Table of Contents

SECTION 1
INTRODUCTION

1.1 Description

The CN600 Series is a second generation of industrial scanners based on the field proven CN100 six zone temperature monitor/alarm system. Several models and options are available.

The CN600 Series is a microprocessor based scanner which accepts signals from thermocouples or RTD's. In the basic unit, six zones are sequentially scanned with a selectable display rate of 1 to 40 seconds each. A single output relay is provided to indicate an alarm condition on any zone. The faceplate has been arranged to call attention to an alarm condition by flashing the main temperature display and indicating the zone in alarm with a flashing zone number display. The CN600 Series implements a security password to protect certain functions.

1.2 Features

- Six Zones or 12 Zones
- Adjustable Display Time
- Field Proven Zone Switching
- Temperature and Setpoint Monitoring
- Four Digit Display of Temperature
- 2 Digit Display of Zones
- 5 Amp Latching or Non-Latching Relay
- Standard Thermocouples [T,E,J,K,S,R,B,C]
- Extended Ranges
- Six RTD Inputs (2 or 3 wire)
- Six Optional Independent Outputs
- Programmable Selection of HI, LO or HI/LO Alarms
- Password Protection
- Optional Inputs Other Than Thermometer
- 1/4 DIN Aluminum Box
- Splash Proof Face
- Plug-In I/O Terminals
- RS-232 Communication

NOTE: Consult RS-232 Software for use of RS-232 Communications.

1.3 Models

The following Models are available:

- Standard Thermocouple
- Extended Range
- RTD Input
- 12 Zone Thermocouple

Model Number	Description
CN606TC1	6 Zone T/C
CN606TC2	6 Zone T/C w/Extended Range
CN606RTD	6 Zone RTD (2 Wire)
CN612RTD	12 Zone RTD (2 Wire)
CN606RTD-3	6 Zone RTD (3 Wire)
CN612TC1	12 Zone T/C
CN612TC2	12 Zone T/C w/Extended Range
(Open Collector Option)	
CN606TC1-OC	6 Zone T/C
CN606TC2-OC	6 Zone T/C w/Extended Range
CN606RTD-OC	6 Zone RTD (2 Wire)

SECTION 2
RS-232 COMMUNICATIONS
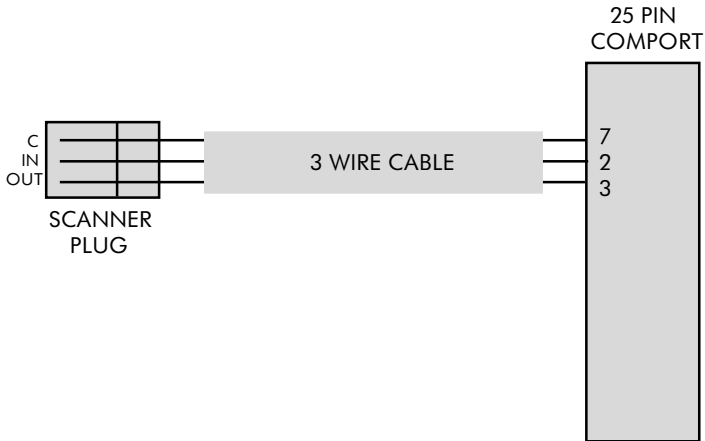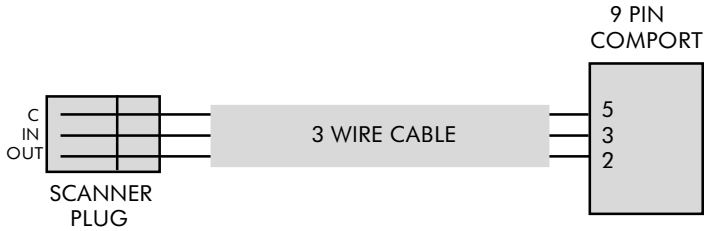
2.1 Description

> NOTE: Minimum requirements to run RS-232 software is a PC computer with Windows 95.

Up to ten scanners can be connected in parallel to a single RS-232 communications port on a PC. Each scanner is assigned a serial number from 0 to 9. The computer uses these numbers to determine which scanner unit to address at a given time.

A simple set of menus is provided in the software which allows the operator to change the settings of each connected scanner unit and display individual operating parameters.

For users with advanced software capabilities, see Section 2.4 for an operating protocol.
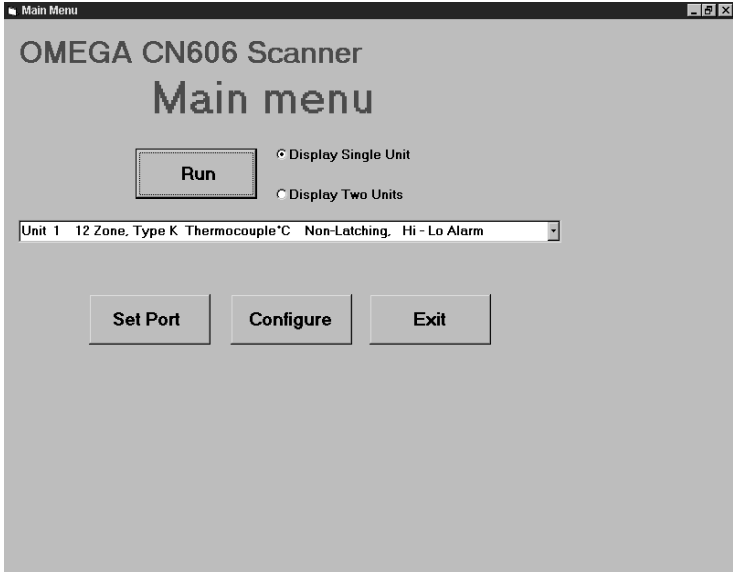
2.2 RS-232 Cable Connections

