OPERATING MANUAL

EchoTherm™
DIGITAL HOT PLATES and HOT PLATE/STIRRERS
MODELS HP50, HP50A, HS50, HS50A, HP51, HP51A, HS51 and HS51A
For All Voltages

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I. INTRODUCTION

Congratulations on your purchase of a Torrey Pines Scientific EchoTherm™ Digital Hot Plates and Hot Plate/ Stirrers. 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 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 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 packed** to prevent damage in shipment and **insured** against possible damage or loss. Torrey Pines Scientific 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 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.** ***Attention: Lire ce manuel pour des informations complémentaries.***

This symbol means: **Warning. Hot surface.** ***Attention, surface chaude.***

This symbol means: **Ground or earth connection.** ***Connexion á la terre.***

This symbol is the **WEE symbol**. It means that the unit must be disposed of as any electrical appliance like a computer. It cannot be disposed of in the normal trash.

V. CAUTIONS

HEATER PLATE SURFACE

The Torrey Pines Scientific Hot Plate/Stirrers are capable of temperatures on the heater surface in excess of 450°C on ceramic units and 400ºC on aluminum units. Touching the heated surface will cause severe burns. **USE EXTREME CAUTION AT ALL TIMES.** Never leave your hot plate accessible to others while it is hot. Although the unit is equipped with a "**HOT WARNING"** indicator on the front panel, do not rely on this alone. Never touch the heating surface unless you are absolutely sure that it is cool.
NOTE: DO NOT INSTALL THIS UNIT CLOSER THAN SIX (6) INCHES (15.24 CM) TO A WALL OF COMBUSTIBLE MATERIAL. ALSO, THIS UNIT IS NOT FOR USE WITH FLAMMABLE SUBSTANCES.

TEMPERATURE PROBE

When attempting to control PROBE TEMPERATURE, plug in the temperature probe and place it in the sample AT ALL TIMES. If not placed into the sample and plugged into the rear of the unit it will not be able to sense the temperature of the sample as heat is being applied. This will result in driving the heater to its maximum and could result in ruining the sample.

Temperature probes vary in size and material. Immersion probes of stainless steel are supplied with the units. For other probes available in other lengths and materials, call the factory or consult your price list. All probes come with 3-foot (91.44 cm) interconnect cable and are 3/16th (47.6 mm) in diameter. Stainless steel probes work best with all but the most aggressive chemicals. Solid Teflon will work with the most aggressive chemicals, but only to about 250°C. Glass probes are available for use with aggressive chemicals at higher temperatures.

ELECTRICAL

These hot plate/stirrers are made in models that operate at 100, 115, and 230 volts AC ±10%. Be certain that your voltage matches the unit you receive. Check the nameplate on the bottom for the voltage setting on your unit. Be certain to use a three-wire, properly grounded AC input. Take the normal care and precaution one would use with any electrical appliance. Be careful to keep the AC line cord away from the hot plate. **Be certain to use a line cord of the same type and rating as the one supplied with this unit. Note: all fuses are fast blow. Be certain to replace any blown fuse with a fuse of like value. All fuse values are on the fuse label next to the fuse holder.**

VI. GENERAL DESCRIPTION

These units are general purpose digital hot plates and hot plate/stirrers. They are available with solid ceramic or milled flat cast aluminum tops. The tops are 6" x 6" (15.24 cm x 15.24 cm) for the HP50 & HS50 and 12" x 12" (30.48cm x 30.48cm) on the HP51 & HS51. All functions are settable from the digital front panel and display. These units, when received, display temperature in ºC. They can be switched to read in ºF. See page 6.

HEATER

Either the plate surface temperature or the actual sample temperature may be set and controlled. A sensor in the plate is used to monitor and control plate surface temperature. Alternately, a 100-ohm, 3-wire platinum RTD temperature probe may be connected to the rear of the unit and inserted into the sample solution to measure and control solution temperature. When a temperature is set, power is applied to the heater to precisely control the temperature at the plate surface or in the sample as directed by the user.

