatically selecting the controller's PID settings or manually setting the unit as desired.

Tuning a 3-Mode controller involves three (3) major adjustments; Proportional Band (Gain), Rate (Derivative) and Reset (Integral) action. OMEGA has simplified the adjustment procedure with the incorporation of the Rate and Reset settings into one adjustment "RT" which is displayed in seconds of Rate time. The Reset time is automatically set at six (6) times the displayed Rate values.

5.3.2 Automatic PID Tuning Procedure

NOTE FOR OPTIMUM RESULTS

1. Set point must be a minimum of 100°F above the starting or ambient temperature when tuning is initiated for accurate tuning. Less than 100°F may not yield effective tuning settings.
2. Multi-zone applications require Auto-Tune units on each zone and simultaneous warm-up.
3. Loss of power or a turn-off during the Auto-Tune cycle requires a re-start from ambient (or at least 100°F rise to set point) for reliable PID values.
4. Change of state processes, 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 occured.

5.3.2.1 Damping Settings

Heat Damping Choices ("-At-": position #10)

To allow the controller to provide automatic tuning for a wide variety of processes that may exhibit varying heating characteristics and/or varying heating capabilities, the controller offers three damping choices:

00 Low Damping - For processes that: (any combination of the following)

- are adequately powered with excellent coupling between heater and probe.
- require quick response and the tightest possible temperature control is desired.

01 Normal Damping - For processes that: (any combination of the following)

- have heaters that are properly sized.
- have good coupling between heater and probe.
- are considered standard with moderate lags and response time.

02 High Damping - For processes that: (any combination of the following)

- are overpowered
- have multiple lags
- are poorly coupled between the heater and probe.

COOL ("-ct-"; **position #12**) (Not On RTD Units)

When using the controller on heating and cooling applications, such as extruders, the "ct" number allows setting of the controller for the type of cooling used:

00 - Oil cooling (Use this Setting if No cooling is used)

01 - Air cooling - Forced air

02 - Water cooling (above 212 F set point)

5.3.2.2 **Operating Instructions** (Read "Damping Settings" before proceeding)

How to Start the Automatic Tuning Procedure

STEP 1: Energize the unit and proceed immediately to step 2.
STEP 2: Place the unit on stand-by by pushing the stand-by button. LED above button will light. Auto-tune can only be accessed from the stand-by position.
STEP 3: Index down and enter access code, position 9, then press set point.
STEP 4: Index down and enter all settings per section 5.2 Basic Set-up. e.g. set point, A1, A2, HC, CC, AT, cF, ct, ld, bd, and press set point. RT, HG, and CG will be set by controller during Auto-Tuning.
STEP 5: Index down to "-At-".

STEP 6: When ready to start Auto-Tuning calculation of PID settings press the "Enter/Tune" button. The displays will return to process and set point displayed. The F/C digit will blink while tuning is in process. Upon completion of tuning, the digit will stop blinking. To stop the Auto-Tuning press stand-by/cancel.

NOTE: RTD input will not Auto-Tune when the decimal point range is used. If tenth degree range is desired either auto tune on the other range and then move the range jumper or use manual tuning methods.

How to override automatic tuning parameters (Also refer to Ziegler-Nichols Tuning Method)

It is possible to set or fine tune the three mode parameters manually.

To manually enter parameters:

1) Press Index button until "Rt" (Rate), "HG" (Heat Gain) or CG (Cool Gain) are displayed.
2) Enter new parameter setting desired using the up/down buttons.
3) Press the "Enter" key.

The new parameters will now take control of the process.

5.3.3 Manual Tuning Procedure

The following procedure can be used for fine tuning after or instead of Auto-Tuning.