9 PIN
COMPORT

C
IN
OUT
3 WIRE CABLE
5
3
2

SCANNER
PLUG

25 PIN
COMPORT

C
IN
OUT
3 WIRE CABLE
7
2
3

SCANNER
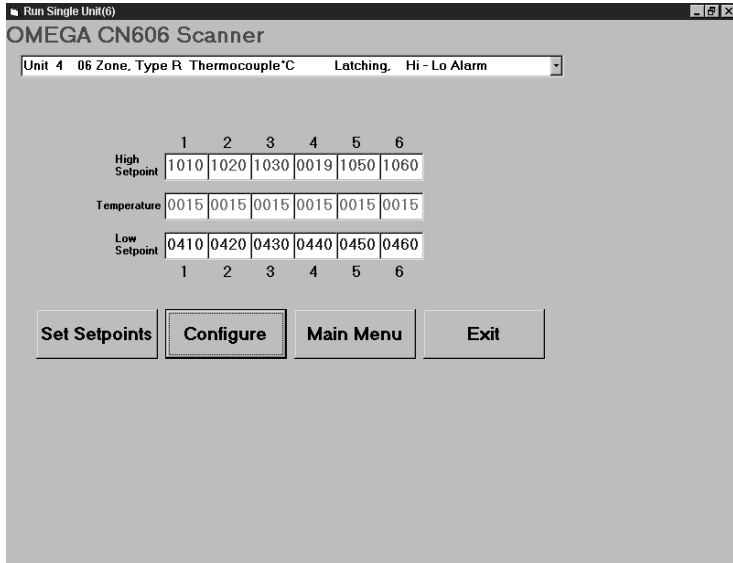PLUG

2.3 RS-232 PC Screens
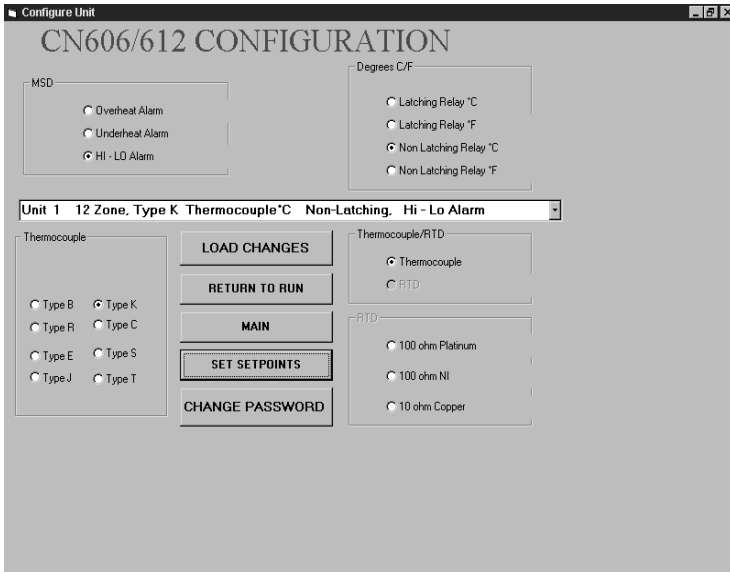
The following screen menus are provided:

1. SELECT PORT- Scans all available PC ports and indicates which port is connected to scanners.

2. MAIN MENU- Allows the following operations:

- RUN one unit display or two units simultaneously.

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- CONFIGURE UNIT allows individual unit type selection, including: T/C Type, Temperature Scale, Latching or Nonlatching Alarm, and Hi, Lo or Hi/Lo Alarm.

- SET SETPOINTS allows changes to individual unit Hi and Low setpoints, scan time settings and allows zones to be enabled/disabled.
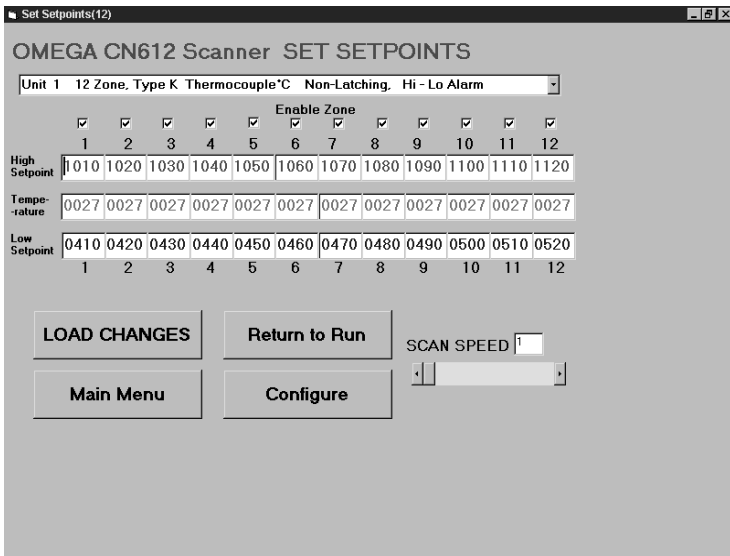
2.4 Operating Protocol for RS-232 Communications

The CN606 Scanner is designed with standard RS-232 three wire serial communication capabilities. Up to ten scanners can be parallel connected to a single PC. The transmission line is held in tristate to avoid cross-talk between scanners except when the computer addresses a specific scanner for communication.

