

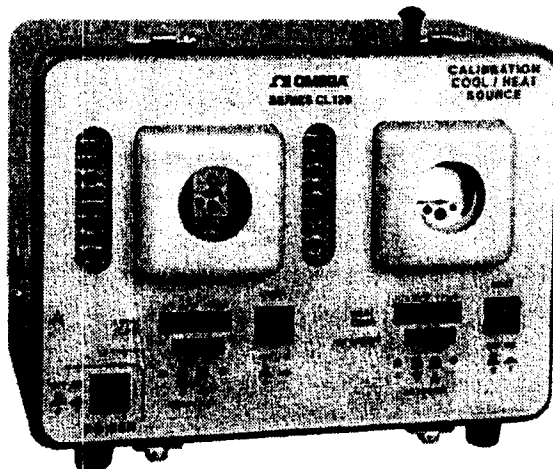
User's Manual



An OMEGA Technologies Company

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SERIES CL120 **Cool and Heat Source**



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA'S WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. The 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 are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

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applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

■■■■ RETURN REQUESTS / INQUIRIES ■■■■

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

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

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

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

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

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

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I INTRODUCTION


The COOL/HEAT SOURCE is a powerful instrument that conveniently houses a COOL SOURCE, a HEAT SOURCE, a HEAT and COOL SOURCE, or two HEAT SOURCES in one package. It is available with standard block holes and/or with a Universal Jaw™ which accommodates irregularly shaped probes.

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. Universal Jaws™ (Patent Pending) which accept all diameters up to $\frac{1}{2}$ inch and include standard holes for $\frac{1}{4}$ inch, $\frac{3}{16}$ inch and $\frac{1}{8}$ 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).
3. An optional 5 hole block with a high temperature capability of 700°C (1292°F).

The Series CL120 COOL/HEAT SOURCE is identified by the side mounted identification plate illustrated in Figure 1 below. The Identification Plate 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	
	
Model	Serial
CL120	1234
Power	<input type="checkbox"/> 90-130 VAC 50/60 Hz
	<input type="checkbox"/> 210-250 800 VA Max

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 CL120 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.

SAFETY INFORMATION

When using the CL120, 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. Prevent body contact with grounded surfaces.

3. Do not operate near flammable liquids or in explosive atmospheres.

SAFETY PRECAUTIONS 3



4. 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.



5. Do not touch the end of a probe that was inserted into a probe cavity until the probe has returned to ambient temperature.



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

7. Disconnect power cord before servicing the instrument.



8. Never carry the unit by the cord or yank it to disconnect from receptacle. Keep cord away from heat, oil, and sharp edges.

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



Carefully unpack and remove the CL120 COOL/HEAT SOURCE from the shipping carton. Inspect the unit for any obvious damage in shipping. If there is any damage, report it promptly to Omega.

POWER CORD

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

POWER REQUIREMENTS

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

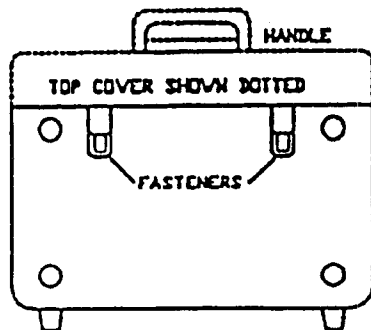
ORIENTATION AND TOP REMOVAL

Before attempting to operate the CL120, it is important to read the following instructions.

1. Orient the unit with the removable top and handle facing up. Unlatch the two fasteners and swing the top up. (See Figure 2)

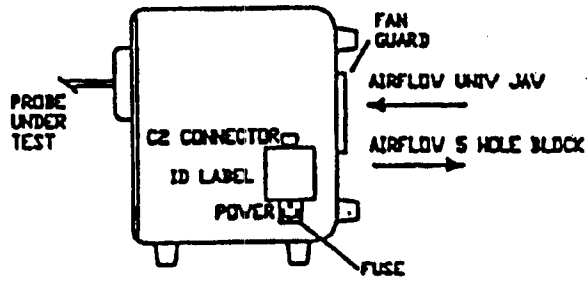
2. Remove the top cover by pulling to the right. Note, it is not necessary to remove the top cover to operate the unit in the vertical mode.
3. Observe the proper orientation when using the unit. Refer to Figures 3 and 4 and the detailed descriptions in Section 5, Operating Instructions, Probe Insertion.
4. Read the Operating Instructions in this manual before proceeding.

