# OPERATING MANUAL

## COLE-PARMER CHILLING/HEATING BLOCK
## CATALOG # 44175-00

## DOCUMENT NUMBER 1

Cole-Parmer Instrument Company
625 East Bunker Court
Vernon Hills, IL 60061
Phone: 1-847-549-7600 or Toll Free: 1-800-323-4340
Telex: 28-9405 Fax: 1-847-247-2929
E-mail: info@coleparmer.com
Web Site: http://www.coleparmer.com

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## I. INTRODUCTION

Congratulations on your purchase of a Cole-Parmer Chilling/Heating Block. Please read the instructions carefully to insure that you receive the maximum benefit from it. Also, be sure to fill out and return the enclosed warranty registration card.

## II. WARRANTY

Cole-Parmer Instrument Company warrants this product to be free from significant defects in material and workmanship for a period of one year from the date of purchase. If repair or adjustment is necessary and has not been the result of misuse within the one year period, please return---freight prepaid---and correction will be made without charge. Cole-Parmer alone will determine if the product problem is due to deviations or customer misuse.

Out of warranty products will be repaired on a charge basis.

## III. RETURN OF ITEMS

**Authorization must be obtained from our Customer Service Department before returning items for any reason.** When applying for authorization, please include data regarding the reason the items are to be returned. For your protection, items must be **carefully packaged** to prevent damage in shipment and **insured** against possible damage or loss. Cole-Parmer will not be responsible for damage resulting from careless or insufficient packing. A restocking charge will be made on all unauthorized returns.

**Note:** Cole-Parmer Instrument Company reserves the right to make improvements in design, construction, and appearance of the product without notice.

## IV. LABELS

There are various labels on the body of this unit. Listed below are the labels and their meanings.

This symbol means "ATTENTION. The INSTRUCTION MANUAL IS TO BE CONSULTED FOR FURTHER INFORMATION."

This symbol means "WARNING, HOT SURFACE."

## V. CAUTIONS

CHILLER/HEATER PLATE SURFACE

The Chilling/Heating Block is capable of chilling and heating the plate surface from -10°C to 90°C. The upper temperature of 90°C (194°F) is hot enough to burn the skin if touched. **Use extreme caution at all times.** Never leave your unit accessible to others when it is hot. Never touch the plate surface unless you are sure it is cold.

ELECTRICAL

The IC20 cooling/heating module runs off 12 volts dc at 4.2 amps. The instrument is supplied with a universal power supply that can take inputs from 100 to 240 volts AC ±10%. The unit is supplied with an AC input cord for the power supply. Be certain to use a line cord with the same rating and of the same type as the one supplied by the manufacturer. Use the normal care and precaution one would use with any electrical appliance.

## VI. GENERAL DESCRIPTION

The Cole-Parmer Chilling/Heating Block is a Peltier driven chilling/heating plate. It comes with a universal power supply and the chilling/heating module. The unit has only one moving part, the DC fan that cools the unit. Everything else is solid state and should last years without problem. All functions of the unit are accessible from the front panel via the membrane switch and accompanying digital display. Since the unit runs from 12 volts dc, it can be powered from the cigarette lighter jack in any car or truck using a cable available as an accessory from the manufacturer. Call for information.

HEATER/CHILLER PLATE

The plate surface is a very flat aluminum plate designed for good contact with any flat surfaced item placed on it. The plate size is 2.875" (7.3 cm) x 4.375" (15.2 cm). It is designed in this size to accommodate 96-well assay plates and aluminum blocks supplied by Cole-Parmer. It chills and heats quickly without a load on it. The temperature of the plate is sensed by a solid state IC mounted under the plate. The computer in the unit compares the plate temperature with the target temperature and instructs the Peltier module to heat or chill the plate as required.

TIMER

The Chilling/Heating Block has a count down timer which reads in days, hours, minutes, and seconds all at once. It can be set to a maximum of 30 days. The timer will be displayed at the same time as the SET POINT and PLATE TEMP. It has a user settable AUTO-OFF as well. This works to turn the chiller/heater target temperature off when the timer counts to zero.