> **Configuration**
> BAUD rate = 4800
> Data bits = 8
> Parity = N
> Stop = 1

Communication software for the PC is written in Visual Basic. This software package has been created to operate on PC Windows 95 platform meeting the minimum requirements.

Customers can communicate with CN606 scanners through a PC by using the following protocol:

- Scanners will not initiate communication. The RS-232 Command Module (computer or similar device) must initiate.

- All communication is in ASCII format except Check Sum. Check Sum is generated by hexadecimal addition with carry of data string (one byte).

- To start communication, the Command Module must send alert code ASCII [L] hex 4C. This commands the scanners to cease RS232 communication and listen for an ID Code. The Command Module then sends the Identification Number for the scanner that it needs to address, ASCII [0 to 9] hex 30 to 39. The identified scanner will then expect a command code. All the other scanners on-line will wait for the next alert code.

- Command codes are divided into two groups:

  Group 1. Commands requesting data from the scanner:
  ASCII [A] hex 41 = Zones/ Alarms/ Scan time
  ASCII [M] hex 4D = Model/ Password/ ID#/ # of zones
  ASCII [S] hex 53 = Setpoints
  ASCII [T] hex 54 = Temperature

ASCII Zones/ Alarms/ Scan time   15 bytes
   1 byte [binary] zones 1 to 6   [0011 1111] = (3F h)
   1 byte [binary] zones 7 to 12   [0011 1111] = (3F h)
   1 byte [binary] zones 1 to 6 Hi alarm   [0011 1111] = (3F h)
   1 byte [binary] zones 7 to 12 Hi alarm   [0011 1111] = (3F h)
   1 byte [binary] zones 1 to 6 Lo alarm   [0011 1111] = (3F h)
   1 byte [binary] zones 7 to 12 Lo alarm   [0011 1111] = (3F h)
   2 digit scan time
    + check sum

ASCII Model/ Password/ ID#/ # of zones   13 bytes
   4 digit model code   4 bytes
   4 digit password   4 bytes
   2 digit ID#   2 bytes
   2 digit number of zones   2 bytes
    + check sum   1 byte

ASCII Coded Setpoints   97 bytes
   12 zones, 4 digits each zone [Hi setpoint]   48 bytes
   12 zones, 4 digits each zone [Lo setpoint]   48 bytes
    + check sum   1 byte

ASCII Coded Temperature   49 bytes
   12 zones, 4 digits each zone   48 bytes
    + check sum   1 byte

Group 2. Commands preparing scanner to receive data:
       ASCII [m] hex 6D = Model/ Password/ ID#
       ASCII [e] hex 65 = Zone enable/ Scan time
       ASCII [s} hex 73 = Setpoints

ASCII Model/ Password/ ID#   10 bytes
   4 digit model code   4 bytes
   4 digit password   4 bytes
   1 byte ID   1 byte
    + check sum   1 byte

ASCII Zone enable/ Scan time   7 bytes
   1 byte [binary] zones 1 to 6   [0011 1111]   2 bytes
   1 byte [binary] zones 7 to 12   [0011 1111]   2 bytes
   2 digit scan time   2 bytes
    + check sum   1 byte

ASCII Coded setpoints	97 bytes
12 zones, 4 digits each zone [Hi setpoint]	48 bytes
12 zones, 4 digits each zone [Lo setpoint]	48 bytes
+ check sum	1 byte

• The four digit code for model selection is as follows:

Digit 1. (msd)
    0 = Overheat Alarm
    1 = Underheat Alarm
    2 = Hi/ Lo Alarm

Digit 2.
    0 = Latching Relay °C
    1 = Latching Relay °F
    2 = Nonlatching Relay °C
    3 = Nonlatching Relay °F

Digit 3. (preset at the factory)
    0 = Thermocouple
    1 = RTD

Digit 4. (Thermocouple units only)
    0 = Type B
    1 = Type C
    2 = Type E
    3 = Type J
    4 = Type K
    5 = Type R
    6 = Type S
    7 = Type T

Digit 4. (RTD units only)
    0 = 100 ohm Platinum
    1 = 100 ohm Nickel
    2 = 10 ohm Copper

SECTION 3
INSTALLATION

3.1 Unpacking

Upon receipt of shipment, inspect the container and equipment for any signs of damage. Take particular note of any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

Remove the packing list and verify that all equipment has been received. Each package should contain:

- Scanner (CN606 or CN612)
- Operator's Manual
- RS-232 Software
- Two mounting slides with screws
- Power plug (9 pin)
- RS-232 plug (3 pin)
- Two T/C plugs (6 pin)
- (CN612 only) Two Additional T/C plugs (6 pin)

If there are any questions about the shipment, please call the Customer Service Department.

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.

3.2 Mounting

Select a location for the monitor that is free from excessive shock, vibration, dirt, moisture and oil. Mount the monitor into a 3 5/8" (92mm) square cutout. The monitor as shipped is 1/4 DIN (92mm square), so it does not have to be removed from it's housing to be mounted.

Remove the two screws that secure the mounting slides. Remove the slides and insert the case into the cutout from the front side of the panel. Reinstall the two slides and two screws. The length of the slides must be reduced if the monitor is to be mounted in an extra thick panel.