Figure 2. Removal of top cover



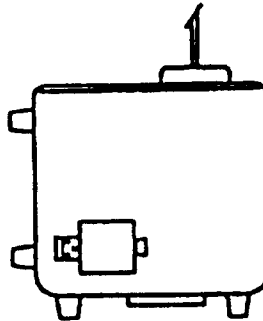
4 PREPARATION FOR USE

Figure 3. Horizontal Orientation



Use in horizontal mode for temperatures $>500^{\circ}\text{C}$ (932°F).

Figure 4. Vertical Orientation



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



It is essential that the user read and understand the entire section on Operating Instructions before applying power to the Series CL120.

FRONT PANEL ASSEMBLY

Refer to Figure 5 “Front panel assembly” to reference the items described below. Use of the CL120 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.

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 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. 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 Universal Jaw in 100°C steps 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 (102mm) 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.

8. OPTIONAL FIVE HOLE BLOCK

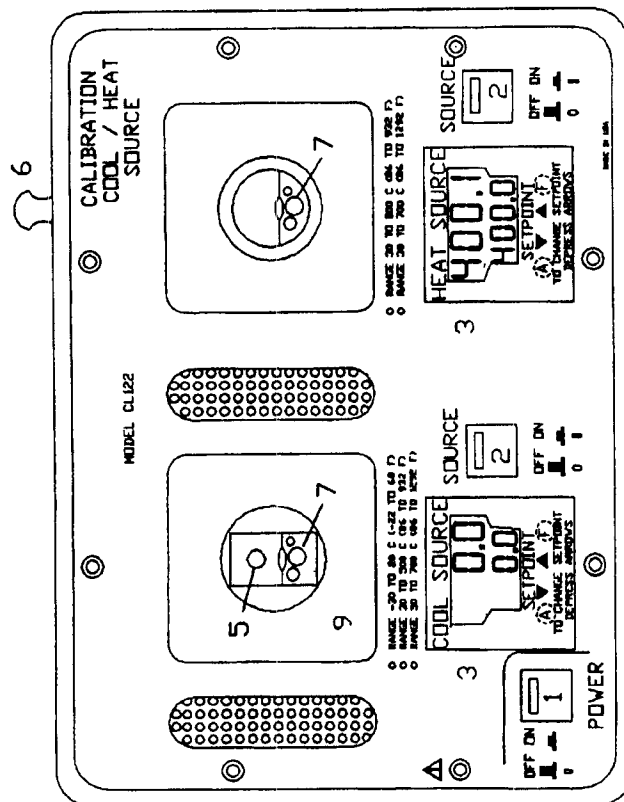
This optional block has hole diameters of 3/8 inch, 1/4 inch, 3/16 inch, 1/8 inch, and 1/16 inch (9.5, 6.4, 4.8, 3.2, and 1.6 mm). The actual hole diameters are slightly larger than those listed so that a round probe has a slip fit. The hole depths are 4 inches except for the 1/16 inch hole which is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

9. REMOVABLE COVER

Both the Universal Jaw and the Five Hole Block COOL Sources have a removable cover. The cover should be installed for a 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.

5 OPERATING INSTRUCTIONS

Figure 5. Front panel assembly



PROBE INSERTION **USING THE FIVE HOLE BLOCK**

The temperature probe under test ("PUT") should be inserted as far as possible up to the maximum depth of 4 inches (102 mm). The holes are slightly over-sized so that probes of the exact diameter can be accommodated with a slip fit.

The COOL/HEAT Source can be in the horizontal or vertical mode (See Figures 3 and 4) for heat temperatures less than 500°C (932°F).

For heat temperatures of 500°C or higher (932°F) it is imperative to use the horizontal mode (See Figure 3) because the hot airflow will deflect from the mounting surface and cause the instrument to heat up.

USING THE UNIVERSAL JAW

To raise the Universal Jaws lift the appropriate knob. See Figure 5, #5 for the COOL Source and #6 for the HEAT Source. The temperature probe under test should be inserted as far as possible up to the maximum depth of 4 inches (102 mm). The COOL/HEAT Source must be in the Vertical Mode when using the Universal Jaw so that the best contact is made between the Jaw and the PUT. If the conventional holes are used, the instrument may be in either the horizontal or vertical mode.

