

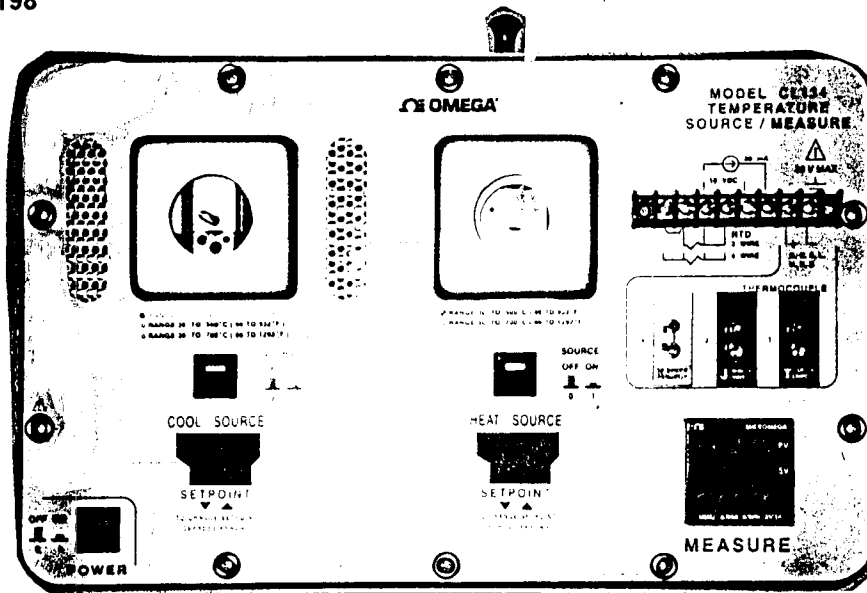
SERIES CL134

TEMPERATURE
SOURCE / MEASURE
USER'S MANUAL

M-2932/1198



<http://www.omega.com>
e-mail: info@omega.com



MADE
IN
USA

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2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

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INTRODUCTION

The Series CL134 Temperature Source / Measure is a powerful instrument that simplifies the testing of temperature sensors by conveniently housing both the SOURCE and MEASURE in one package.


The Unit has:

1. Separate COOL and HEAT SOURCES which cover the ranges from -30°C (22°F) to ambient and ambient to 700°C (1292°F) respectively.
2. A MEASURE unit for thermocouples, RTDs, and temperature transmitters.
3. Universal Jaws TM (Patent Pending) which accept all diameters up to 1/2 inch and include standard holes for 1/4 inch, 3/16 inch and 1/8 inch (6.4, 4.8, 3.2 mm) diameters. The COOL SOURCE Universal Jaw range is -30°C (22°F) to ambient. The HEAT SOURCE range is ambient to 500°C (932°F).
4. An optional 5 hole block with a high temperature capability of 700°C (1292°F).

IDENTIFICATION

The CL134 is identified by the side mounted identification plate, (shown in Figure 1) which shows a unique serial number as well as the power requirement and communications options.

FIGURE 1: IDENTIFICATION PLATE

COMMUNICATIONS	
<input type="checkbox"/> None	
<input type="checkbox"/> RS-485	
<input type="checkbox"/> IEEE-488	CE
	
An OMEGA Technologies Company	
Model	Serial
CL 134	0001
Power <input type="checkbox"/> 90-130 VAC 50/60 Hz	
<input type="checkbox"/> 210-250 800VA Max	

3. SAFETY PRECAUTIONS

A. HAZARD AND WARNING SYMBOLS



The lightning flash within the triangle symbol is intended to alert the operator to dangerous conditions of HIGH HEAT and/or HIGH VOLTAGE that may exist within the Model CL 134 which could cause serious harm or burns to the operator if safety precautions are not followed.



The exclamation point in the triangle symbol is intended to alert the operator to important operating or maintenance instructions in the manual.

B. SAFETY INFORMATION

When using the Model CL134, as with any electric product, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and personal injury. Some of these precautions include the following:



1. Do not expose to rain or use in damp or wet locations.
2. Guard against electric shock.
3. Prevent body contact with grounded surfaces
4. Do not operate near flammable liquids or in explosive atmospheres.

3. SAFETY PRECAUTIONS



5. Do not touch the heat or cool block, nor insert your finger or any other part of your body into the probe cavities after the unit has been in operation until these areas have returned to ambient temperature.



6. Disconnect power cord when instrument is not in use.

7. Disconnect power cord before servicing unit.



8. Never carry the unit by the cord or yank it to disconnect from receptacle.

9. Keep cord away from heat, oil, and sharp edges.

10. Frequently check the unit for damaged parts including the power cord. A damaged part should be properly repaired or replaced before the unit is returned to operation.

C. STATIC ELECTRICITY

Static Electricity may accumulate on clothing and tools, especially when levels of Relative Humidity are low. Prior to making connections to the measurement controller, the operator is advised to neutralize any static-charge that may be present on his person or tools. Such "static electricity may be dissipated by momentarily touching (with a hand, finger or tool) an external bare metal surface of the calibrator's chassis.

4. PREPARATION FOR USE



Carefully unpack and remove the CL134 Temperature Source / Measure from the shipping carton. Inspect the unit for any obvious damage in shipping. If there is any damage, report it promptly to Omega.

A. POWER CORD

The power cord is wrapped around two cord wraps in the inside of the top cover. Note that when storing the Model CL134, the power cord must be wrapped carefully to prevent the cord from being cut when the top cover is fastened down.

B. POWER REQUIREMENTS

The power requirement is noted on the identification label. The standard unit requires 90 - 130 VAC, 50/60 Hz with 800 VA maximum. The "230 Option" is for 210 - 250 VAC, 50/60 Hz. A 90-130 VAC unit cannot be changed to 210 - 250 in the field.

C. ORIENTATION AND TOP REMOVAL

Before operating the Unit, it is important to read the following instructions.