3.3 Outline Dimensions
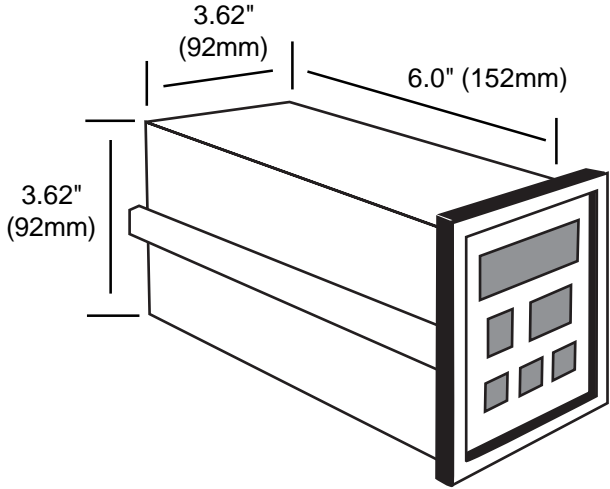
3.4 Wiring the Power Circuit

The line voltage for the scanner is selected by an external jumper assembly to operate either on 120VAC or 240VAC±10%, 50/60Hz (factory wired for 120VAC). It is very important that the proper line voltage is connected to the instrument. If 120VAC is connected to a 240VAC model, it will not work properly. A 120VAC instrument connected to 240VAC will overheat and burn the input transformer.
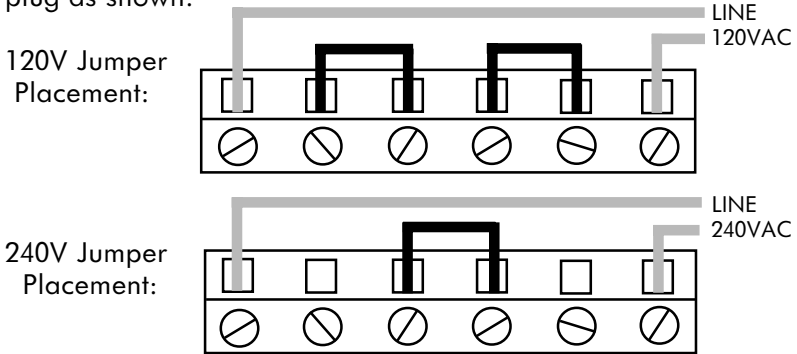
WARNING! !
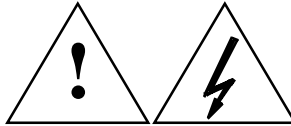
The scanner is powered with either 120 or 240 VAC. To avoid electric shock or fatality hazards the power to the scanner lines must be switched off at the main switch, or circuit breaker before the scanner A/C wiring, including the line selector jumpers can be handled.

3.5 Changing Line Voltage Setting

Program the input line voltage by placing jumpers on the line plug as shown:

120V Jumper
Placement:

LINE
120VAC

240V Jumper
Placement:

LINE
240VAC

WARNING! !
Line Voltage
see P 10
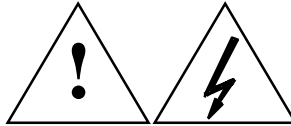
3.6 Sensor Placement

Proper sensor placement is essential. It can eliminate many problems in the total system. The probe should be placed so that it can detect any temperature change with little thermal lag. In a process that requires fairly constant heat output, the probe should be placed close to the heater. In processes where the heat demand is variable, the probe should be close to the work area. Experimenting with probe location can often provide optimum results. Some RTDs are shock sensitive and require care in handling and installation. To avoid current feedback from zone to zone and from zone to RS-232 communications, ungrounded thermocouples are recommended. Thermocouple wires should not be placed in the same conduit as the power lines.

SECTION 4
PARTS OF THE INSTRUMENT

Temperature\Setpoint Display

Temperature Scale Selection

Function Setting

Zone Setting

Function   **Zone**

Set\Shift\Reset Button

Load Button

Advance Digit Button
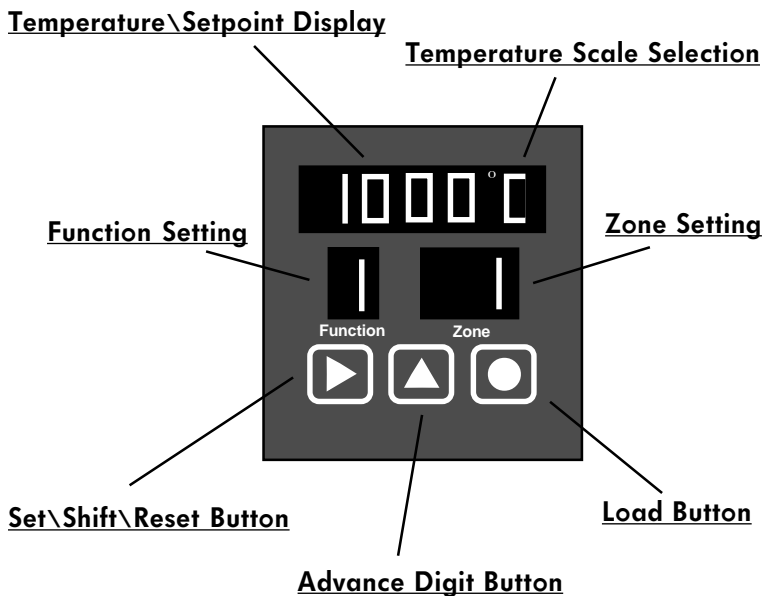
Temperature\Setpoint Display- Main display with multiple functions.

Temperature Scale Selection- Choice of °C or °F.

Function Setting- Indicates the operating status of the instrument.

Zone Setting- Indicates an active zone or a zone that is being set.

Set\Shift\Reset Button- Used to recall the setpoint, to select digits during setup or to reset the alarm.

Advance Digit Button- Used to increment selected digit.

Load Button- Used to accept a setting.

4.2 Button Functions

There are three flatpad buttons provided and two combinations for seperate functions.