SECTION 5 OPERATING INSTRUCTIONS

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 Pt.C.

Four range selections are available for the HEAT Sources.

RANGE	Pt.C	PtC	Pt.F	PtF
Maximum Temp	537.7	700	999.9	1292
Unit of Measure	C	C	F	F
Resolution Degrees	0.1	1	0.1	1
As Shipped	_____	_____	_____	_____

HEAT RANGE SELECT CHART

IF THE "AS SHIPPED" RANGE IS SATISFACTORY, IGNORE THE REST OF THIS PROCEDURE.

To change the range, proceed as follows.

The A/M and @ buttons are hidden. They are located as shown below.

1) Depress @ and the UP arrow. The display becomes:



PHOTO NUMBER 1

2) Depress the UP arrow two times. The top display becomes Conf (Configure).

3) Depress @. The top display becomes 0; the bottom display is ULoc (unlock) as shown below.



PHOTO NUMBER 2

- 4) Depress the UP arrow until the top display is 20.
- 5) Depress @. The display becomes:

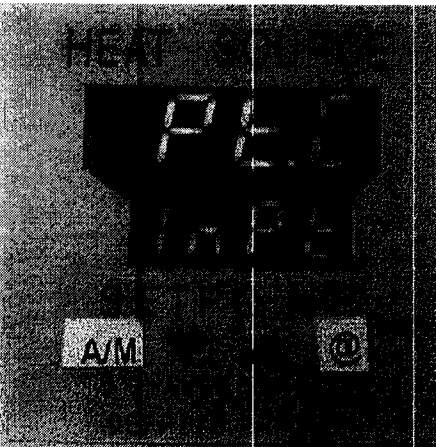


PHOTO NUMBER 3

- 6) Depress the UP and DOWN arrows to select the desired range Pt.C, PtC, Pt.F or PtF.
Consult the HEAT RANGE SELECT CHART for the range information.
- 7) Depress A/M to enter this range.

The operating parameters must now be set.

- 8) Depress @ and the UP arrow. The display becomes PHOTO NUMBER 1.
- 9) Depress the UP arrow once. The top display becomes SEtP.
- 10) Depress @. The top display becomes 0 as shown in PHOTO NUMBER 2.

- 11) Depress the UP arrow until the top display is 10.
- 12) Depress @. The display becomes:

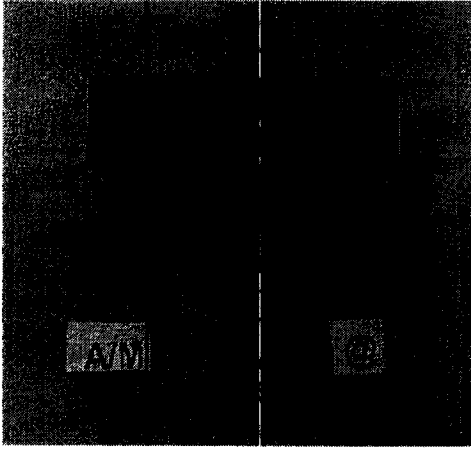


PHOTO NUMBER 4

13) Depress @ to step through the following parameters. At each parameter were a numerical value is listed, use the arrow keys to set the numerical value in the upper display. Where factory default is noted, depress key @ to advance to the next parameter.

RANGE	Pt.C	PtC	Pt.F	PtF
FiLt	3.5	3.5	3.5	3.5
OFFS	---	---	---	---
PPJJ	---	READ ONLY	---	---
Pb_P	---	---	---	---
ArSt	---	---	---	---
rAtE	---	---	---	---
biAS	0	0	0	0
SPuL	537.7	700	999.9	1292
SPLL		FACTORY DEFAULT		
OPuL	50	100	50	100
Ct1	0.5	0.5	0.5	0.5
diSA		FACTORY DEFAULT		
rp		READ ONLY		
SP		READ ONLY		
SLoc	10	10	10	10

HEAT SETUP CHART

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 Pt.C.

Two range selections are available for the COOL Sources.

RANGE	Pt.C	Pt.F
Unit of Measure	C	F
Resolution Degrees	0.1	0.1
As Shipped	_____	_____

COOL RANGE SELECT CHART

IF THE "AS SHIPPED" RANGE IS SATISFACTORY, IGNORE THE REST OF THIS PROCEDURE.

