**OPERATING MANUAL**

**EchoTherm™**
**PROGRAMMABLE, DIGITAL, ELECTRONIC**
**CHILLING/HEATING PLATE**
**MODEL IC25, IC25XR, IC25XT, IC35 and IC35XT**

**DOCUMENT NUMBER IC25/35 SERIES, REV 1**
**February 2, 2012**

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# I. INTRODUCTION

Congratulations on your purchase of an *EchoTherm* Programmable, Digital Electronic Chilling/Heating Plate Model IC25/35 Series.  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 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 packaged** 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."

This symbol means "WARNING, HOT SURFACE."

## V. CAUTIONS

CHILLER/HEATER PLATE SURFACE
The IC25/35 Series units are capable of chilling and heating the plate surface from -20°C to 110°C.  These upper temperature limits are 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 IC25/35 cooling/heating modules runs off 12 volts dc.  The instruments are 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 Torrey Pines Scientific Models IC25/35 are Peltier driven for chilling/heating.  They come with a universal power supply and the chilling/heating module.   The units have 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.

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 4.37" (11.1 cm) on the IC25's and 5.0" (12.7 cm) x 5.0" (12.7 cm) on the IC35's.  It chills and heats quickly without a load on it.  The temperature of the plate is sensed by a platinum RTD 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 IC25/35 Series have 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. The timer has an additional mode used when running programs only. See the programming section for this information.

ALARM

These units have 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 timer first sounded.

DATA LOGGER

The units are supplied with a built-in data logger. The data logger can be made to collect up to 7825 data points in intervals of 1/second, 1/minute, or 1 every 5 minutes. See the instructions later for use.

## VII. FRONT AND REAR PANEL CONTROLS

FRONT PANEL

The front panel of the IC25 shown above is representative of all the units and 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 or sample block 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, or write a program, 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 IC25/IC35 units.  When used with the keyboard, it can be made to simply set a temperature, to set a timer, to write and run a program, to set the data logger, and to calibrate the plate 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 tactile feedback when they are depressed.  Use of these arrows will be described in the next chapter.


# X.  NON-PROGRAMMABLE, SIMPLE SETTINGS OF TEMPERATURE, TIMER AND DATA LOGGER

SETTING TEMPERATURE IN THE NON-PROGRAMMABLE MODE

To set a temperature, simply 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 XT units can be set to -20°C they only can go 40°C below ambient (-10C and 30C below ambient on all other models).  What that means is that the unit may not reach -20°C if the ambient temperature is 25°C.  Also, the power available to heat and chill the plate and samples on these are 50 or 100 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. For best results, use the covers available as accessories.  The part numbers for the covers for the aluminum blocks is 720-0009 (IC25's) & 720-5509 (IC35's).

## SETTING TIMER IN THE NON-PROGRAMMABLE MODE

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
        Program
        Start Log / Stop Log
        Tmr & Pgm Options
        Log Options
        Calibrate

(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.  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 TMR & PRG OPTIONS are AUTO-OFF: yes or no, and ALARM TONE: yes or no, for non-program operation.  TIMER WAITS UNTIL PT=ST: yes or no, where PT is plate temperature and SP is temperature set point is for programmed operations only.  These options should be set before setting a timer value.  To reach TMR & PRG OPTIONS scroll the pointer down the list until it points at TMR & PRG 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.

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, 7825 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 DATA EVERY:  SEC., MIN., OR 5 MIN.  Pressing the UP arrow again will change the pointer from SEC to MIN to 5 MIN.  Stop the display at the sampling interval desired then press both the DOWN arrow.  The display will now show the pointer arrow at LOG OPTIONS.  Push the UP 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 IC25/IC35 units have 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 scrolling down through the options in the secondary functions to "Clear cal pts", and then depressing both the UP and DOWN arrows together. The unit is calibrated at the factory at 10⁰C and 70⁰C.**

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. PROGRAMMING

The IC25/35 series units can store 5 programs in memory. Each program can be 10 steps or less. Each program, regardless of length, can then be instructed to repeat from 1 to 99 times. The programs cannot be linked one to the other. **When writing a program it is important to be aware of the sample size versus the time set between steps. Be sure to give a larger sample block ample time to equilibrate before going on to the next temperature.**

**In the program mode, the timer can be used one of two ways.** The timer can be set to start to count down as soon as the program step starts, or the timer can be set to count down when a target temperature is reached. The timer should be set to one or the other mode before starting to write a program. The instructions below are for setting-up the timer.

Setting-Up The TIMER

The TIMER can be set to run when a program step starts or to wait until a target temperature is reached before starting to count down.  This latter setting is preferred for more accurate work.  Here are the instructions.

After the unit is turned on the display will show the SET POINT and PLATE TEMP with their associated values.  Depress both UP and DOWN arrows together to reach the secondary functions.  Using the DOWN arrow scroll the pointer arrow down to TMR & PGM OPTIONS.  Press both UP and DOWN arrows and the display will show AUTO-OFF: no, and ALARM TONE: yes.  Depress the DOWN arrow twice and the screen will show TIMER WAITS UNTIL PT=SP: yes or no.  Use the UP arrow to move the pointer to the setting wanted.   The setting is made.  To return to the normal screen,  touch the DOWN arrow to go back to TMR & PGM OPTIONS.  Then scroll the pointer up to EXIT and press both the UP and DOWN arrows.