Set/Shift/Reset Button

1. Selects Digit
2. Enables/Disables Zones
3. Resets Alarm during **"RUN" MODE**
4. Switches Main Display Functions

Advance Digit Button

1. Advances Selected Digits
2. Advances Zones

Load Button

Advance Digit Button & Load Button (together)

 &

1. Requests the Password
2. Engages Function Select

Set/Shift/Reset Button & Load Button (together)

 &

1. Displays the Setpoint during **"RUN" MODE**
2. Exits Setpoint Display during **"FUNCTION SELECT" MODE**

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4.3 Back of the Scanner

RS-232
Port

Line Voltage
and Jumpers

SPDT
Relay
Connect

Zones 7-12
(CN612
models only)

INPUT

Zones 1-6
(all models)

Red Wire

THERMOCOUPLES
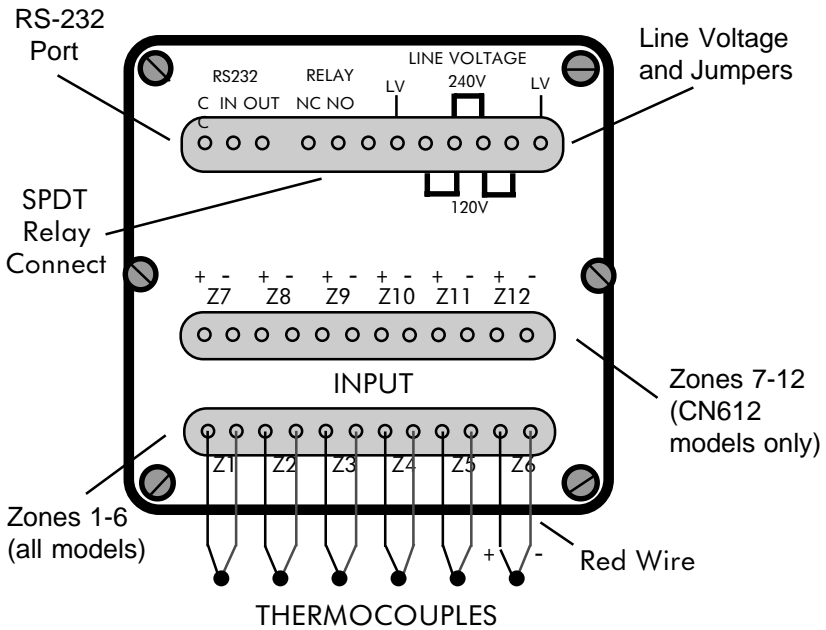
WARNING! !
Line Voltage
see P 10
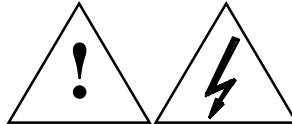
RS-232 Port- Cable connection (see Section 1.3)

C - Common   Pin 5
IN - Input   Pin 2   } 9 Pin Comport
OUT - Output Pin 3

Relay
NC- Non-energized Closed
NO- Non-energized Open
C- Common

Line
LV- 120VAC or 240VAC cable
Jumpers- Determines voltage input (see Section 3.4)

4.4 Temperature/Setpoint Display (Main Display)

During **"RUN" MODE**, the Main Display is used to monitor zone temperatures, check setpoints, and indicate ALARM conditions.

During operator programming in **"FUNCTION SELECT" MODE**, the Main Display is used to:

> 1. Set the Zone Setpoints
> 2. Enter Passwords
> 3. Select Functions
> 4. Set the Zone Display Time
> 5. Select the Instrument Model

During **CALIBRATION** (Function 9), the Main Display is used to:

> 1. Set calibration millivolts

SECTION 5
SETUP AND OPERATION

There are two methods of setting up the CN600 Series scanner. The CN600 Series can be easily configured using the RS-232 Communications software or the scanner can be set up through it's front panel by using the following instructions.

5.1 "RUN" MODE

Once the instrument is mounted and powered, it will go into **"RUN" MODE**. This is the basic operating mode for the CN606 in which each zone is sequentially scanned at approximately 4 complete scans per second (all zones) and each active zone is displayed for the scan time set by the operator (1 to 39 seconds). The last settings loaded will control the instrument.

During **"RUN" MODE**, the operator is able to perform the following seperate functions:

1. Check individual Setpoints by pressing ▶ & ●

   NOTE: In HI/LO Alarm Mode, the operator may toggle between HI and LO Setpoints by pressing ▶

2. Lock individual Zones for monitoring by pressing ● Unlock with ▶

3. Activate **"FUNCTION SELECT"** by pressing ▲ & ●

   NOTE: If the Password Function is enabled, the correct Password must be entered to access **"FUNCTION SELECT"**

5.2 Functions

Functions are selected on the Main Display during **"FUNCTION SELECT" MODE** and transferred to the Function Display by the ● button.

Ten Functions are available:

Section in Manual	FUNCTION DISPLAYED	DESCRIPTION
5.1	0	**"RUN" MODE** (Monitor Zone Temperatures, Setpoints, Alarms)
5.4	1	**"FUNCTION SELECT"** (Password Protection Option)
5.3	2	Select Active Zones (Activate or Disable Zones)
5.3	3	Set LO Setpoint
5.3	4	Set HI Setpoint
5.3	5	Serial Number (to set a one digit Instrument RS-232 address)
5.3	6	Set Scan Time (1 to 39 seconds)
5.3	7	Select Model (four digit model #: Alarm,Relay & F/C, Input, Type)
5.3	8	Password Enable/Disable
5.3	9	Calibration (with a Fixed Password)

5.3 Functions Description

RUN
This is the basic operating mode entered on power-up.
See SECTION 5.1

FUNCTION SELECT
This is the function from which most other Functions are available. See SECTION 5.4

SELECT ACTIVE ZONES
During **"FUNCTION SELECT"**, use ▲ to select "2" on the Main display.