To change the range, proceed as follows.

The A/M and @ buttons are hidden. They are located as shown in the photos.

- 1) Depress @ and the UP arrow. The display becomes PHOTO NUMBER 1.
- 2) Depress the UP arrow two times. The top display becomes Conf (Configure).
- 3) Depress @. The top display becomes 0; the bottom display is ULoc (unlock) as shown in PHOTO NUMBER 2.
- 4) Depress the UP arrow until the top display is 20.
- 5) Depress @. The display becomes PHOTO NUMBER 3.
- 6) Depress the UP and DOWN arrows to select the desired range Pt.C or Pt.F. Consult the COOL RANGE SELECT CHART for the range information.
- 7) Depress A/M to enter this range.

The operating parameters must now be set.

- 8) Depress @ and the UP arrow. The display becomes PHOTO NUMBER 1.
- 9) Depress the UP arrow once. The top display becomes SEtP.
- 10) Depress @. The top display becomes 0 as shown in PHOTO NUMBER 2.
- 11) Depress the UP arrow until the top display is 10.
- 12) Depress @. The display becomes PHOTO NUMBER 4.

13) Depress @ to step through the following parameters. At each parameter were a numerical value is listed, use the arrow keys to set the numerical value in the upper display. Where factory default is noted, depress key @ to advance to the next parameter.

RANGE	Pt.C	Pt.F
FiLt	3.5	3.5
OFFS	---	---
PPJJ		READ ONLY
Pb_p	---	---
ArSt	---	---
rAtE	---	---
biAS	0	0
SPuL	FACTORY DEFAULT	
SPLL	FACTORY DEFAULT	
OPuL	100	100
Ct1	0.5	0.5
diSA	FACTORY DEFAULT	
rp	READ ONLY	
SP	READ ONLY	
SLoc	10	10

COOL SETUP CHART

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 (Degr. Celsius, 0.1° 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. To change the range, proceed as follows:

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".

NOTE: A and F are hidden keys. See Figure 5.

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.
-

5 OPERATING INSTRUCTIONS

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.
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.
9. Place the C/F stickers at the letter 3 in Figure 5. Use blue for COOL Source, red for HEAT Source.

6 SPECIFICATION

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. 11.5 in wide × 8.4 in. high × 7 in. deep (292 × 213 × 178 mm). Removable top 2.5 in. deep (64 mm)

Power: 90 to 130 VAC. 210 to 250 VAC (with option 230). 800VA maximum; 50/60Hz.

OPERATING INSTRUCTIONS

5

	0.1°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.

COOL SOURCE SPECIFICATIONS

	CUJ Cool Source Universal Jaw	C Cool Source 5 Hole Block
Range	Ambient to -30°C (-22°F) Range is 50°C (90°F) below ambient	
Accuracy: ¹	$\pm 0.1^{\circ}\text{C}$ ($\pm 0.2^{\circ}\text{F}$) for probes 0.25 inch (6.4 mm) and smaller $\pm 0.2^{\circ}\text{C}$ ($\pm 0.4^{\circ}\text{F}$) for probes >0.25 inch up to 0.5 inch (6.4 to 12.7 mm)	
Resolution:	0.1°C or °F	
Stability: ²	$\pm 0.05^{\circ}\text{C}$ (0.1°F)	
Repeatability:	$\pm 0.05^{\circ}\text{C}$ (0.1°F)	
Cool Time:	5 minutes to cool and stabilize from ambient to 0°C (32°F)	
Uniformity		
X-Y axis:	$<\pm 0.03^{\circ}\text{C}$ (0.05°F)	
Z axis (depth)	$<0.1^{\circ}\text{C}$ (0.2°F) from 4 inches (102 mm) deep to 2 inches (51 mm) deep	
Metal Block:	Aluminum Jaw accepts up to 0.5 in (12.7 mm) Drilled holes $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$ in (3.2, 4.8, 6.4 mm) 4 in (102 mm) deep	Aluminum Drilled holes $\frac{1}{16}$ $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{3}{8}$ inch (1.6, 3.2, 4.8, 6.4, 9.5 mm) 4 in (102 mm) deep Other holes available