1. Orient the CL134 with the removable top and handle facing up. Unlatch the two fasteners and swing the top up. (See Figure 2)
2. Remove the top cover by pulling to the right. Note, it is not necessary to remove the top cover to operate the unit in the vertical mode.
3. For the proper orientations when using the unit, refer to Figures 3 and 4 and the detailed descriptions in Section 5 B Operating Instructions, Probe Insertion.

4. PREPARATION FOR USE

READ THE OPERATING INSTRUCTIONS IN THIS MANUAL BEFORE PROCEEDING

FIGURE 2: REMOVAL OF TOP COVER

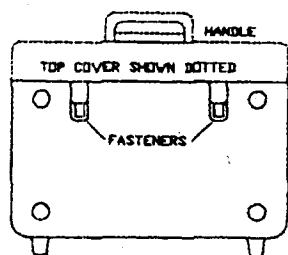
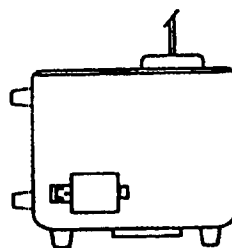


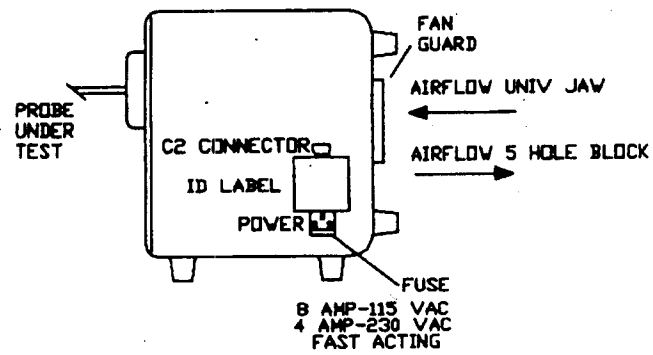
FIGURE 3: VERTICAL ORIENTATION



Use in vertical mode for Universal Jaw or when conventional holes are used at temperatures below 500° C (932° F)

4. PREPARATION FOR USE

FIGURE 4: HORIZONTAL ORIENTATION



USE IN HORIZONTAL MODE FOR TEMPERATURES $>500^{\circ}\text{C}$ (932°F)

5. OPERATING INSTRUCTIONS



It is essential that the user read and understand the entire section on Operating Instructions before applying power to the CL134.

A. FRONT PANEL ASSEMBLY

Refer to Figure 5: "Front Panel Assembly" to reference the items described below. Use of the CL134 is controlled through these components.

1. POWER PUSH-BUTTON

Depress for power on. When power is on, the Power Push-button lamp is illuminated. The temperature controllers illuminate and the fan operates.

2. COOL AND HEAT PUSH-BUTTONS

Depress to Cool or Heat. The lamp illuminates when power is applied to the respective COOL or HEAT Source. When the block is stabilized at the setpoint temperature, the lamp blinks constantly.

3. TEMPERATURE CONTROLLERS

There is a separate temperature controller for each of the HEAT and COOL modules. The top display is the block temperature as sensed by the internal reference RTD. The bottom display is the setpoint temperature, or the temperature that the block is commanded to stabilize at. The setpoint arrows up/down are used to control the setpoint temperature. Hidden push-buttons A and F are not operator controls. These are used for calibration, range, or to change the read-out unit of measure between C and F and are described in other sections of this manual. The OEM manual is enclosed for special features such as ramping.

5. OPERATING INSTRUCTIONS

4. AIR VENTS

Air is expelled through the air vents. These vents should occasionally be wiped clean of dust. The COOL Source in particular needs an unimpeded flow of air to reach its lowest temperatures.

5. LIFT BAR (Model Cool Universal Jaw only)

The operator should lift up on this bar to insert a temperature probe into the COOL Source Universal Jaw. Any probe up to a cross sectional dimension of 0.5 inches (12.7 mm) can be inserted into the Universal Jaw.

6. LIFT KNOB (Model Heat Universal Jaw only)

The operator should lift up on this knob to insert a temperature probe into the HEAT Source Universal Jaw. On the Model with two Heat Universal Jaws there are two knobs. Any probe with a cross sectional dimension of 0.5 inches (12.7 mm) or less can be inserted into the Universal Jaw.

Raise the temperature for the Universal Jaw steps of 100°C above 200°C. That is, if going to 500°C, go to 300°C, wait 5 minutes, go to 400°C, wait 5 minutes, then proceed to 500°C.

7. CONVENTIONAL HOLES

The standard diameters for the holes are 1/4 inch, 3/16 inch, and 1/8 inch (6.4, 4.8, and 3.2 mm) They are 4 inches (102 mm) deep. Whenever possible, these holes should be used for round conventional probes rather than the Universal Jaw because the heat up or cool down time is more rapid. The heat or cool transfer coefficient is greater from a tight fitting hole than from the 0.5 inch (12.7 mm) hole of the Universal Jaw.

5. OPERATING INSTRUCTIONS

8. OPTIONAL FIVE HOLE BLOCK

This optional block has hole diameters of 3/8 inch, 1/4 inch, 3/16 inch, 1/8 inch, and 1/16 inch (9.5, 6.4, 4.8, 3.2, and 1.6 mm). The actual hole diameters are slightly larger than those listed so that a round probe has a slip fit. The hole depths are 4 inches except for the 1/16 inch hole which is 1.5" (38 mm) deep. This block is machined from a bronze alloy with a capability of up to 700°C.

9. REMOVABLE COVER

The Model CL 134 has a removable cover. The cover should be installed for normal use. The cover can be removed to allow a temperature probe with a large diameter flange to get closer to the COOL block. The HEAT Source covers are not removable.

10. TERMINAL BLOCK

The terminal block is used to connect all temperature sensors. It is also used to measure volts and milliamps. Three and four wire RTD hook ups are on the front panel. Two wire RTDs are illustrated on the Model CL134 front panel drawing (Figure 5).