Press ⬤ to load.

The Main Display will become blank.
A "2" will be shown in the Function Display.
Zone "1" will be indicated in the Zone Display.

On the Zone display: Flashing "1"= Current Zone Disabled
                        Steady "1" = Current Zone Active

Push ▶ to change the status of the zone.

When the correct zone status is set, push ▲ to advance to the next zone.
Set the status of each zone and press ⬤ to load all zones

and return to **"FUNCTION SELECT" MODE**.

SET LO SETPOINT
During **"FUNCTION SELECT"**, select "3" on the Main display.
Load with ⬤

A "3" will appear in the Function Display.
The current zone will appear in the Zone Display.
The Main Display will show the current setpoint with it's

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first digit flashing.
If changes are required:

Increment digit with ▲

Select digit with ▶

Load with ● and the next zone will appear.

If no changes are required, push ● to check the next
zone.

When the setpoints for each zone have been checked or

corrected, press ▶ & ● together to return to

"FUNCTION SELECT" MODE.

4
Function

SET HI SETPOINT
Repeat procedure for "LO SETPOINT" but begin with
selecting Function "4" and then set each zone's HI setpoint.

5
Function

SERIAL NUMBER
One Digit Instrument Serial Number. Used for RS-232
addressing. Follow the same procedure as for Function 6
but select Function 5.

6
Function

SET SCAN TIME
During "FUNCTION SELECT", select "6" on the Main display.
Load with ●

A "6" will appear in the Function Display.
Two "Scan Time" digits will appear in the Temp. Display.
Set the required scan time (within 1 and 40 seconds) using

▲ to increment and ▶ to select digit.

Press ● to load and return to **"FUNCTION**

SELECT" MODE.

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SELECT MODEL
During **"FUNCTION SELECT"**, select "7" on the Main Display.

Load with

A "7" will appear in the Function Display.
A four-digit Model number will appear in the Main Display.
Each digit represents an option available within the instrument.
Choose a number for each digit that suits your needs.

Increment with and select next digit with to choose

the proper model from the list below:

First Digit	0-	Overheat Alarm
(MSD)	1-	Underheat Alarm
	2-	HI-LO Alarm

Second Digit	0-	Latching relay °C
	1-	Latching relay °F
	2-	Non Latching Relay °C
	3-	Non Latching Relay °F

Third Digit (Factory Preset)

	0-	Thermocouple
	1-	RTD

Fourth Digit   (Thermocouple)   (RTD)

0-	Type B	0	100 ohm Platinum
1-	Type C	1	100 ohm NI
2-	Type E	2	10 ohm Copper
3-	Type J		
4-	Type K		
5-	Type R		
6-	Type S		
7-	Type T		

Press to load.

The instrument will return to **"FUNCTION SELECT" MODE**.

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PASSWORD ENABLE/DISABLE

Select "8" on the Main Display.
Press [ ] to load.

An "8" will appear in the Function Display.
The first digit on the Main Display will flash "0" or
"1", depending on the previous setting.
To enable Password, enter "1" on the Main Display.
To disable Password, enter "0" on the Main Display.
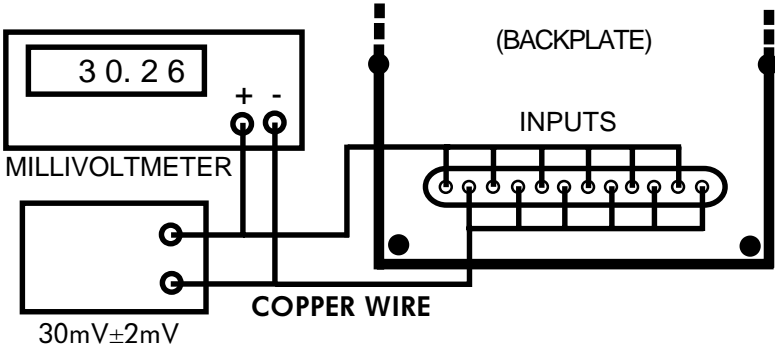Load and Exit with [ ] .

CALIBRATION
**NOTE: To avoid any interference during calibration,
disconnect the RS-232 wires from the scanner.**

THERMOCOUPLE UNIT WIRING: Parallel-connect all
thermocouple terminals of the Input Connector as shown:

Using copper wire, connect the positive and negative
terminals of the Input Connector to a presision
millivoltmeter and a low output impedance source
(10 ohm or less) set to 30mV ±2mV input.

RTD UNIT WIRING: Short-circuit the upper Input
Connector as shown on next page. In the lower
Input Connector, connect a $330\Omega \pm 5\%$ resistor across
each zone except Zone 3.

Using copper wire, connect Zone 3 to a precision millivoltmeter and 300Ω±0.1% resistor as shown:
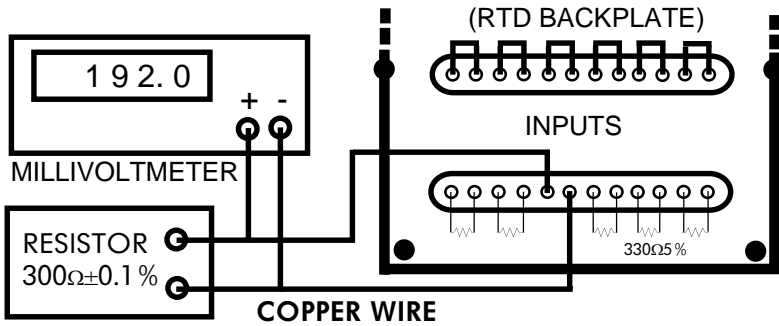
Allow the instrument to run for 15 minutes before calibrating. During **"FUNCTION SELECT"**, select "9" on the Main Display. Press ⬛ to load.