STIRRER

The stirrer is a motor driven magnet which revolves directly under the center of the heater plate. It is normal to stir a solution while heating for uniformity. A stir bar is used in the solution and couples with the motor driven magnet under the heater plate and stirs the solution.

TIMER

They come with a count down timer that is settable and displayed in hours, minutes and seconds. The timer can be set to 99:59:59 hours. When the timer is set it starts to count down to zero. At zero the timer will sound an audible alarm that will ring ten times. At zero the timer will start to count up so that the user will know how long it has been since the timer counted down to zero. In addition to the timer, the units have an AUTO-OFF function. When the AUTO-OFF function is activated AUTO will appear to the right of the timer display, and the heater and stirrer will turn off at the end of any count down timer setting.

MEMORY

All units in this series include two memory keys, MEM 1 and MEM2. Each memory setting can store a temperature and a stirrer speed for instant recall and use later. Memory settings are retained even when the unit is shut off.

VII. FRONT AND REAR PANEL CONTROLS

FRONT PANEL

Shown above are the keyboard and display for the HS50 Digital Hot Plate/Stirrers. The HS51 is the same only longer from right to left to fit the bigger chassis. The HP50 and HP51 units will not have the STIRRER and STIRRER OFF keys.

The front panel has a tactile touch membrane keyboard with audible feedback. The keyboard is used to set all operating parameters. The display is a LCD type made up of three rows of numbers and icons which function to display all parameters when the unit is running and during setting. When the unit is turned on, the display will come on and show the actual plate surface temperature. If a probe is used, it will display the probe temperature instead of the plate temperature. The timer and stirrer functions will show zeros.

There is one red LED PLATE HOT indicator on the front panel. It is actuated when the plate surface goes over 50°C to warn the user that the plate surface is hot enough to cause burns.

To change the unit from reading in ºC to reading in ºF or vise-versa hold the HEAT OFF button down for 3 seconds. The display will switch over. Degrees C or F is indicated when C or F is displayed next to the temperature reading.

REAR PANEL

The AC power connector jack and fuse holder is a module mounted on the rear of the unit. The RS232 jack and the temperature probe jack are mounted next to it. Note the polarity on the probe jack. Be sure not to force this connection when plugging in the temperature probe. The temperature sensor jack is a 5-pin DIN jack which is used with a 3-wire, 100-ohm at 0°C platinum RTD temperature probe.

The AC power jack is a three-prong, male plug combining the snap-in fuse holder. The fuse types used appear on the label on the rear of the unit.

CAUTION: If the fuses blow repeatedly, contact your dealer or the manufacturer.

ATTENTION: Si les fusibles sautent de manière répétitive, contacter votre distributeur habituel ou le fabricant.

VIII. SET UP PARAMETERS AND INSTRUCTIONS

The HP50/HS50 and HP51/HS51 Digital Hot Plates and Hot Plate/Stirrers are very simple instruments to install and use. Follow the instructions below.

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 unit into a properly grounded, three-wire outlet of proper voltage.

3. Plug the temperature probe (if used) into the jack on the rear of the unit.

4. Place the sample on the heater plate and put the temperature probe (if used) into the sample container.

5. Turn on the unit by the POWER push button on the front panel. The unit will beep once and the display will light up. At this point the user can set or view any of the parameters of the unit.

6. Set target temperature, stirrer, and timer (if wanted) according to the instructions given in the following sections.

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

Note: Ne pas utiliser cet équipement si vous ne pouves pas respecter les conditions d'utilisation spécifiées par le fabricant.

ENVIRONMENTAL INFORMATION

1. These units are for installation category II.

2. These units are rated pollution degree 2.

IX. DISPLAY AND KEYBOARD DESCRIPTIONS

DISPLAY

The display has three rows of numbers and icons. From the top they are as follows:

Probe Temperature or Plate Temperature: The top row of numbers shows the plate or probe temperature. These numbers will be followed with a C or F which denotes that the temperature reading is in degrees Centigrade or Fahrenheit. When a target temperature is set into the unit the numbers in the display will change accordingly to show the progress of a set temperature toward its target showing first the actual temperature for 5 seconds and then flashing the target temperature for one second. If no target temperature is set, then the display always will show the actual temperature.