ALARM

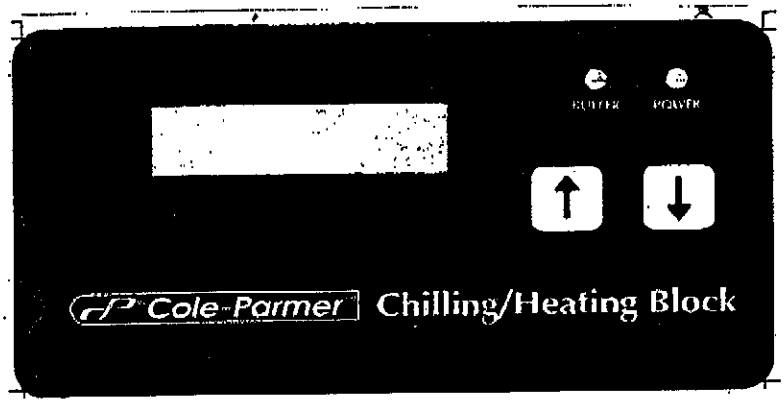
The unit has an audible alarm that sounds for one minute when the timer counts down to zero. Touching the UP ARROW will turn the alarm off during this first minute. However, if the alarm sounds for the entire minute, it will shut off the sound automatically. When the alarm first sounds, the timer will start to count up. This lets the user know how much time has passed since the first timer sounded.

DATA LOGGER

The unit is supplied with a built-in data logger. The data logger can be made to collect up to 8110 data points in intervals of 1/second, 1/minute, one every 5 minutes. See the instructions later for use.

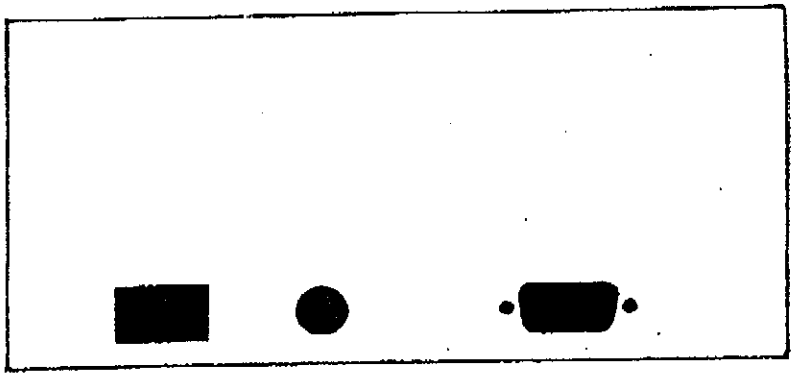
## VII. FRONT AND REAR PANEL CONTROLS

FRONT PANEL




The front panel of the Chilling/Heating Block shown above has a tactile touch membrane keyboard with audible feedback. The keyboard is used to set all operating parameters. The display is a two-line alphanumeric LCD with backlighting. When the unit is turned on, the display will light and show the SET POINT and PLATE TEMP which is the actual temperature of the plate surface. There are two LED's on the front panel. One a power on indicator, the other, the buffer, flashes when the data logger is collecting data and is on solid when the data logger is full and needs to be dumped.

REAR PANEL



The rear panel shown above has the on/off power switch at the left, the 12 volt dc power input jack in the middle and the RS232 I/O port on the right.

## VIII. SET UP PARAMETERS

SET UP PARAMETERS

1. Ambient operating temperature range is from 5°C to 40°C.

2. Maximum altitude of operation should not exceed 2000 meters.

3. Maximum ambient operating relative humidity should not exceed 80% at 31°C decreasing linearly to 50% relative humidity at 40°C.

SET UP INSTRUCTIONS

1. Place the unit on a level, dry bench or surface.

2. Plug the power supply into a properly grounded, 3-wire outlet of proper voltage.

3. Plug the power supply cable into the rear of the chilling/heating module.

4. Place the sample on the plate surface.

5. Turn the unit on by the switch on the rear of the chilling/heating module. The unit display will light and the power LED will illuminate.