A "9" will appear in the Function Display and the Main Display will flash "0". A Fixed Password (0101) is now required to enter this Function to protect against accidental miscalibration. Follow the password entry procedure in Section 5.6.
Observe the voltage reading on the millivoltmeter. This reading should be near 30.26mV for Thermocouple Unit wiring and around 192.0mV for RTD Unit wiring.
Set this full four digit mV reading on the Main Display using the 🔼 button to increment and the ▶ button

to shift digits. Press ⬛ to load and activate SELF CHECK.
For about 20 seconds, the display will flash the digits as shown:

During this time, the scanner checks and callibrates itself.

NOTE: Do not change the impedance source or resistor input during this SELF CHECK PERIOD.

When SELF CHECK is finished, the display returns to **"RUN" MODE** and CALIBRATION IS COMPLETED

5.4 "FUNCTION SELECT" MODE

"FUNCTION SELECT" is the mode through which most Functions are accessible.
To access **"FUNCTION SELECT" MODE**, press ▲ & ⬤ together while in **"RUN" MODE**.
A "1" should appear in the Function Display. If it flashes, then the instrument is in **"FUNCTION SELECT"**. If the "1" is steady, a Password is required.
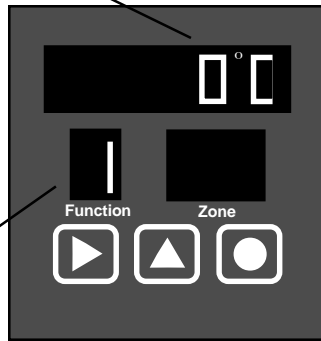
When in **"FUNCTION SELECT" MODE**, the fourth digit in the Main Display will flash "0".

Use ▲ to increment this

digit to the desired Function number (2-9) chosen from the Functions List.

Press ⬤ to load.

The Function number selected will transfer to the Function Display and information relevant to that Function will appear in the Main and Zone Displays.

5.5 Security

The instrument is factory preset with a Four Digit Password (1011) to restrict access to settings.
The Password can be enabled or disabled within Function 8 of the instrument. (If enabled, follow procedure 5.3)
The Password can only be changed by computer using RS-232.
There is also a fixed password to enter Function 9 Calibration.

5.6 Entering the Password (Factory Preset) to access FUNCTION SELECT MODE

> NOTE: The Password can only be changed by a computer using RS-232 Communications.

During **"RUN" MODE**, press ▲ and ● together to access **"FUNCTION SELECT" MODE**. If the Password security is enabled, a steady "1" will appear in the Function Display and the first digit in the Main Display will flash "0". If the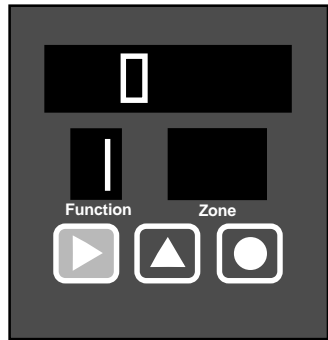 Password security is disabled, a "1" will flash in the Function Display and the last digit in the Main Display will flash "0".

TO ENTER PASSWORD 1011

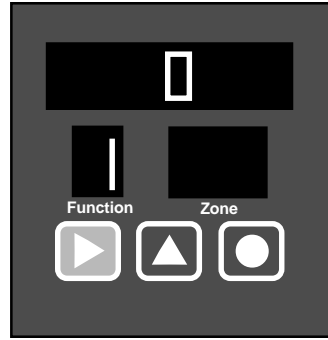1. Press ▲ to increment the first

digit to "1".
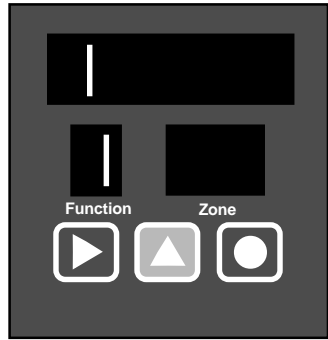
1.

2. Press ▶ to shift to the second

digit. In this case, the second digit of the password is a "0"; there's no need to increment it.

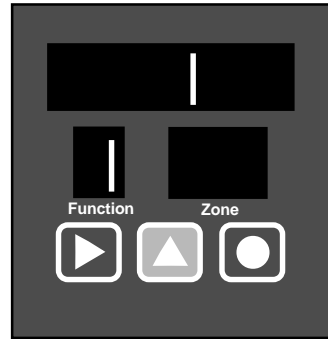

2.
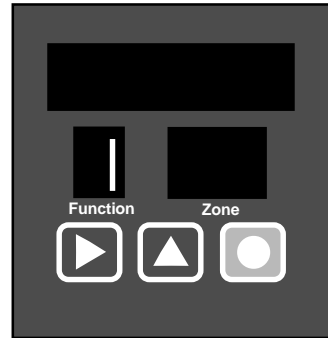
3. Press ▶ again to shift to the

third digit.

3.

4. Press ▲ to increment the

third digit to "1".

5. (Not illustrated) Shift to

the fourth digit with ▶ and

increment the display to "1"

with ▲ .


4.

6. Push ⬤ to load the password.

6.