11. THERMOCOUPLE CONNECTORS

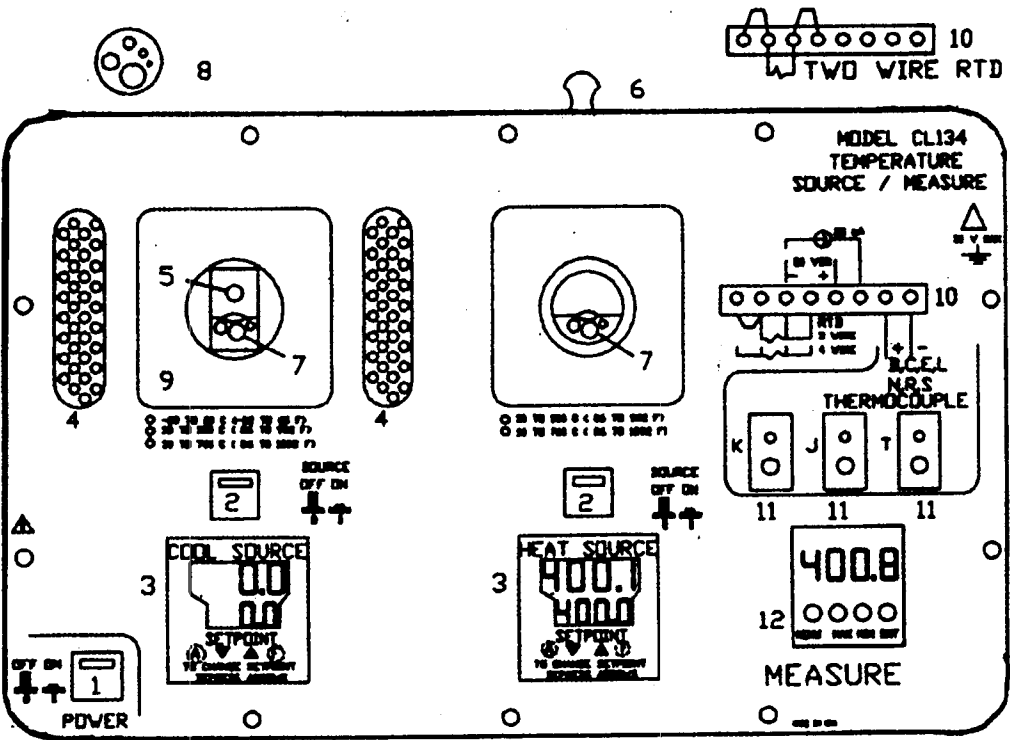
The actual thermocouple connectors are Type K (yellow), type J (black), and type T (blue). Other thermocouples are connected to the terminal block.

12. MEASURE (CN77000)

The measure readout is a four digit meter that can be programmed for all temperature, volt, and mA ranges.

5. OPERATING INSTRUCTIONS

FIGURE 5: FRONT PANEL ASSEMBLY



5. OPERATING INSTRUCTIONS

C. HEAT SOURCE RANGE SETUP PROCEDURES

Unless the user has requested otherwise, both the Universal Jaw and the 5 Hole Block HEAT Sources are shipped in range number 7222 (537.3° C maximum, 0.1° resolution).

Four range selection are available for the HEAT Sources.

Range Number	7222	7220	7223	7221
Maximum Temperature	537.3°	700°	999.1°	1292°
Unit of Measure	°C	°C	°F	°F
Resolution Degrees	0.1°	1°	0.1°	1°
As Shipped	_____	_____	_____	_____

If the "As Shipped" range is satisfactory, ignore the rest of this procedure. If you wish to change the range, proceed as follows. Note: Both the "A" and "F" keys referred to below are hidden keys. Refer to Figure 5.

1. Turn power off then on. Within 10 seconds press both the "F" and "UP" arrow keys and hold until the lower display shows "inPt".
2. Depress the up arrow key until the desired range number appears.
3. Depress the A key to enter this setting into the controller's memory.
4. Wait about two minutes for the controller to exit the range setup mode. Alternatively, turn power off then on.
5. The display will show decimal points after each number (e.g. x.x.x.x.). This warns the operator that the following setup parameters are not entered.
6. Momentarily depress both the "F" and "UP" arrow keys. The upper display is 0; the lower display is ULoc.

5. OPERATING INSTRUCTIONS

7. Depress the up arrow key until the upper display is 10.
8. Step through the SETUP parameters on the following page by depressing key F. At each parameter where a numerical value is listed, use the arrow keys to set that numerical value in the lower display for the noted range. Where "factory default" is noted, depress key F to advance to the next parameter.
9. Place the C/F stickers at the number 3 in Figure 5. Use blue for COOL Source and red for HEAT Source.

5. OPERATING INSTRUCTIONS

Resolution Degrees	0.1° C	1° C	0.1° F	1° F
Range No.	7222	7220	7223	7221
Filt	_____	_____	_____	_____
OFFS	_____	_____	_____	_____
Out1	Factory	Default		
Pb1	_____	_____	_____	_____
rSEt	_____	_____	_____	_____
rAtE	_____	_____	_____	_____
biAS	0	0	0	0
SPhI	505.0	705	999.1	1292
SPLo	Factory	Default		
Ophi*	_____	_____	_____	_____
Ct1	0.5	0.5	0.5	0.5
h_A1	Factory	Default		
L_A2	Factory	Default		
LAEn	Factory	Default		
APt	Factory	Default		
PoEn	Factory	Default		
rPEn	Factory	Default		
SPST	2	2	2	2
COen **	1	1	1	1
Loc	Factory	Default		

*OPHi is the percentage duty cycle of the Heater. If low temperatures are sourced (<200°C), set the value at 50 to minimize overshooting the setpoint.