Writing A Program

Before entering a program, write out the steps or the profile of the program.  To enter the program, do the following:

Depress the UP and DOWN arrows.  The display will go into its secondary functions showing EXIT and SET & START TIMER with an arrow pointing at EXIT.  Use the DOWN arrow to scroll down to PROGRAM.  Depress both the UP and DOWN arrows and the following screen will appear.

<div align="center">

→Pgm <u>1</u>        Run            Edit

New          Clr            Exit

</div>

       The pointer arrow can be moved around this screen by touching the
             DOWN arrow.  When the pointer is on a function it is active.
             Pgm <u>1</u>   Denotes the number of the program.  Touching the UP arrow will
             advance the number through programs 1 to 5.  Start with number 1 for
             your first program.

Run          When the pointer is on Run, the program entered into Pgm can be started
             to run by pressing both the UP and DOWN arrows.

Edit         Placing the pointer here and pressing the UP and DOWN arrows enters
             the unit into the screen for writing programs.

New        Placing the pointer here and touching the UP and DOWN arrows erases a program in the numbered slot in Pgm so that a new program can be written in that slot.

Clr        Placing the pointer here and pressing the UP and DOWN arrows will clear the program written in that slot.  This acts just like New.

Exit       Placing the pointer here and pressing the UP and DOWN arrows will exit the program mode and return the display to the normal operating screen.

To write the program, do the following:

1) When the display is in the mode above, place the pointer arrow next to Prg and use the UP arrow to identify the program.  Pgm 1 through 5 can be used.  It is recommended to start at program 1.

2) Scroll the pointer arrow to Edit using the DOWN arrow.  Press both the UP and DOWN arrows.  The following screen will appear.

<div align="center">

1                      0d   0h   0m   0s

Sp: 20⟨   X   ⟩
</div>

1       is the program step
0d      is days on the timer
0h      is hours on the timer
0m      is minutes on the timer
0s      is seconds on the timer
Sp: 20 is the set temperature (target temperature)

↗       is to decrease down program steps using the UP arrow
X       is to exit the program writing mode by pressing both the UP and DOWN arrows

↗       is to advance up program steps using the UP arrow

3) Starting at program step 1 use the DOWN arrow to move the pointer to Sp: and use the UP arrow to set the first target temperature.  Note that if you overshoot the temperature you will have to continue to go up until you go all the way around.

4) Move the pointer to 0s or 0m or 0h or 0d and use the UP arrow to set the timer value for the temperature just set.  By now the timer should have already been set to start to run with initiation of the first temperature step or after the first target temperature has been reached.

5) Repeat the above two steps until the program is complete.  Then scroll the pointer to X and touch both the UP and DOWN arrows.  The next screen to appear will be asking how many cycles the program is to run.  1 to 99 cycles are available.

Pgm: 1                  →Cycles=1
Run                     Exit

Pgm <u>1</u>          is shows the program number.
Cycles=          is the number of times to cycle the program.  Use the UP arrow to increase the cycles from 1 to whatever value is wanted up to 99.
Run          Starts the program running when pointer is placed on it and UP and DOWN arrows are pressed.
Exit          Exit this screen.  The program is complete and can be run at any time.


Running A Program

Once a program is written and stored in memory it can be recalled and run at any time by doing the following:

1) When in the normal screen, that is, the screen showing SET POINT: and PLATE TEMP:, depress the UP and DOWN arrows.

2) Use the Down ARROW to move the pointer to Program.  Depress both the UP and DOWN arrows to move to the next screen.

3) Use the DOWN arrow to move the pointer to RUN.  Depress both UP and DOWN arrows and the next screen will come up identifying the program number and giving the user one more chance to change the cycle number.

4) Use the DOWN arrow to move the pointer to Run and depress the UP and DOWN arrows.  The program will start to run and the following screen will come up.  This screen shows all running functions of the program so that it can be monitored as it runs.

<u>1</u> <u>1</u> <u>1</u>          0d   0h   0m   0s

Sp: 20 Pt: 20

<u>1</u>          This first digit is the program step being run.  It will change as the program steps advance.

<u>1</u>          This second digit is the program being run.  It will only change when another program is being run.  Program numbers are 1 through 5.

<u>1</u>          This third digit is the program cycle being run.  If only one cycle is used it will not change.  It will change up through 99 if the program is being cycled to 99 times .

0d, 0h, 0m, 0s          is the count down timer.  It will count down as the time passes.

Sp:   Shows the temperature target or set point for the program step.

Pt:   Shows the actual plate temperature.

Remember that as the timer counts down and the unit goes through all its steps it will reach zero on its last step.  At that time the alarm will sound (if initially set), and can be stopped by pressing either the UP or DOWN arrow.

# XIII. 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.  **The Serial Command Set is at the end of this document.**

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

# XIV. 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 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.

**Note: Outside electrical interference such as lightning might on occasion cause the unit to lock up or change target temperature without being instructed to do so. The unit should be reset if this happens. To reset the unit turn it off from the rear panel switch and turn it on again while holding the DOWN Arrow depressed.**

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, Germany (European)
730-0008           Power Cord, UK
730-0004           Power Cord, Italy
730-0005           Power Cord, Austral & China

## XV. 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

## XVI. SERIAL COMMAND SET

The following pages contain the Serial Command Set and include everything needed to connect the unit to a computer using the RS232 I/O port on the rear of the unit and then instructing the unit to run a temperature, a self-written program or collect data.