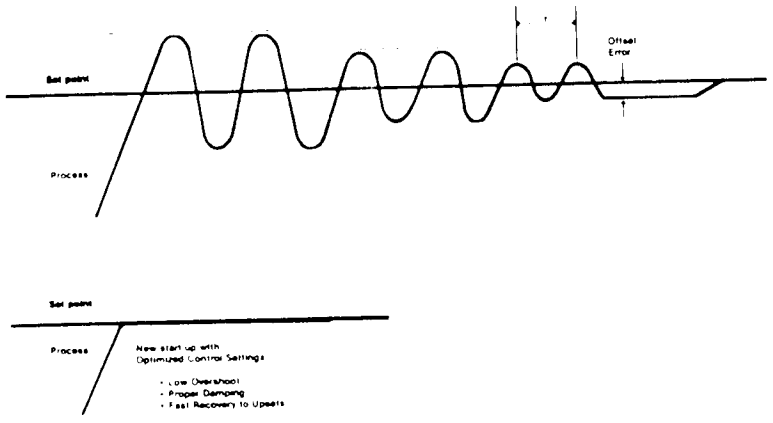
Ziegler-Nichols PID Tuning Method

This has long been an accepted method of tuning PID (3-Mode) controllers using a minimum of time and set up to reach effective tuning parameters. Before proceeding make sure the basic unit setup is done as discussed in section 5.2.

NOTE: If cooling is not used, enter heat gain value in cool gain also.

1. Apply power and immediately press the STAND-BY key. The STAND-BY light will come on.
2. Adjust desired set point. If oscillations and overheating will damage equipment, a lower set point should be used for initial tuning.
3. Set Heat Gain (·HG·) and Cool Gain (·CG·) to 400 (even if no cooling is to be used, the cooling gain should be set the same as the heat gain). Disconnect the cooling apparatus.

Figure 5.3 ZIEGLER-NICHOLS TUNING TECHNIQUE



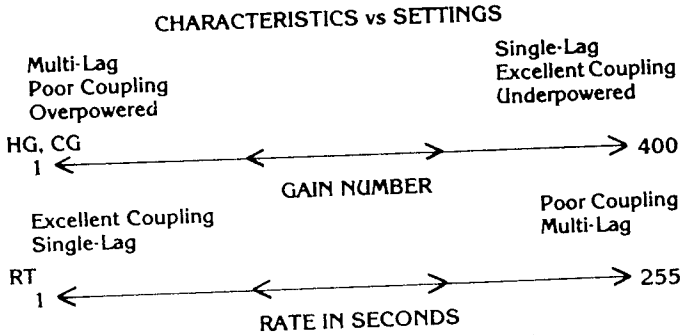
4. Press STAND-BY again and temperature will begin to rise. When the process rises to the desired set point it will probably oscillate. Periodically decrease the Gain (lower the HG number) until a small constant oscillation is obtained. Reducing the Gain by steps of one half (1/2) the previous -HG- setting is an acceptable method to obtain the desired small oscillation. Note time between oscillations in seconds. ("T" on Figure 5.3).
5. Decrease the Heat Gain to 60% of the value obtained in the previous step. The Gain is now tuned. Enter the same number in the Cool Gain.
6. The best rate time(-RT-) setting is one-eighth (1/8)the time in seconds of one cycle (see cylce time "T" in Figure 5.3). This will give a conservatively tuned system. If faster response and/or faster rise to set point is desired one-twelth (1/12) of "T" may be used. Note that faster settings may yield instability and temperature overshoots on startup. Remember that the reset automatically tracks the rate (-rt-) adjustment.
7. Connect cooling apparatus. Observe control stability.
8. If oscillation occurs lower the cool gain number. If cooling is sluggish raise the cooling gain number.

NOTE: In order to observe changes in process temperature, especially as they relate to time, it is helpful to use a temperature recorder in conjunction with all tuning and parameter setting procedures.

TUNING HINTS:

1. Once the optimum -rt- and -HG- have been set into the unit, cold start tests of the process should be tried. Remember that start-up and running parameters will usually be different and it is desirable to adjust both gain (HG) and rate/reset (RT) ±25% to strike a balance between good start-up and running settings.

   Generally higher settings of -rt- will give more controlled start-ups with less overshoot; lower values will give faster recovery from process upsets. Higher gain settings will give tighter control of the running process, but may give more overshoot on start-up.



2. If difficulty is encountered in tuning the cooling control:
   a. Be sure that cool cycle is optimized (faster settings give less "ripple" and better control, but must be weighed against shortened solenoid life, motor starter wear, etc.)
   b. Cooling mechanisms may have excessive lag (time delay). If possible improve the dynamics of the cooling transfer, otherwise use a higher (2X) ·rt· value.
   c. Optimize cooling gain.
      If temperature continues to climb, begin doubling the value of cooling gain (·CG·). Allow sufficient time for the process to stabilize between adjustment. If the process begins to oscillate on cooling, reduce the cool gain (CG) setting. Optimum setting of the cooling gain will minimize temperature excursions without causing oscillation.
   d. Since heat rate has been compromised, reduce heat gain to 1/2 previous value.
3. On/Off Cooling
   Setting the cool gain (·CG·) to 00 produces on/off action for cooling. The deadband is 1 degree.