**COen appears only for units with C1 or C2 Communications Options.

5. OPERATING INSTRUCTIONS

D. COOL SOURCE RANGE SETUP PROCEDURES

Unless the user has requested otherwise, both the Universal Jaw and the 5 Hole Block COOL Sources are shipped in range number 2230 (Degrees Celsius, 0.1 degrees resolution).

Two range selection are available for the COOL Sources.

Range Number	2230	2231
Unit of measure	° C	° F
Resolution degrees	0.1°	0.1°
As Shipped	_____	_____

If the "As Shipped" range is satisfactory, ignore the rest of this procedure. If you wish to change the range, proceed as follows. Note: Both the "A" and "F" keys referred to below are hidden keys. Refer to Figure 5.

1. Turn power off then on. Within 10 seconds press both the "F" and "UP" arrow keys and hold until the lower display shows "inPt".
2. Depress the up arrow key until the desired range number appears.
3. Depress the A key to enter this setting into the controller's memory.
4. Wait about two minutes for the controller to exit the range setup mode. Alternatively, turn power off then on.
5. The display will show decimal points after each number (e.g. x.x.x.x.). This warns the operator that the following setup parameters are not entered.
6. Momentarily depress both the "F" and "UP" arrow keys. The upper display is 0; the lower display is ULoc.
7. Depress the up arrow key until the upper display is 10.

5. OPERATING INSTRUCTIONS

8. Step through the following setup parameters by depressing key F. At each parameter where a numerical value is listed, use the arrow keys to set that numerical value in the lower display for the noted range. Where "factory default" is noted, depress key F to advance to the next parameter.

Resolution Degrees	1° C	0.1° F
Range No.	2230	2231
Filt	3.5	3.5
OFFS		
Out1	Factory	Default
Pb1	1.5	2.7
rSEt	1.30	1.30
rAtE	0.10	0.10
biAS	0	0
SPhi	Factory	Default
SPLo	Factory	Default
Ophi*	Factory	Default
Ct1	0.5	0.5
h_A1	Factory	Default
L_A2	Factory	Default
LAEn	Factory	Default
APt	Factory	Default
PoEn	Factory	Default
rPEn	Factory	Default
SPST	2	2
COen **	1	1
Loc	Factory	Default

**COen appears only for units with C1 or C2 Communications Options.

5. OPERATING INSTRUCTIONS

E. OPERATING THE MEASURE UNIT

The Measure Unit readout parameters may be changed from C to F and changed for inputs including thermocouples, RTDs, volts and mA. Note: To change the input type (thermocouples, RTDs, volts and mA) dip switch changes are required. The unit will be factory set to accept a K thermocouple.

The measuring unit for the CL 134 series is a temperature / process controller which offers more features than a standard panel meter. However, it will "only" be used as a readout device in the CL 134 series block calibrator.

Note¹ To change the input type (thermocouples, RTDs, volts and mA) dip switch changes are required. The unit will be factory set to accept a K thermocouple.

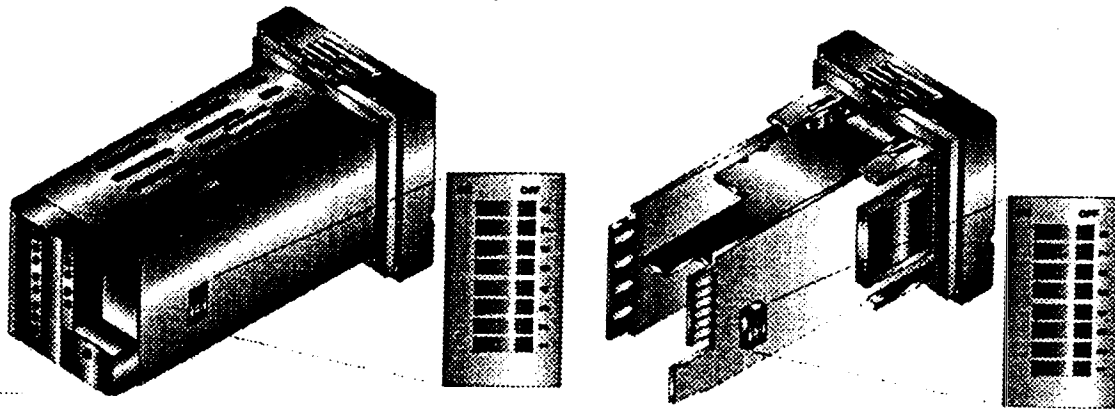
Note² To escape from an undesirable menu item press the menu button twice.

For further details regarding the readout device refer to the CN77000 manual.

5. OPERATING INSTRUCTIONS

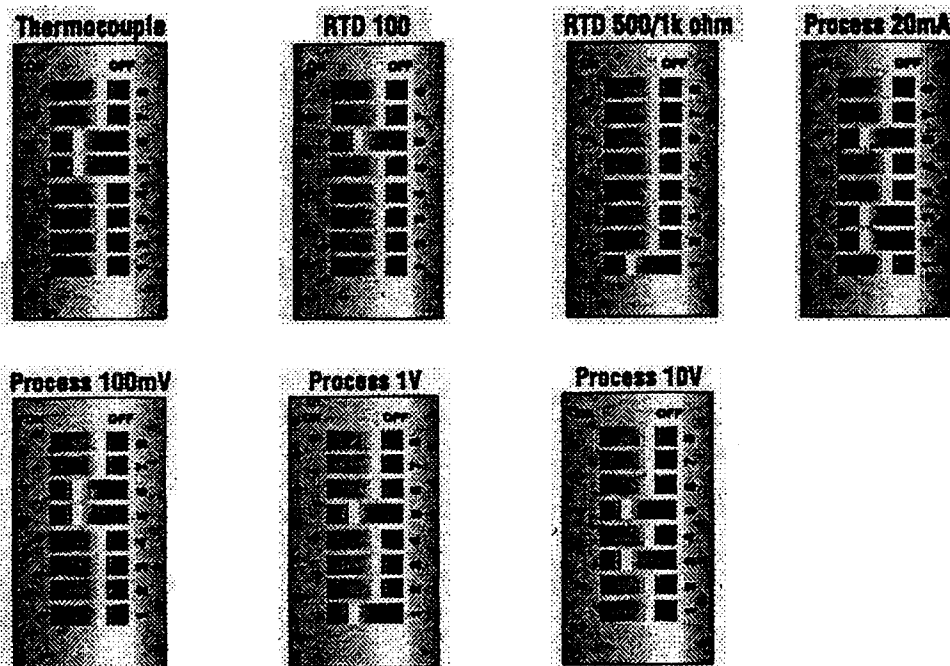
The settings of the DIP switch must be verified or set to comply with your selection at the Input/Type menu. The DIP switch is accessible through an opening on the side of the case. After carefully removing the controller from the case, locate the dip switch (see Figure 6) and set the switches according to the following tables.