6. Set target temperature and timer, if wanted, according to the instructions that follow.

**Note: Do not use this equipment in any manner not specified by the manufacturer.**

ENVIRONMENTAL INFORMATION

1. This unit is for installation category II.

2. This unit is rated pollution degree 2.

## IX. DISPLAY AND KEYBOARD DESCRIPTIONS.

DISPLAY

The display is a two-row alphanumeric LCD with backlighting for easy viewing. It is used to set all the parameters of the Chilling/Heating Block. When used with the keyboard, it can be made to simply set a temperature, to set a timer, to set the data logger, and to calibrate the plate or any block on it against a local standard.

KEYBOARD

The keyboard consists of an UP ARROW and a DOWN ARROW. When the keys are touched, an audible beep will occur. The user will note that the keys also have a tactile feedback to them when they are depressed. Use of these arrows will be described in the next chapter.

## X. SETTING TEMPERATURE, TIMER AND DATA LOGGER

SETTING TEMPERATURE

To set a temperature for the plate, simple press the UP or DOWN ARROW until the top line of the display shows the desired temperature. The display will read SET POINT and the value you enter. The unit will now go to that temperature. Note that the actual plate temperature will be shown in the display as PLATE TEMP. You will be able to watch this number change as the unit drives to the SET POINT entered.

There are a couple of points to remember. Although the unit can be set to -10°C, it can only go 30°C below ambient. What that means is that the unit may not reach -10°C if the ambient temperature is 25°C. Also, the power available to heat and chill the plate and samples on it is 50 watts. This means that there are some larger loads that will not go as far hot or cold as wanted, or, if they do, it will take longer than the unloaded plate will. For best results, use the covers available as accessories. For 96-well assay plates the part number for the cover is 44175-40. The part number for the cover for the aluminum blocks is 44175-50.

## SETTING TIMER

The timer is a count down timer that reads in days, hours, minutes, and seconds continuously. It can be set to 30 days maximum. When the timer counts down to zero, it will sound an audible alarm for one minute. When the alarm starts to sound, the unit will then count up so that the user may see how long it has been since the alarm timed out. The audible alarm can be turned off after it has sounded by depressing the UP or DOWN ARROW.

When the timer is set, the display will show the timer value in days, hours, minutes, and seconds on the top line. The bottom line of the display will now show the SET POINT as SP and then the value as set, and the display will show the PLATE TEMP as PT and the actual plate temperature.

To set the timer, simultaneously depress both the UP and DOWN arrows. The display will toggle into a mode where the other functions can be accessed. The list of other functions is:

→ EXIT
SET & START TIMER
START LOG
CALIBRATE
TIMER OPTIONS
LOG OPTIONS

(The timer will be covered here. More of the other functions will be covered later.)

Depress the DOWN arrow and the pointer arrow to the left of the list will move down the list. Pressing the UP arrow will move the pointer arrow back up the list. Note that only two items of the list can be displayed at any one time. When the arrow is pointing to SET & START TIMER press both the UP and DOWN arrows at the same time. The display will now show the timer in days, hrs, mins, secs. Pressing the DOWN arrow will cause the pointer to jump from seconds to minutes to hours to days in that order. This allows setting each as needed. Stopping the pointer where wanted and then pushing the UP arrow allows a value to be set. Pressing both UP and DOWN arrows together again will set the timer and change the display so that it now shows the timer and the temperature set point and plate temperature. The timer will start to count down at this point.

The other timer options under TIMER OPTIONS are AUTO-OFF and BEEP. These options should be set before setting a timer value. To reach TIMER OPTIONS scroll the pointer down the list until it points at TIMER OPTIONS. Next depress both the UP and DOWN arrows together. The display will now show AUTO-OFF: NO, and BEEP: YES. Note that the pointer arrow is still to the left. Pushing the DOWN arrow will

cause the pointer to move down and then up again between the AUTO-OFF and BEEP functions. The UP arrow is then used to activate the AUTO-OFF (change the setting from no to yes) and the BEEP (change the setting from yes to no). Once the setting has been made, press the UP and DOWN arrows together and the unit will return the display to where the pointer is at EXIT. Depress the UP and DOWN arrows together and the display will return to the original screen. Play with this. You cannot hurt the unit, and you will become more familiar with the operation.

## SETTING THE DATA LOGGER

The data logger collects values of actual plate temperature at intervals that can be set by the user. These data points, 8110 maximum, can be collected every second, every minute, or every five minutes as set by the user. As data points are collected, the BUFFER LED will flash, once for each data point collected. When the buffer is full, the BUFFER LED will stop flashing and be on constantly. The buffer can then be down loaded whenever wanted via the RS232 I/O port as per the instructions in that section of the manual.

To set the data logger, depress both UP and DOWN arrows at the same time. The display will then show the menu of other functions with the arrow pointer to the left. Scroll down the selections by pressing the down arrow until LOG OPTIONS is indicated by the pointer. Depress both the UP and DOWN arrows at the same time and the display will say LOG ENTRY EVERY SECOND. Pressing the DOWN arrow again will change the display to LOG ENTRY EVERY MINUTE. Pressing the DOWN arrow again will change the display to say LOG ENTRY EVERY 5 MINUTES. Stop the display at the sampling interval desired then press both the UP and DOWN arrows at the same time. The display will now show the pointer arrow at EXIT. Push the DOWN arrow until the pointer arrow is at START LOG. Press the UP and DOWN arrows at the same time and the unit will start to collect data points and the BUFFER LED will start to flash. The display will return to reading the SET POINT and PLATE TEMP.

To stop logging data points, depress the UP and DOWN arrows at the same time. The display will go to the other options screen. Scroll the pointer to STOP LOG. Then depress the UP and DOWN arrows together and the unit will stop collecting data points. The BUFFER LED will stop flashing and the display will return to reading SET POINT and PLATE TEMP again.

## XI. TEMPERATURE CALIBRATION

The temperature calibration built into the unit is stable and will hold without drifting. However, our standards for temperature measurement may not be the same as the users. Therefore, the unit has been designed to be calibrated in the field by the user. Follow the easy instructions below if calibration is wanted or needed.

**Note: The calibration is single point for optimum accuracy. Therefore, if calibration is changed, it is best to clear the old calibration in memory. This is done by turning off the unit, and then turning it on again while holding either the UP or DOWN arrow depressed.**

To calibrate the unit at a particular temperature, set the unit to go to that temperature. Give the unit time to equilibrate. Then press the UP and DOWN arrows at the same time. The display will go to the other options screen with the pointer arrow to the left of EXIT. Scroll the pointer down using the DOWN arrow until the pointer is at CALIBRATE. Depress the UP and DOWN arrows at the same time and the display will read DISPLAYED and the temperature displayed, and MEASURED and the temperature measured. Now measure the plate temperature (or the block or other item that may be holding the samples to be controlled) using an electronic thermometer with a good surface temperature probe. **Note: This is a difficult temperature measurement to make accurately. If help is needed contact the factory**. When the temperature measurement is made use the UP or DOWN arrow to make the MEASURED TEMPERATURE displayed read what the external meter measurement reads. Now press the UP and DOWN arrows at the same time and the display will return to normal. The unit is now calibrated.

## XII. RS232 INTERFACE

The RS232 is available through the 9-pin D-subminiature connector on the rear of the unit. Pins 2, 3 and 5 on the connector are used. It operates at 9600 baud, 1 stop bit, no parity. No handshake hardware or software is necessary. It will work well on a Windows terminal program per the settings in the chart on the following page. All communications settings and queries are done using ASCII characters with carriage return as the terminating character.

**Note: To comply with CE and to avoid possible EMI radiation from the RS232 cable, use a shielded cable.**

**IC20 Serial Communication Command Set**

4-13-99

| Command sent to IC20 | Data Returned from IC20 if no error | Message Returned from IC20 if an error occurs | Function |
|---|---|---|---|
| p<CR> | Plate Temp<CR><LF> | e<CR><LF> | The IC20 will send back the current plate temperature<br><br>HyperTerminal example: type the letter "p" (no quotes) and hit the "enter" key<br>If the current plate temperature is 20C, "20" will be sent back followed by a carriage return and line feed character (the HyperTerminal cursor will move to the beginning of the next line.) |
| s<CR> | Setpoint Temp<CR><LF> | e<CR><LF> | The IC20 will send back the current setpoint temperature<br><br>HyperTerminal example: type the letter "s" (no quotes) and hit the "enter" key<br>If the current setpoint temperature is -9C, "-9" will be sent back followed by a carriage return and line feed character (the HyperTerminal cursor will move to the beginning of the next line.) |
| l<CR> | All logged values delimited by <CR><LF> | e<CR><LF> | The IC20 will send back the all the logged values for the last log session. Each datapoint will be separated by <CR><LF>.<br><br>HyperTerminal example: Capture the log data to a text file by selecting "Transfer" then "Capture Text..." from the HyperTerminal menu. Give the file a name and add ".csv" to the name (example "filename.csv) and click on the "Start" button. Then type the letter "l" (no quotes) in the terminal window and hit the "enter" key. The data will be displayed in the terminal window and captured to the file. Stop the log capture by selecting, "Transfer" then "Capture Text..." then "Stop" from the HyperTerminal menu.<br>The saved log file may now be opened directly from an application like Microsoft Excel for charting or analysis. |
| b<CR> | s,m, or 5 <CR><LF> | e<CR><LF> | The IC20 will send back the time base for the "Log Options" on the IC20. If temperatures are logged every second, "s" will be returned. If temperatures are logged every minute, "m" will be returned. If temperatures are logged every 5 minutes, "5" will be returned.<br><br>HyperTerminal example: type the letter "b" (no quotes) and hit the "enter" key<br>If the "Log Option" selection is once every second, "s" will be sent back followed by a carriage return and line feed character (the HyperTerminal cursor will move to the beginning of the next line.) |
| n(value)<CR> | ok<CR><LF> | e<CR><LF> | Change the "Set Point" temperature on the IC20 to a new value. The new value must be in the range -10 to 90.<br><br>HyperTerminal example: type "n73" (no quotes) and hit the "enter" key<br>The Set Point on the IC20 will change to 73C and "ok" will be sent back followed by a carriage return and line feed character (the HyperTerminal cursor will move to the beginning of the next line.) |

Notes:

1. Serial protocol is 9600 baud, 1 stop bit, no parity
2. When the IC20 powers up, "IC20 v1.0" will be sent to the terminal
3. <CR> is the ASCII "carage control character (d'13')
4. <LF> is the ASCII "line feed" character (d'10)
5. Commands are case sensitive

## XIII. CLEANING, MAINTENANCE, AND CONSUMABLE PARTS

### CLEANING

This unit is subject to splashes and spills during normal use. Also, condensation may occur when heating after chilling. Be sure to wipe up all spills and condensation with a soft cloth or paper towel as they occur. If a cleaning solution is necessary, use a mild soap or detergent solution and a soft cloth. Do not use solvents. They could damage the paint or display window on the unit.

**Caution: Do not attempt to clean the plate surface when it is hot. Burns might occur.**

### MAINTENANCE

There is no ongoing maintenance program needed with this unit other than the normal care and cleaning as instructed above, and a simple inspection done whenever the unit is to be used. This simple inspection should include:

1. Checking that the AC cord and the DC cable to and from the power supply module are not frayed or burned.

2. Checking that the unit is not dirty to a point where proper performance is impaired. This is especially important relative to the membrane switch and LCD window.

3. Being certain to store the unit properly, when not in use, in an area that will not have items placed on top of the unit, and covering the unit in a way that will keep dirt and other foreign bodies out of the unit.

### SPARE PARTS AND CONSUMABLES

There are no spare parts or consummables listed for this unit. For more information, please call Cole-Parmer.

## XIV. ADDITIONAL SYMBOLS

The following are additional symbols found on labels on the instrument

| Symbol | Description |
|---|---|
| V | Voltage |
| ~ | Alternating Current |
| A | Current |
| Hz | Frequency |
| W | Power |