Without a probe is plugged into the rear of the unit the icon to the left of the numbers represents the plate temperature at its surface as measured with a sensor in the heater plate. It appears as a flat surface with heat waves rising from it. When the probe is plugged in the icon to the left of the numbers will change and appear as a vessel with a temperature probe in it.

Stirrer (for units with stirrers): The middle line in the display shows the stirrer speed in RPM (revolution per minute) with RPM to the right of the numbers.

Timer: The bottom row on the display shows the timer. The numbers that can be set and displayed are in hours, minutes, and seconds. The timer can be set to 99:59:59 maximum. The timer will count down to zero from its setting and sound an audible alarm and then start to count up letting the user know how long it has been since the timer counted down to zero. The words "AUTO-OFF" next to the numbers are visible only when the AUTO-OFF function is actuated. When this function is actuated, the timer will count down to zero, sound the audible alarm, and turn the heater and stirrer off.

KEYBOARD

Up/Down and Right/Left Arrows: The UP and DOWN and RIGHT and LEFT arrows on the right of the display are used to set values for the probe temperature, plate temperature, stirrer, and timer. The UP and DOWN arrows will cause the value of the digit selected to scroll up or down in value. The RIGHT and LEFT arrows are for setting the units, tens or hundreds value.

HEATER Key: The heater key is touched prior to adding a target temperature value.

STIRRER Key (stirring units only): This key is touched prior to adding a stirrer speed value into the unit.

TIMER Key: The timer key is touched prior to adding a value into the count-down timer.

AUTO OFF Key: This key activates or deactivates the AUTO-OFF function. When activated, the words "AUTO-OFF" will be illuminated on the display. When activated during a count-down timed event, the timer counts down to zero and shuts off the heater and stirrer and sounds the audible alarm. When this function is deactivated and a timer value is set, the timer will count down to zero and sound the audible alarm, but will not turn off the heater or stirrer.

HEATER OFF Key: Touching and releasing the HEATER OFF key will turn off the heater. The HEATER OFF key also is used to change the unit temperature display from °C to °F and vise-versa. Holding the key down for 3 seconds will make the display change from one to the other.

STIRRER OFF Key (stirring units only): Touching and releasing this key will turn off the stirrer.

MEM 1 and MEM 2 Keys: These keys are used to store settings of the heater and stirrer into memory for instant recall and use at any time.

CANCEL Key: The CANCEL key is used when a mistake is made when during the process of setting any value of heater, stirrer or timer into the unit. It will erase those settings so that the user can start over again.

ENTER Key: The ENTER key is touched after numerical values for the heater, stirrer or timer are set. Enter is the final step made to instruct the unit to start running the values set.

POWER Key: This key turns the power to the unit off and on.

X. SETTING TEMPERATURE, STIRRER, TIMER, AUTO-OFF, and MEMORY

TEMPERATURE

The heater may be set to control either the plate surface or the sample itself. When the probe is not plugged into the unit, the plate surface icon is displayed to the left of the numbers. The unit will control the plate surface when a target temperature is set. When the probe is plugged into the unit, the probe icon is displayed to the left of the numbers. Placing the probe into the solution, the target set will control the solution temperature directly. When a target temperature is set the control electronics in the hot plate will automatically apply power to the heater plate to reach the desired temperature.

Setting a target probe temperature will erase any target plate temperature previously set and vice versa. Target temperatures may be set anywhere in the range from ambient to 450°C or 842ºF on the ceramic heater units. The aluminum tops are settable to 400ºC or 752ºF. The unit comes with the display reading in degrees C. To change it to degrees F depress and hold the HEAT OFF button until the display changes. To change back to degrees C repeat the process.