NOTE: If wrong password is entered,
the instrument will go back to **"RUN" MODE.**

If password is correct, "1" in the function display will start
flashing and the instrument will go to **"FUNCTION SELECT".**
In **"FUNCTION SELECT" MODE** the operator may choose
a Function from the FUNCTIONS list.

5.7 Wiring RTD Models
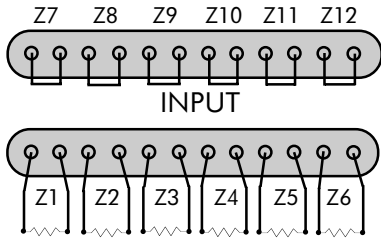
NOTE: See Section 4.3 for thermocouple wiring.
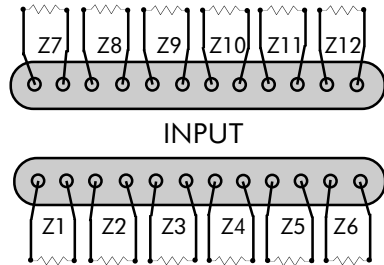
Six Zone RTD- 3 Wire
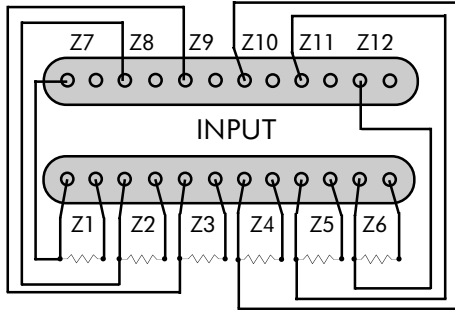
3 Wire Model
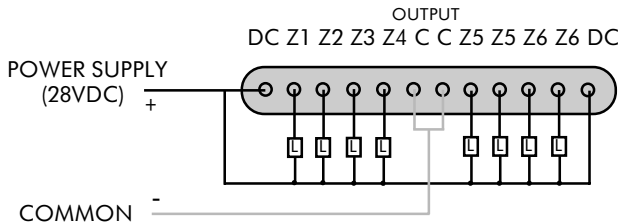using 2 Wire Probe
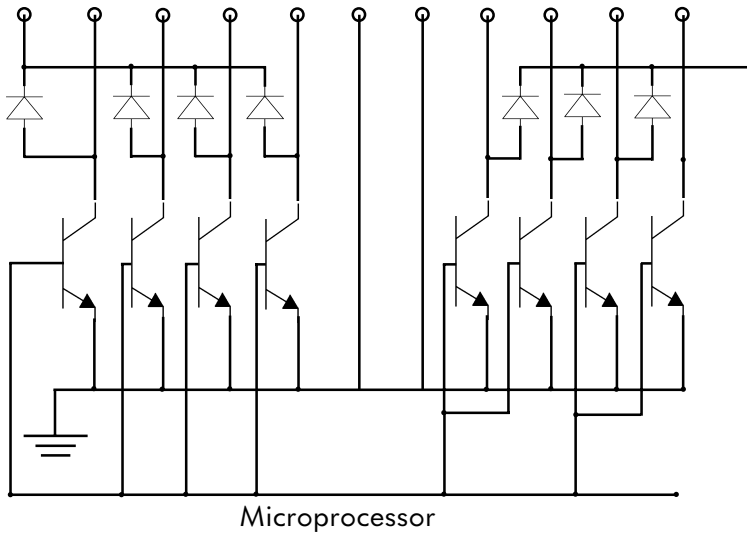(Short Upper Terminals
as shown)

Twelve Zone RTD- 2 Wire only

5.8 Wiring OC Models

Output

25

Open Collector Transistor Diagram for Output

Microprocessor

5.9 Thermocouple Ranges

Standard Ranges

TC	ºC Range	ºF Range
J	0-750	32-1400
K	0-1000	32-1900
E	0-500	32-1000
T	0-400	32-750
S	0-1750	32-3200
R	0-1750	32-3200
B	0-1800	32-3300
N	0-1100	32-2100
C	0-2300	32-4200

Extended Ranges

K	0-1300	32-2500
E	0-1000	32-1800

RTD Ranges

100Ω Platinum	0-600	32-1200
120Ω Nickel	0-300	32-600
10Ω Copper	0-250	32-500

SECTION 6
SPECIFICATIONS

No. of Zones	Six standard/ Twelve Expanded
Zone Display Time Adjust.	1-40 seconds
Scan Time	Approx. 1/4 sec
Input Range	0-40mV Standard/ 0-75mV Expanded
Accuracy	±0.1% Range
Resolution	±5uV
Thermocouple Type	J,K,E,T,S,R,B,N,C
Cold Junction Compensation	Automatic
Linearity	±1 °C
Scale Selectable	°C or °F
Open T/C Warning	Flashing Display
RTD (2 or 3 wire)	100 W Pl 100 W Ni 10 W Cu
Line Power	120/240VAC; 50/60Hz
Power Consumption	10VA Max.
Alarm Relay	5 Amp; 120VAC Relay deenergizes on alarm .5Amp@40VDC
Optional 6 Outputs (One for each Zone; Open Collector Transistors deenergize on alarm)	External DC power required
Communication	RS232 (3wire)
Alarms Selectable	HI LO HI/LO } Latching or Non-latching
Alarm Range	Full Range
Terminals	Headers for Plug-in Wiring
Enclosure	1/4 Din Aluminum, 6" long
Reset	Manual
Max. Voltage between Inputs	6VDC or RMS
Reaction to Power Loss MODE	Unit returns to "RUN"
Main Display	Four Digit; 0.6" high