5.4 Heating Output Only Processes

The Series CN6070A temperature controller has been designed for coordination between heating and cooling devices. When used to control a heating only process with natural cooling, the cooling algorithm is still present. This has no effect in proportional mode (rt = 0), with the heat proportional band starting from set point (0% output) down to the bottom of the band (100% on).

Configured as a 3-mode P.I.D. unit (rt < 0), the controller will carry it's time-related functions of rate and reset from the heating to cooling bands and back. In most applications, this will not cause any noticable effects, since the controller will be working on the heating band. Letting the controller auto tune on the first start-up will usually give excellent results, with the cool gain automatically matching heat gain if cool tune is set to "00".

The presence of cooling reset action will be noticed only if the process temperature exceeds set point for an excessive amount of time. The reset action will attempt to decrease temperature, and without any means to do so, push the heating band temporarily downward. The net result will be a noticable undershoot.

This will only occur in a process if excess heat is externally applied or stored, or set point is lowered and the natural cooling time is much slower than rate and reset time set into the controller. The controller will memorize the time and temperature error and keep correcting until the "area" of error is balanced on the downside.

Depending on the type of process and the mode of operation, there are several ways to correct this.

1. Reduce heat gain (HG) ⅔ to ½ of normal. This may keep the process in the heat band.
2. Make cooling on/off by setting cool gain to 0.
3. Before auto-tuning, index to cool tune and set it to forced air (ct = 01). Then return to set point, index to auto-tune, and "tune". This will set cooling to a reduced memory state.

SECTION 6 COMMUNICATIONS

6.1 Communications Modules

Optional plug-in modules are available to allow interfacing to the most common industry standards. A brief description of each type follows.

6.1.1 RS485

RS485 is a specification standard for balanced voltage digitial interface circuits published by the EIA.

It was published in 1983 as an upgrade of RS422A electrical specifications, with emphasis given to the application of multipoint systems. The interface circuits used in the 6071A/6072A meet the electrical characteristics of the RS485 standard.

The RS485 multipoint capability allows up to thirty-two (32) units to be connected together in a half duplex network. More can be added with the use of "repeaters."

This module allows bi-directional data transfer over a shielded twisted pair. The twisted pair is a transmission line with drops to communicating devices. Since it is a transmission line, terminating resistors are required at the most distant ends of the line to minimize reflections. (Typically 60 ohms from each line to signal ground). The RS485 module is fully optically isolated, eliminating ground loop problems. Parallel drops fromt he transmission line should be kept as short as possible. Alternately the line could be daisy chained at each DB-9 connector. Note that the polarity of the line is important and each device will specify an "A" and "B" connection. On the RS485 module, "A" is pin 8 and 4; "B" is pin 7 and 3 and communications ground is available on pins 1, 2, and 6. Frame ground is pin 5 and 9.

6.1.2 RS232C

The RS232C is a standard that was published in 1968 by the "Electronic Industries Association" (EIA). The RS is an acronym for Recommended

Standard and the 232 is the identification number for that particular standard. The C designates the last revision made to the RS232 standard. The purpose of this standard is to define the electrical characteristics for the interfacing of "data terminal equipment" and "data communications equipment". The standard provides voltage ranges for data and control signals to provide proper transmission.

This module allows bi-directional data transfer via a three conductor cable consisting of signal ground (pin 7), receive (input, pin 2) and transmit (output, pin 3). It is recommended for less than fifty feet between computer/terminal and instrument. Note that multiple instruments cannot be tied to the same port. The module is optically isolated to eliminate ground loop problems. Note that in a typical installation, "data out" of the computer/terminal connects to "receive data" and "receive data" of the computer/terminal connects to "data out". If shielded cable is used it should be connected to frame ground at one end only. Signal ground is connected at both ends. The RS232 module is configured for active operation.