Setting a Temperature: To set a temperature of either the plate or solution, touch and release the HEATER button. Next, use the UP, DOWN, RIGHT or LEFT arrows to set the value into the display. Then touch the ENTER button. The unit will now turn the heater on and drive the solution or plate to the target temperature. Note that the display will toggle between the target and the actual temperatures. When the target temperature is reached, the display will toggle between the target and actual temperatures but the numerical value will remain the same.

CAUTION: Be certain the temperature probe is in the solution when controlling a solution temperature. Failure to do so could damage your sample because the hot plate will drive to maximum while seeking a temperature it cannot find.

Note: When the heater is turned off using the HEATER OFF button, the value is saved so that when the heater is next used that previously set value is displayed and ready to set by touch the ENTER button.

Setting the Stirrer (stirring units only): To set a stirrer speed, touch and release the stirrer button. Use the UP, Down, Right or LEFT arrows to set the value desired into the display. Then push the ENTER button. The numbers shown are in revolutions per minute (rpm). The stirrer will now go to the value instructed.

Setting the Timer: **Note that it is not necessary to use the timer when not wanted. The unit will work fine without having the timer activated**. To set a timer value, touch and release the TIMER button. Note that the far left digit in the display will flash. This is the tens of hour's digit. Use the UP, DOWN, RIGHT and LEFT arrows to set in the timer value desired. Then touch ENTER. The timer will start to count down toward zero. When it reaches zero the audible alarm will beep five times.

Setting the Auto-Off: To set the auto-off function, touch and release the AUTO-OFF button. The display will illuminate the words "AUTO-OFF" to the right of the timer telling the user that the auto-off function is set. To turn off the Auto-Off, touch the AUTO-OFF button again. The words, "AUTO-OFF" will no longer be illuminated in the display. When AUTO-OFF is on, the unit will automatically turn off the heater and stirrer when the timer counts to zero.

Setting the Memory

The MEM 1 and MEM 2 keys are for storing frequently used combinations of heater and stirrer values. They do not store timer values. To set either memory slot set the heater, stirrer, or both to the values wanted. Then press and hold the memory key. The key will beep once when first touched and then a second time when the memory values are set. Release the key after the second beep. These values are now kept in memory even when the unit is turned off. They can be set to new values by writing over the values previously set by repeating the steps above. To run the values stored, turn the unit on and touch either memory key. The unit will run the values previously set. A heater value and a stirrer value can be stored in each memory slot.

XI. TEMPERATURE CALIBRATION

These units are designed for accuracy. The temperature calibration designed into the units is made to hold for very long periods of time. When calibrated in the factory, it is expected that the units will meet the most demanding customers' requirements. However, our standards for temperature measurement may not be the same as the users. Therefore, they are designed to be calibrated in the field by the user. Follow the instructions below if calibration is wanted or needed.

Calibration is two-point, one for the high and one for the low end of the temperature range. Temperatures above 100°C are considered high and below that are low. Setting the calibration will set the low or high end temperature and leave the other end of the range as set before. The straight-line calibration at other points is recalculated.

ERASING PRIOR CALIBRATION. When calibrating these units it is always best to erase the prior calibration. To do so press and hold the HEATER key for three seconds. CAL will appear in the display. Next, press and hold CANCEL for three seconds until the unit beeps. Prior calibration is now cleared. Calibration is erased independently for the probe or plate depending on whether the probe is plugged in.

PROBE CALIBRATION

Probe calibration is performed by using an accessory calibration kit (HS30-700) which precisely simulates fixed temperature points. The kit has two "dummy probes" which, when plugged into the probe jack, represent the value of resistance equal to the temperature shown on the dummy probe. The dummy probes represent temperatures of 25°C and 400°C. These are the probe calibration points. The kit is available from Torrey Pines Scientific, Inc.

To calibrate the probe temperature, follow these steps.