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

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

6 SPECIFICATIONS

HEAT SOURCE SPECIFICATIONS

	HUJ Heat Source Universal Jaw	H Heat Source 5 Hole Block
Range:	30° to 500°C 86° to 932°F	30° to 700°C 86° to 1292°F
Accuracy: ¹	±0.05% of setpoint + 0.1°C (0.2°F) for probes 0.25 inch (6.4 mm) and smaller ±0.1% of setpoint + 0.1°C (0.2°F) for probes >0.25 to 0.5 inch (6.4 to 12.7mm)	
Resolution:	0.1°C or °F	0.1° to 537,C (999°F) 1° above 537°C (999°F)
Stability: ²	±0.05°C (0.1°F)	
Repeatability: ³	±0.05°C (0.1°F)	
Heat Time:	10 min. to heat and stabilize @ 300°C	12 min. to heat and stabilize @ 600°C
Uniformity		
X-Y axis:	<±0.03°C (0.05°F)	<±0.1°C (0.2°F)
Z axis (depth)	<0.1°C (0.2°F) from 4 in. deep to Jaws	<0.1% of setpoint from 4 in. to 2 in. deep
Metal Block:	Aluminum Jaw accepts up to 0.5 in Drilled holes 1/8, 3/16, 1/4 in (3.2, 4.8, 6.4 mm) 4 in (102 mm) deep	Bronze Alloy Drilled holes 1/16, 1/8, 3/16, 1/4, 3/8 in. (1.6, 3.2, 4.8, 6.4, 9.5 mm) 4 in (102 mm) deep Other holes available

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

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

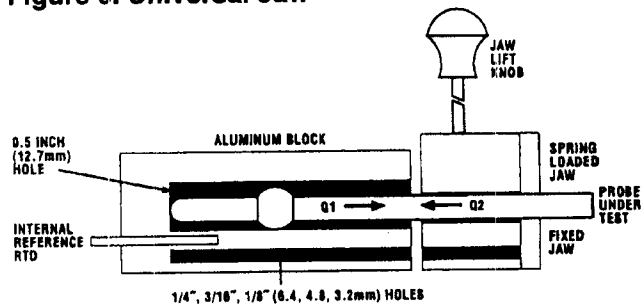
³ Measured with Rosemount 162CE as follows: 1 Measure temperature at 100°C. 2. Heat to maximum (500°C for Universal Jaw, 700°C for 5 hole block). 3. Remeasure at 100°C. The difference between 1 and 3 is <0.05°C.

UNIVERSAL JAW

Illustrated below in Figure 6 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. Request Technical Paper TH12 for a more detailed explanation of the Universal Jaw.

Figure 6. Universal Jaw

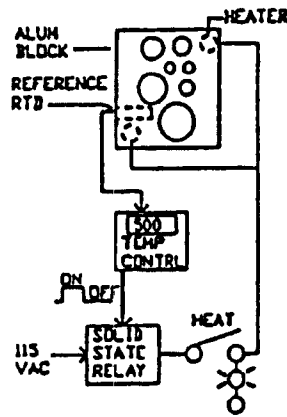


7 PRINCIPLES OF OPERATION

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 7 "Heat Source Schematic") The Heat Switch illuminates when power is being applied to the heater.

Figure 7. Heat Source Schematic



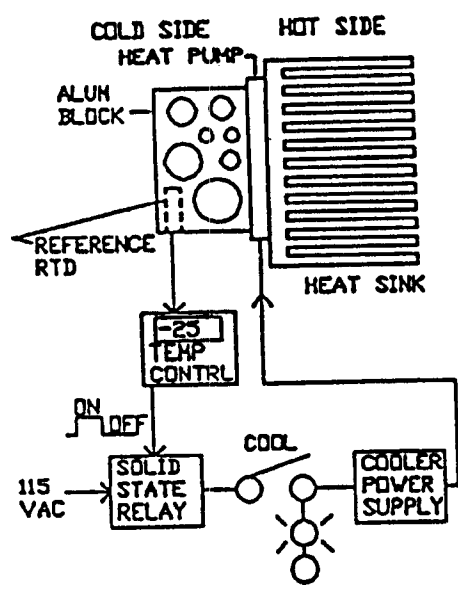
COOL SOURCE

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 8 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 8. Cool Source Schematic





The CL120 is calibrated at the factory with equipment whose calibration is traceable to NIST. The calibration of the CL120 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 CL120 can be returned to OMEGA for periodic recalibration. Contact OMEGA for shipping instructions and scheduling of recalibration.





It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient connected applications.



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