6.1.3 20 MA Current Loop

This module allows bi-directional data transfer via a current loop with each instrument series connected within the loop (10 Units Maximum). The module is "passive" i.e. an external current source is required. This is usually available at the computer/terminal. Typically the receive and transmit section of each instrument is series connected and inserted into the loop; however a separate loop for receive and transmit may be used in the event there is insufficient headroom in the energizing supply. For series transmit and receive approximately two volts of headroom is taken for each instrument on line. For operation with separate loops, approximately 1.5 volts is taken for receive and 0.5 volts for transmit. Care must be observed to insure the polarity of connections is correct because current will still flow in the loop if polarity is reversed making troubleshooting difficult. Wiring connections are: Pin 3 = Transmitting Position (+), Pin 4 = Transmit (−), Pin 7 = Receive (+), Pin 8 = Receive (−), Pins 5 and 9 are Frame Ground.

6.2 Installing the Communications Modules

A. Plug the 11 point receptacle on the module into the header on processor module (vertical board behind display). Be sure the connector is properly centered on the header connector.

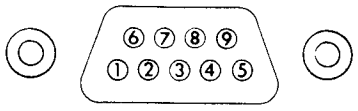
B. Slide the notch on the P.C. board into the slot on the stand-off.

C. RS485 and RS232C MODULES: Plug the three pin connector into the mating header on the power supply (lower board). Be sure leads are free of other components.

NOTE: TRANSMIT, RECEIVE INDICATORS

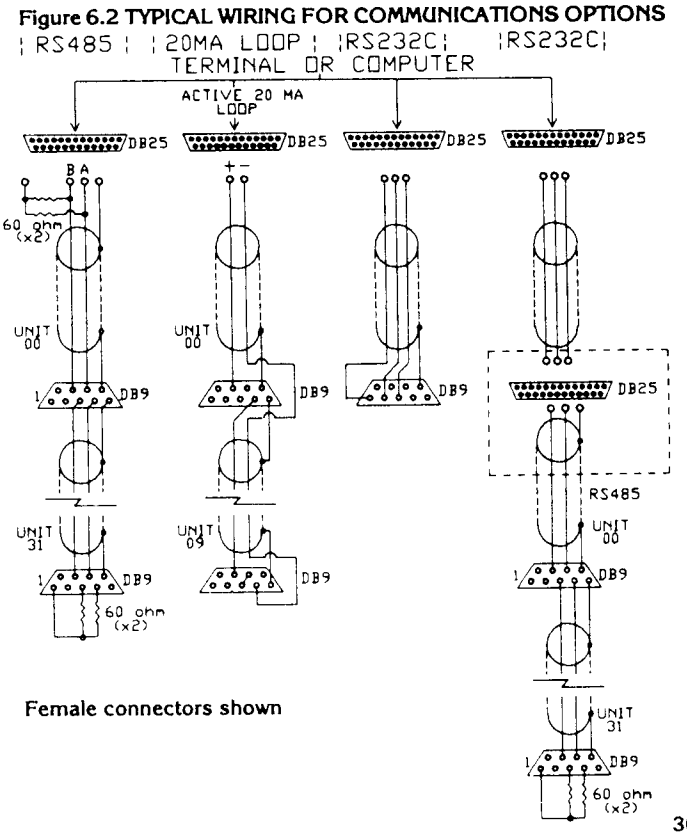
To the left of the upper 4 digit display is a LED indicator for the receive function. This LED will illuminate briefly when a transmission is present on the communications bus. To the left of the lower 5 digit display is a LED indicator for the transmit function. This LED will illuminate briefly when the Model 6070A that has been addressed transmits information on the communications bus.

Figure 6.1 COMMUNICATIONS CONNECTOR PINOUT



PIN #	RS 485	20 MA LOOP	RS 232
1	SIGNAL GROUND	NC	SIGNAL GROUND
2	SIGNAL GROUND	NC	RECEIVE (INPUT)
3	"B"	TRANSMIT (+)	TRANSMIT (OUTPUT)
4	"A"	TRANSMIT (–)	NC
5	FRAME GROUND	FRAME GROUND	FRAME GROUND
6	SIGNAL GROUND	NC	SIGNAL GROUND
7	"B"	RECEIVE (+)	SIGNAL GROUND
8	"A"	RECEIVE (–)	NC
9	FRAME GROUND	FRAME GROUND	FRAME GROUND