1. Insert the 25°C dummy probe in the probe jack at the rear of the unit. Depress and hold the HEATER key for 3 seconds until the display reads CAL. Press ENTER. Use the UP, DOWN, RIGHT and LEFT arrows as needed to set the display to read 25°C. Then press ENTER. The probe low calibration point is now set.
2. Remove the 25°C dummy probe and replace it with the 400°C dummy probe. Depress and hold the HEATER key for 3 seconds until the display reads CAL. Press ENTER. Use the UP, DOWN, RIGHT and LEFT arrows to make the display read 400°C. Then press ENTER.
3. Remove the dummy probe. The probe calibration is now complete.

PLATE CALIBRATION

The plate calibration does not affect the probe calibration and vice versa. If you are using the probe temperature control loop only, it is not necessary to calibrate the plate loop. The plate loop has been factory calibrated and is not likely to change.

To calibrate the plate, one needs an accurate temperature meter, preferably digital, and a surface temperature probe. This is a very difficult measurement to make, and not all surface temperature probes will do the job well. If you need help, please contact the factory. The Plate and Probe calibration kit #HS30-800 is available from the factory and will contain the temperature meter, surface temperature probe, and dummy probes for the probe calibration.

The calibration procedure requires that calibration starts at the low temperatures and goes high. Be sure before making an adjustment that the current calibration is cleared as instructed above. Plate calibration is time consuming. Be certain that the plate temperature has stabilized at the point being calibrated before taking a plate measurement. Follow the procedure below.

1. Start at room temperature. Using your temperature meter, measure the plate surface temperature in the center of the plate. Push and hold the HEATER key for three seconds until the display reads CAL. Then press ENTER. Input the correct reading and press ENTER. The low plate calibration point is now set.

2. Set the PLATE temperature to 350°C (300ºC on aluminum units). The plate will start to heat. Give the unit ample time to reach and stabilize at the target temperature, usually about 30 minutes. When the temperature reading on the display is stable, measure the plate temperature with your meter. Push and hold the HEATER key for three seconds until the display reads CAL. Then press ENTER. Input the correct reading and press ENTER. The plate high calibration point is now set.

3. Let the plate cool and then redo step 1. The plate surface calibration is now complete.

XII. POWER INTERRUPTION PROTECTION

The unit is provided with power interruption protection. If AC power is interrupted while running a temperature and stirring speed, the unit will go back to the previously set temperature and stirring speed when power returns. To let the user know that a power interruption has occurred, the degrees C or F icon to the right of the temperature display will flash.

XIII. CLEANING, MAINTENANCE, AND CONSUMABLE PARTS

Cleaning

This unit is subject to splashes and spills during normal use. Be sure to clean all spills quickly. Wipe spills with a soft cloth or paper towel. If a cleaning solution is necessary, use a mild soap or detergent solution and a soft cloth. Be sure not to use solvents. They could damage the paint, labels or display window on the unit. A mild abrasive can be used to clean the ceramic glass heater surface. Do not use abrasives on the cast aluminum heater top. They will scratch the surface.

CAUTION: Do not attempt to clean the heater surface when it is hot. Burns could occur.

PRÉCAUTION D'EMPLOI: Ne pas nettoyer la surface de la plaque lorqu'elle est chaude pour éviter toute brûlure accidentelle.

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 line cord is 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- Be certain to store the unit properly, in an area that will not have items placed on top of the unit. Keep the unit covered in a way that will keep dirt and other foreign bodies out.

Spare and Consumable Parts

Part Number	Description
730-0001	Power Cord, US, 10 amp
730-0002	Power Cord, German (European)
730-0003	Power Cord, UK
730-0004	Power Cord, Italian
730-0005	Power Cord, Australia, China
730-0006	Power Cord, US, 13 amp
730-0007	Power Cord, US, 15 amp
730-0009	Power Cord, India and South Africa

XIV. ADDITIONAL SYMBOLS

The following are additional symbols found on the labels of the instrument.

Symbol	Description
V	Voltage
~	Alternating Current
A	Current
Hz	Frequency
W	Power
F	Fast Acting Fuse
T	Time Delay Fuse
I	Mains On
O	Mains Off
WEE	Dispose of the unit in a proper way. Not in the normal trash.

XV. RS232 SERIAL INTERFACE SPECIFICATION

(See the following that follow)