FIGURE 6: DIP SWITCH LOCATION -- SWITCH SETTINGS ARE SHOWN IN OFF POSITION



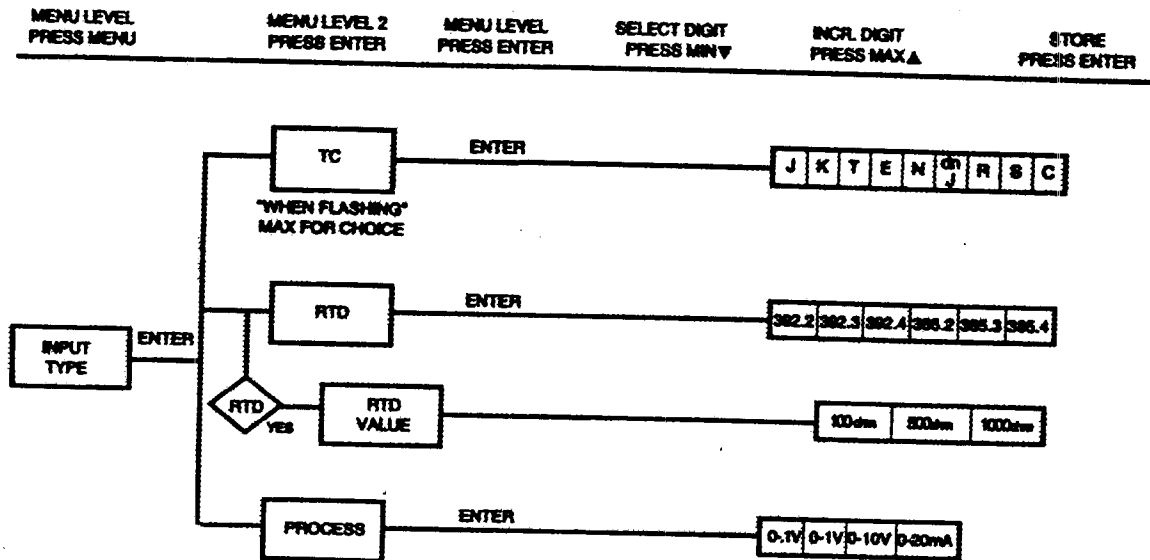
5. OPERATING INSTRUCTIONS

FIGURE 7: DIP SWITCH SETTINGS



5. OPERATING INSTRUCTIONS

FIGURE 8: FLOWCHART FOR INPUT TYPE



5. OPERATING INSTRUCTIONS

FIGURE 9: INPUT TYPE (THERMOCOUPLE)

Display	Action	Response
		ENTER INPUT TYPE MENU:
	Press MENU.....	1) Press MENU, if necessary, until "inpt type" prompt appears.
	Press ENTER.....	2) Display flashes "rtd", "t.c.", or "proc" (RTD, Thermocouple, Process), if the displayed input type is TC, press MENU to skip to step 5 (tc stops flashing).
		THERMOCOUPLE SUBMENU:
	Press MAX	4) Press MAX to scroll to "t.c." (flashing).
	Press ENTER	5) Display flashes "stored" message and "t.c" stops flashing
	Press ENTER	6) Display flashes previous thermocouple type selection. ie. "J" (see below for types)
	Press MAX	7) Scroll through the available thermocouple types to the selection of your choice.
	Press ENTER	8) Display flashes "stored" message and advances to the next menu Reading Configuration

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

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

Display: J cR t E n dnJ r S b C




5. OPERATING INSTRUCTIONS

FIGURE 10: INPUT TYPE (RTD)

Display	Action	Response
	Press MENU Press ENTER	ENTER INPUT TYPE MENU: 1) Press MENU, if necessary, until "Inpt type" prompt appears. 2) Display flashes "rtd", "t.c.", or "proc" (RTD, Thermocouple, Process), if the displayed input type is RTD, press MENU to skip to step 5 (rtd stops flashing).
	Press MAX Press ENTER Press ENTER	RTD SUBMENU: 4) Press MAX to scroll to "rtd." (flashing). 5) Display flashes "stored" message and "rtd." stops flashing 6) Display flashes previous RTD type selection ie. 392.2. (see below for RTD types)
	Press MAX Press ENTER	7) Scroll through the available RTD types to the selection of your choice: 8) Display flashes "stored" message and advances to "rtd value".
<hr/>		
RTD Types:	385, 392, Two, Three and Four-wire	
Display:	392.2 392.3 392.4 385.2 385.3 385.4	
	Note: Last digit indicates: 2, 3 or 4-wire input.	