Figure 6.2 TYPICAL WIRING FOR COMMUNICATIONS OPTIONS



Female connectors shown

6.3 Interface Examples

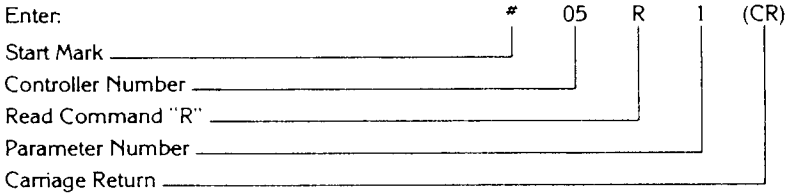
General

The Model CN6070A is designed to respond to data transmitted in ASCII 7 bit code with one start bit, 1 stop bit and odd parity from any terminal or computer. Baud rate is selectable at 300, 600, 1200 or 2400 baud.

6.3.1

To Read a Parameter (e.g. controller #5, reading set point)

Enter: # 05 R 1 (CR)



Controller Response:

(LF) #05R1 0123F (CR) (LF)

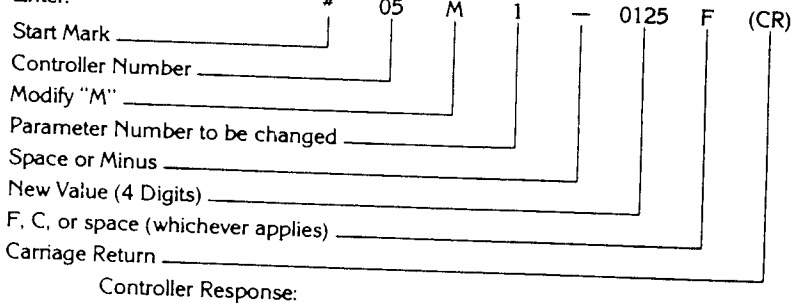
Parameter #1 (Set Point) on controller 05 is presently 123 F.

CR = Carriage Return

LF = Line Feed

6.3.2 To modify a parameter (but not enter into memory)

Enter: # 05 M 1 — 0125 F (CR)



Controller Response:

(LF) #05C1 0125F (CR) (LF)

"C" Temporary Change confirmed.

The set point (Parameter 1) for controller 05 has now been temporarily changed to 125°F. If power is removed the previously "Entered" value will appear.

NOTE: For the RTD models an extra character must be added to accommodate

Example:

ENTER: #05M1·0125_F (CR) For range 26C
ENTER: #05M1·125. 0 F (CR) For range 22F
ENTER: #05M4·0125___ (CR) For Parameters
Space

6.3.3 To modify and store in nonvolatile memory

Enter: # 05 E 1 — 0130 F (CR)

Start Mark

Controller Number

Modify "E"

Parameter Number

Space or Minus

New Value (4 Digits)

F, C, or space (whichever applies)

Carriage Return

Controller Response:

(LF) #05A1 0130F (CR) (LF)

Parameters Alteration "A"

The set point (Parameter 1) for controller 05 has now been changed to 130 F and entered in non-volatile memory.

NOTE: For the RTD models an extra character must be added to accommodate

Example:

ENTER: #05M1-0130 F (CR)	For range 26C
ENTER: #05M1-130. 0 F (CR)	For range 22F
ENTER: #05M4-0130 (CR)	For Parameters

Space

SECTION 7 CALIBRATION

WARNING: These adjustments are factory set and should only be changed by a qualified person using calibrated equipment. Adjustment is not necessary during the life of these controllers.

7.1 Zero (-cL-) and Span (cH) Calibration

1. Unlock access to the calibration constants by entering the unlock number (14) into location 9 (-cd-).
2. Use a temperature calibrator with a range appropriate for the unit to be calibrated. Set in the value for low scale calibration, e.g., (1% of range).
3. Step to -cL- (calibrate low [ZERO]) using the index key.
4. Press the up/down keys until both instruments agree. Press the "ENTER" key.
5. Set in a value on the calibrator equivalent to the high-end capability of the unit under test, e.g. (95% of range).
6. Step to -cH- (calibrate high [SPAN]) using the INDEX key.
7. Press the up/down keys until both instruments agree. Press the "ENTER" key.
8. Repeat steps 2 thru 7 until readings agree. Some interaction between Zero (-cL-) and Span (-cH-) calibration usually occurs.
9. Lock out configuration access, if desired, and return to set point by pressing "SET POINT" key.

