OPERATING MANUAL
TORREY PINES SCIENTIFIC, INC.
DIGITAL HPLC COLUMN HEATER
MODEL CO20

DOCUMENT NUMBER CO20-00

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I. INTRODUCTION

Congratulations on your purchase of a Torrey Pines Scientific, Inc. Model CO20 Digital HPLC Column Heater. 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

Torrey Pines Scientific, Inc warrants this product to be free from 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 abuse or misuse within the one year period, please return---freight prepaid---and correction of the defect will be made without charge.

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

III. RETURN OF ITEMS

Authorization must be obtained 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. Torrey Pines Scientific, Inc., will not be responsible for damage resulting from careless or insufficient packing. A 15% restocking charge will be made on all unauthorized returns.

Note: Torrey Pines Scientific, Inc., reserves the right to make improvements in design, construction, and appearance 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

HEATED SURFACES

The CO20 is capable of heating the COLUMN surface to 90.0°C. The chamber temperature may be 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.

ELECTRICAL

The CO20 runs off 12 volts dc at 4.2 amps. The instrument is supplied with a universal power supply that can take inputs from 90 to 265 volts AC $\pm$10%. The unit is supplied with an AC input cord for the power supply. Be certain to use a 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.

CHEMICAL

All HPLC systems are subject to leaks. Try to avoid leaks which can lead to the rapid evaporation of volatile solvents. Solvents can be dangerous if inhaled. Also, the higher the temperature, the faster the solvents can evaporate. This means that PEL limits can be reached or exceeded quickly. Be sure to check for leaks and to correct them quickly to keep your lab and personnel safe.

VI. GENERAL DESCRIPTION

The Torrey Pines Scientific, Inc., Model CO20 comes with a universal power supply and the HPLC column heating module. It 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.

HEATER

The heater is a 40 watt silicon rubber resistance element that has an adhesive on one side. This adhesive side is mounted to the back of the heater chamber and makes excellent contact with the chamber. The element should last years without problem. The heater is controlled by the electronics of the unit via the column sensor and PID control electronics of the unit. Column temperature is sensed in the chamber with a platinum RTD sensor and compared with the target temperature. The heater is then turned on or off as needed to control the column temperature directly to the temperature set by the user. The unit has over temperature protection that will prevent the unit from going hotter than 20.0ºC above the set point or 95.0ºC maximum.

TIMER

The CO20 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 COLUMN TEMP. It has a user settable AUTO-OFF as well. When activated, this works to turn the 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 or DOWN 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 timer first sounded.

INJECTON COUNTER

The injection counter will count up when the counter leads transition from open to closed. In other words, if the counter leads are connected to a switch, the counter will count up each time the switch goes from "OFF" to "ON". The CO20 provides an audio jack with leads for attaching to the injector. The injection counter can be displayed along with the set and column temperatures simultaneously.

VII. FRONT PANEL CONTROLS

FRONT PANEL

The front panel 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 CHAMBER TEMP. There are two LED's on the front panel. One is a POWER ON indicator, the other is a STABLE TEMP indicator that will illuminate when the column temperature is within 0.25ºC of the set point temperature for one minute.

REAR OF CO20 (TEMPERATURE CHAMBER

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The rear of the CO20 is the column heater chamber. It has three column holder clips

that will accommodate columns of ¼ to ½ inch without replacement. The column is snapped into the mounting clips. The clear plastic cover is then placed over the chamber to keep drafts out. The plastic cover makes column viewing easy.

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 or in the accessory stand.

2. Plug the power supply cable into the jack on the right end of the column oven.

3. Remove the cover from the chamber. It is attached by magnets.

4. With the tubing already attached to the column, place the column in the clamps in the chamber.

5. Replace the cover on the heater chamber.

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

7. 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 unit. When used with the keyboard, it can be made to set a temperature, to set a timer, to set the counter, and to calibrate the unit 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 AND TIMER

SETTING TEMPERATURE

To set a temperature for the chamber, 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 temperature will be shown in the display as TEMP. You will be able to watch this number change as the unit drives to the SET POINT entered.

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 COLUMN TEMP as CT and the actual chamber 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

START TIMER
DISPLAY COUNT
CLEAR COUNT
LO TEMP CAL PT
HI TEMP CAL PT
CLEAR CAL PTS
TIMER OPTIONS

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 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 chamber temperature. The timer will start to count down at this point.

The other timer options under TIMER OPTIONS are AUTO-OFF: NO and ALARM:YES. 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 ALARM TONE: 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 ALARM TONE functions. The UP arrow is then used to activate the AUTO-OFF (change the setting from no to yes) and the ALARM TONE (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.

XI. TEMPERATURE CALIBRATION

The temperature calibration built into the unit is stable and will hold without drifting. The unit is calibrated at the factory. However, our standards for temperature measurement may not be the same as the users. Therefore, the CO20 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 two-point for optimum accuracy. Therefore, if calibration is

changed, it is best to clear the old calibration in memory. This is done by going into the secondary functions by depressing the UP and DOWN arrows at the same time. The unit will display EXIT and START TIMER. Use the DOWN arrow to scroll the pointer down to CLEAR CAL PTS. Then press the UP and DOWN arrows together. Calibration is cleared.

To calibrate the unit at the first temperature point, set the unit to go to the first temperature, usually 30.0ºC. Wait for the TEMP STEADY LED to illuminate and wait 15 minutes. 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 LO TEMP CAL PT. 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 chamber temperature using an electronic thermometer. 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. To set the second calibration temperature, repeat the above procedure at the second reference temperature, usually 70.0ºC, and the HI TEMP CAL PT. The unit is now calibrated.

XII.INJECTION COUNTER

The injection counter connects through the audio jack on the right side of the unit. The audio cable is supplied with the unit with two wires coming from the jack. Attach these to the injector.

The injector counter will increment when the counter leads transition from open to closed. In other words, if the counter leads are connected to a switch, the counter will increment each time the switch goes from "OFF" to "ON". The CO20 provides switch de-bounce filtering of 0.050 seconds.

The display for the counter will look like the TIMER display except the counter value will be on the top instead of the timer value.

To display the counter, simultaneously depress both UP and DOWN arrows. The display will toggle into a mode where the other functions can be accessed. Press the DOWN arrow to scroll down to DISPLAY COUNT then depress both the UP and DOWN arrows. The last stored count value will be displayed. To reset the counter to zero, select CLEAR COUNT from the menu. CLEAR COUNT is the next setting below DISPLAY COUNT.

XIII. CLEANING, MAINTENANCE, AND CONSUMABLE PARTS

CLEANING

This unit is subject to splashes and spills during normal use. Also, condensation may occur when heating. 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 window on the unit.

Caution: Do not attempt to clean the oven 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 very few spare or consumable parts. A simple list is below.

Part Number	Description
730-0001	Power Cord, US
730-0006	Power Cord, German (European)
730-0008	Power Cord, UK
730-0004	Power Cord, Italian
730-0005	Power Cord, Australian

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