5. OPERATING INSTRUCTIONS

FIGURE 11: INPUT TYPE (RTD VALUE)

Display	Action	Response
	Press ENTER	RTD VALUE SUBMENU: 4) Press ENTER at "rtd value" prompt to enter your RTD Value. Display flashes previous RTD value selection ie. 100_. (see below for RTD value selections)
	Press MAX	7) Scroll through the available RTD Values to the selection of your choice:
	Press ENTER	8) Display flashes "stored" message and advances to "Reading Configuration"
RTD Values:	All RTD's may be: 100 ohm 500 ohm 1000 ohm	
Display:	100_ 500_ 1000	

5. OPERATING INSTRUCTIONS

FIGURE 12 INPUT TYPE (PROCESS)

Display	Action	Response
	Press MENU Press ENTER	ENTER INPUT TYPE MENU: 1) Press MENU, if necessary, until "inpt type" prompt appears. 2) Display flashes "rtd", "t.c.", or "proc" (RTD, Thermocouple, Process), if the displayed input type is process, press MENU to skip to step 5 (proc stops flashing).
	Press MAX Press ENTER Press ENTER	PROCESS SUBMENU: 4) Press MAX to scroll to "Proc" (flashing). 5) Display flashes "stored" message and "Proc" stops flashing. 6) Display flashes previous Process type selection. ie. "0-10" (see below for types)
	Press MAX Press ENTER	7) Scroll through the available Process types to the selection of your choice. 8) Display flashes "stored" message and advances to the next menu "Reading Configuration".

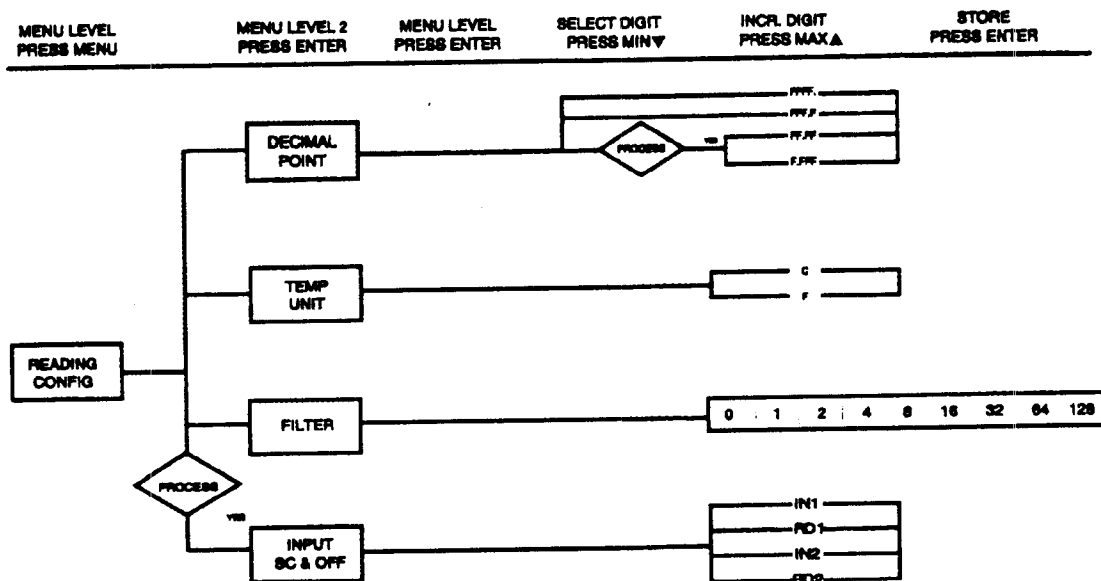
Note: Use the Input type (Thermocouple) (RTD) or (Process) and verify your Dip Switch Setting . See the previous pages for (RTD) and (Process) menus.

Process Types:	100mV	1V	10V	0-20 mA
Display:	0-0.1	0-10	0-10	0-20

Note: For 4-20mA Input select 0-20mA and adjust the Input Scale & Offset accordingly. The example is 4-20mA input.

5. OPERATING INSTRUCTIONS

FIGURE 13 FLOWCHART FOR READING CONFIGURATION



5. OPERATING INSTRUCTIONS

FIGURE 14 READING CONFIGURATION

Display	Action	Response
	Press MENU Press ENTER	1) Press MENU, if necessary, until "Reading Configuration" prompt appears. 2) Display advances to "dec. pt" (decimal point).
DECIMAL POINT SUBMENU:		
	Press ENTER	3) Display flashes previous selection for decimal location.
	Press MAX	4) Scroll through the available selections and choose decimal location: FFFF or FFF.F (also F.FFF and FF.FF — if "Process" type was selected in the "Input Type" menu).
	Press ENTER	5) Display flashes "Strd" message and advances to "Temperature Unit". <i>Note: Decimal point for Process input type is passive.</i>
TEMPERATURE UNIT SUBMENU:		
	Press ENTER	6) Display flashes previous Temperature Unit selection.
	Press MAX	7) Scroll through the available selections to the temperature unit of your choice: °F or °C.
	Press ENTER	8) Display flashes "Strd" message and advances to "Filter Constant".

5. OPERATING INSTRUCTIONS

FIGURE 15: READING CONFIGURATION

Display	Action	Response
INPUT SCALE & OFFSET SUBMENU:		
	Press ENTER	11) Press enter at the "Inpt sc.of" prompt. Display flashes 1st digit in submenu "IN 1"
	Press MAX & MIN	12) Use MAX and MIN buttons to enter "In 1" value. This corresponds to the transducer output i. e. Volt or Current, depending on which one was selected at Process Input Type.
	Press ENTER	13) Display advances to "RD 1" submenu.
	Press MAX & MIN	14) Use MAX and MIN buttons to enter "RD 1" value. This value responds to In 1 in terms of some meaningful engineering units
	Press ENTER	15) Display advances to "IN 2" submenu.
	Press MAX & MIN	16) Use MAX and MIN buttons to enter "IN 2" value.
	Press ENTER	17) Display advances to "RD 2" submenu.
	Press MAX & MIN	18) Use MAX and MIN buttons to enter "RD 2" value.
	Press ENTER	19) Display flashes "stored" message and advances to "Alarm 1" menu.
Note: This submenu allows the user to scale the meter when in process mode and the above display value is an example for 4-20mA input (4 to 20mA = 0000 to 0100%).		

6. SPECIFICATIONS

A. COMMON SPECIFICATIONS

Internal Reference Sensor:	Pt RTD with repeatability better than 0.05° C after repeated cycling to 700° C.
Ramp Mode:	Settable in 0.1° / min. increments
Ambient Temperature:	4° to 40° C (39° to 104° F)
Case Dimensions:	Aluminum Case 16.0 in. wide x 10 in. high x 9 in. deep (406 x 254 x 229 mm) Removable top 2.5 in. deep (64 mm)
Power:	90 to 130 VAC, 210 to 250 VAC (with option 230) 800 VA maximum; 50/60 Hz.

7. SPECIFICATIONS

B. COOL SOURCE SPECIFICATIONS

	COOL SOURCE UNIVERSAL JAW	COOL SOURCE 5 HOLE BLOCK
Range:	Ambient to -30°C, Ambient to -22°F Range is 50°C (90°F) below ambient	
Accuracy: ¹	± 0.1°C (± 0.2°F) for probes 0.25 inch (6.4 mm) and smaller ± 0.2°C (± 0.4°F) for probes >0.25 inch up to 0.5 inch (6.4 to 12.7 mm)	
Resolution:		0.1°C or °F
Stability: ²		± 0.05°C (0.1°F)
Repeatability:		± 0.05°C (0.1°F)
Cool Time:	5 minutes to cool and stabilize from ambient to 0°C (32°F)	
Uniformity		
X-Y axis (across flats):	< ± 0.03°C (0.05°F)	
Z axis (depth):	< 0.1°C (0.2°F) from 4 inches (102 mm) to 2 inches (51 mm) deep	
Metal Block:	Aluminum	Aluminum
	Jaw accepts up to 0.5 in (12.7 mm)	Drilled holes 1/16, 1/8, 3/16, 1/4, 3/8 inch
	Drilled holes 1/8, 3/16, 1/4 inch	(1.6, 3.2, 4.8, 6.4, 9.5 mm)
	(3.2, 4.8, 6.4 mm)	4 inches (102 mm) deep
	4 inches (102 mm) deep	Other holes available

¹ Accuracy for one year with ambient 20° - 26°C. Accuracy may be enhanced by using external reference probe.

² Measured for 24 hours with ambient 20°F to 26°C.

6. SPECIFICATIONS

C. HEAT SOURCE SPECIFICATIONS

	UNIVERSAL JAW	5 HOLE BLOCK
Range:	30° to 500°C, 86° to 932°F	30° to 700°C, 86° to 1292°F
Accuracy: ¹	$\pm 0.05\%$ of setpoint + 0.1°C (0.2°F) for probes 0.25 inch (6.4 mm) and smaller $\pm 0.1\%$ of setpoint + 0.1°C (0.2°F) for probes >0.25 to 0.5 inch (6.4 to 12.7 mm)	
Resolution:	0.1°C or °F	0.1° to 537°C (999° F), 1° above 537°C (999° F)
Stability: ²		$\pm 0.05^\circ\text{C}$ (0.1°F)
Repeatability: ³		$\pm 0.05^\circ\text{C}$ (0.1°F)
Heat Time:	10 minutes to heat and stabilize @ 300°C	12 minutes to heat and stabilize @ 600°C
Uniformity		
X-Y axis (across flats)	$< \pm 0.03^\circ\text{C}$ (0.05°F)	$< \pm 0.1^\circ\text{C}$ (0.2°F)
Z axis (depth):	$< 0.1^\circ\text{C}$ (0.2°F) from 4 inches deep to Jaws.	$< 0.1\%$ of setpoint from 4 inches to 2 inches deep
Metal Block:	Aluminum	Bronze Alloy
	Jaw accepts up to 0.5 in (12.7 mm)	Drilled holes 1/16, 1/8, 3/16, 1/4, 3/8 inch (1.6, 3.2, 4.8, 6.4, 9.5 mm)
	Drilled holes 1/8, 3/16, 1/4 inch (3.2, 4.8, 6.4 mm)	4 inches (102 mm) deep
	4 inches (102 mm) deep	Other holes available

¹ Accuracy for one year with ambient 20° - 26°C. Accuracy may be enhanced by using external reference probe.

² Measured for 24 hours with ambient 20° to 26°C.

³ Measured with Rosemount 162CE as follows: 1. Measure temperature at 100°C. 2. Heat to maximum (500°C for Universal Jaw, 700°C for 5 hole block). 3. Remeasure at 100°C. The difference between 1 and 3 is <0.05°C.

7. SPECIFICATIONS

D. MEASURE UNIT SPECIFICATIONS

Input Type		Range	Accuracy*
Process Voltage		0 to 100mV, 0 to 1 V, 0 to 10 Vdc	0.03% rdg
Process Current		0 to 20 mA, 4 to 20 mA	0.03% rdg
J	Iron-Constantan	-346 to 1400°F	0.7°F
K	CHROMEGA-ALOMEGA	-454 to -256°F -256 to 2502°F	1.8°F 0.7°F
T	Copper-Constantan	-454 to -310°F -310 to 752°F	1.8°F 0.7°F
E	CHROMEGA Constantan	-454 to -364°F -364 to 1832°F	1.8°F 0.7°F
R	Pt/13%Rh-Pt	-58 to 104°F 104 to 3250°F	1.8°F 0.9°F
S	Pt/10%Rh-Pt	-58 to 212°F 212 to 3214°F	1.8°F 0.9°F
B	30%Rh-Pt/ 6%Rh-Pt	212 to 1184°F 1184 to 3308°F	1.8°F 0.9°F
C	5%Re-W/ 26%Re-W	32 to 4253°F	0.7°F
N	Nicrosil Nisil	-418 to 148°F -148 to 2372°F	1.8°F 0.7°F
L	J DIN	-328 to 1652°F	0.7°F
RTD	Pt, 385, 100 Ω	-328 to 1652°F	0.3°F
	Pt, 392, 100 Ω	-328 to 1562°F	0.3°F

*Accuracy (all ±) includes maximum linearization error.

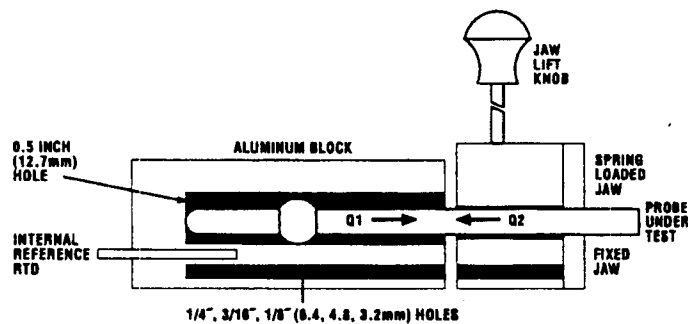
7. PRINCIPLES OF OPERATION

A. UNIVERSAL JAW

Illustrated below in Figure 16 is an industrial temperature probe with a ferrule. This probe cannot be tested in a conventional drilled hole because the ferrule prevents good contact between the probe and the metal block. Heat (Q_1) flows down the stem of the probe causing the probe output to read less than the calibration temperature as sensed by the internal reference RTD. This effect is referred to as stem loss.

The Universal Jaw™ clamps around the probe with actively heated jaws and injects the amount of heat (Q_2) needed to neutralize the stem loss. For the Cool Source, the Universal Jaw works similarly, except the directions of Q_1 and Q_2 are reversed.

FIGURE 16: UNIVERSAL JAW

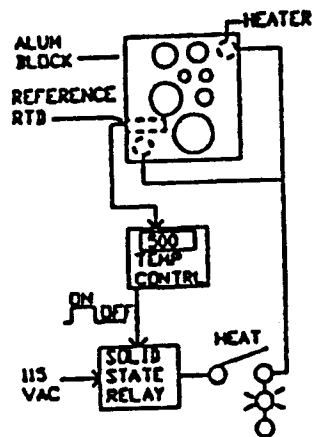


7. PRINCIPLES OF OPERATION

B. 5 HOLE BLOCK HEAT SOURCE

The heat source block is heated by two cylindrical heaters that are mounted in the heater block. To regulate the heater temperature, the temperature controller measures the temperature of the block by means of the reference RTD (Resistance Temperature Detector). This measured temperature is compared to the setpoint temperature, and when the two are equal, the temperature controller gates the solid state relay off thereby shutting down the current to the heaters. When the block temperature is stabilized at the setpoint, the temperature controller continuously signals the solid state relay to turn the heater current on and off. (See Figure 17 "Heat Source Schematic") The Heat Switch illuminates when power is being applied to the heater.

FIGURE 17: HEAT SOURCE SCHEMATIC



7. PRINCIPLES OF OPERATION

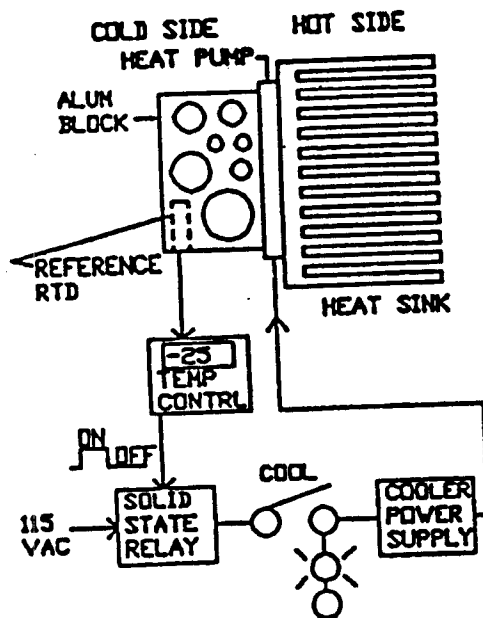
C. COOL SOURCE

The cool source employs a solid state heat pump to remove heat from the block. The heat is transferred to the heat sink where it is blown away by the fan. The thermal attachment of the heat pump to the heat sink and block requires precision machined flat surfaces for good heat transfer. The heat pump is a collection of hundreds of thermocouples that produce a temperature gradient when a current is applied. By thermally anchoring the hot side to a large heat sink, the cold side is driven colder and colder. (See Figure 18 Cool Source Schematic.)

To regulate the cold side temperature, the temperature controller measures the temperature of the block by means of the reference RTD. This measured temperature is compared to the setpoint temperature, and when the two are equal, the temperature controller gates the solid state relay off thereby shutting down the current to the heat pump. When the block temperature stabilizes at the setpoint, the temperature controller continuously signals the solid state relay to turn the heat pump current on and off. The resultant temperature profile is an irregular cycling typically less than $\pm 0.1^{\circ}\text{C}$. The Cool Switch illuminates when power is being applied to the heat pump.

7. PRINCIPLES OF OPERATION

FIGURE 18: COOL SOURCE SCHEMATIC



8. RECALIBRATION

The CL134 is calibrated at the factory with equipment whose calibration is traceable to NIST. The calibration of the CL134 should be checked periodically to ensure that it is operating within its specifications.

Calibration should be performed on a scheduled basis, typically at 12 month intervals. An appropriate calibration sticker should be affixed to the unit stating the date the unit was calibrated and the next date that the calibration is to be performed.

Recalibration should only be performed by trained personnel. The Unit can be returned to Omega, for periodic recalibration. Contact Omega for shipping instructions and scheduling of recalibration.



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