NOTE: Pressing index continuously selects -cH- or -cL- (Span and Zero) in the calibrate mode to facilitate testing. Exit this mode by pressing the "SET POINT" key.

SECTION 8 TROUBLESHOOTING

8.1 Troubleshooting - General

Symptom	Probable Cause & Corrective Action
Display does not light up.	No power, blown fuse.
Process display shows (— — —) or 'HHHH'	Open thermocouple circuit. Shorting terminals 1 and 2 should indicate temperature at back of case. Repair or replace thermocouple.
Process display shows LLLL or counts down scale when temperature is rising.	Check for reversed thermocouple.
About 30% error.	Wrong thermocouple type connected or internal range jumper in wrong position. Check serial tag for sensor type and then check probe. Consult manual for jumper location for desired range and then check unit and sensor.
No heat.	Incorrect heater wiring, wrong output module. Check for cause and correct the components.
Display blinks; entered values change.	Electromagnetic interference (EMI). To eliminate high voltage spikes, separate sensor and controller wiring from "dirty" power lines. Ground heated devices. Suppress all coils and contacts. See section on Electrical Noise.
Heat stays on.	Welded relay contacts or shorted output module. Check for cause and correct the components.

8.2 Troubleshooting - Communications

Basic Connection and Cautions

If problems are encountered, it is recommended that all connections and adjustments be reviewed carefully. The following are suggested checks.

- Connect wiring per drawings, making sure to double check all connections.
- Unit ID Code correct?
- Select baud rate on controller and make sure it agrees with host system.
- Select ODD parity and confirm that ASCII 7 bit code with one start and 1 stop bits is selected.
- Apply power and address controller making note of the receive (RX) light which will light if there is a signal occuring on the lines connected to the unit.
- Try "READ" command sequence (see Example). No response usually indicates a problem with the baud rate, parity or host terminal software. Recheck all settings if problems are experienced.
- It may be necessary to reverse the A & B lines to the host system if the polarity is unknown on RS485 or 20mA loop interface. If the receive light on the RS485 is lit (RX) but the transmit light (TX) is not, the signal polarity is probably backwards.
- If inconsistent or random responses are experienced, electrical noise is probably the cause. Add terminating resistors (per drawing), shielded cable and suppress source if it can be identified.
- Garbled response, may indicate open or intermittent wiring or connectors.
- If units with RS485 are being addressed through a conversion box by an RS232C port on the computer and the RS and TX lights are lighting but the computer is not getting data back from the controllers, check the RTS line. It may be missing or may not be getting toggled.

OMEGA® ...Your Source for Process Measurement and Control

TEMPERATURE

- ☐ Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- ☐ Wire: Thermocouple, RTD & Thermistor
- ☐ Calibrators & Ice Point References
- ☐ Recorders, Controllers & Process Monitors

PRESSURE/STRAIN

- ☐ Transducers & Strain Gauges
- ☐ Load Cells & Pressure Gauges
- ☐ Instrumentation

FLOW

- ☐ Rotameters & Flowmeter Systems
- ☐ Air Velocity Indicators
- ☐ Turbine/Paddlewheel Systems
- ☐ Vortex Meters and Flow Computers

pH

- ☐ Electrodes & Transmitters
- ☐ Benchtop/Laboratory Meters
- ☐ Controllers, Calibrators & Simulators

DATA ACQUISITION

- ☐ Data Acquisition and Engineering Software
- ☐ Communications-Based Acquisition Systems
- ☐ Plug-in Cards for Apple, IBM & Compatibles
- ☐ Data Logging Systems
- ☐ Recorders, Printers & Plotters

HEATERS

- ☐ Heating Cable
- ☐ Strip Heaters
- ☐ Cartridge Heaters
- ☐ Immersion Heaters
- ☐ Tubular & Band Heaters

OMEGA® ENGINEERING, INC.

An OMEGA Technologies Company

One Omega Drive, Box 4047
Stamford, CT 06907-0047
(203) 359-1660 Telex: 996404 Cable: OMEGA FAX: (203) 359-7700

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP