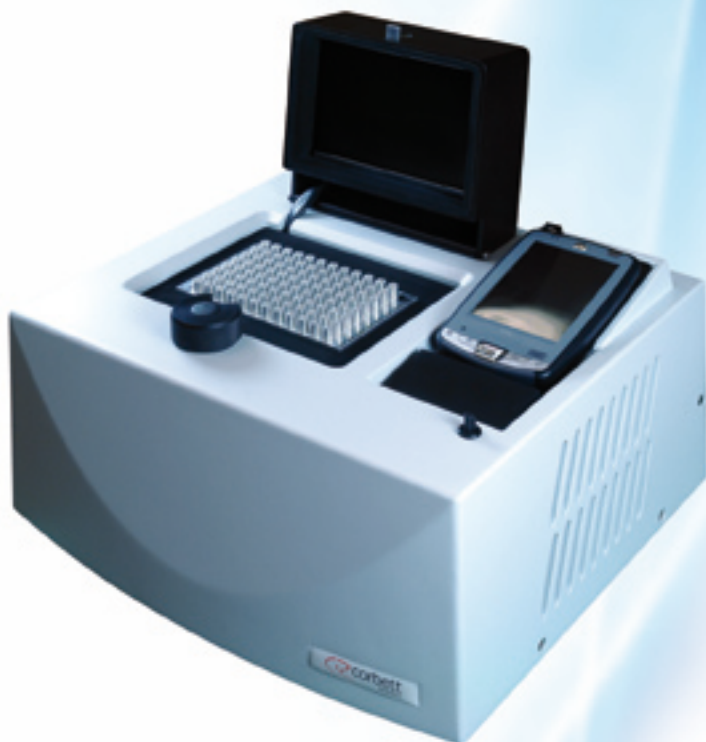




Palm-Cycler[™]
gradient thermal cycling

THE THERMAL CYCLING
GRADIENT

The new Gradient Palm-Cycler™ combines robust engineering, advanced performance and a palmtop PC interface for supreme user-friendly flexibility.



Palmtop PC Interface

A palmtop PC interface provides the convenience of the familiar graphical Windows® operating system combined with a backlit color touch-screen for an unsurpassed user experience in a thermal cycler.

The power of a palmtop PC computer allows advanced software functions to be included and total flexibility in thermal cycle programming. New software features are regularly incorporated and available as free upgrades via web download.

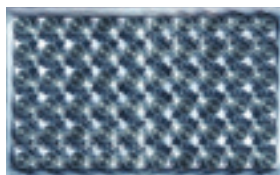
An SD memory card is included for convenient backup and transfer of programs between instruments. Each card can hold thousands of saved cycle programs.

In addition, the calendar software included with the palmtop PC computer makes a perfect booking system for laboratories where the instrument is in high demand!

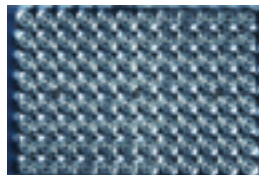


Support for all Reaction Formats

There are three models of Palm-Cycler to suit different sample tube formats:



1 60-well format to suit large volume reactions in individual 0.5 mL tubes with attached caps



2 Industry standard 96-well format for 0.2 mL individual or strip tubes (domed or flat-capped) or 96-well plates (low- or high-skirt) with strip caps or adhesive film seals



3 Industry standard 384-well format for plates with adhesive seals

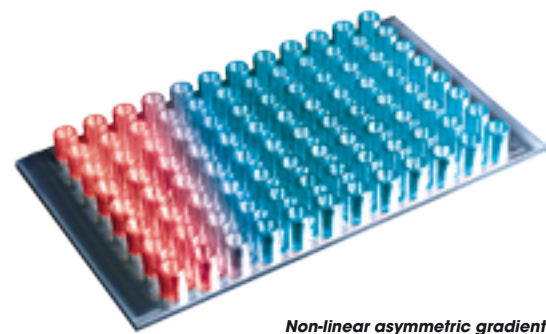
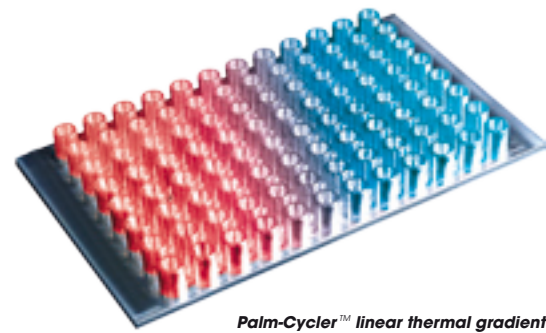
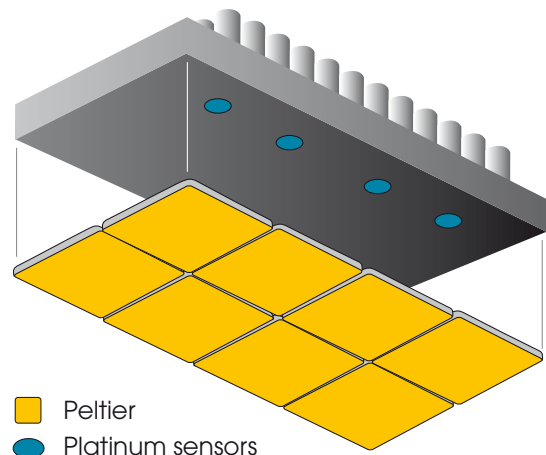
True Linear Gradient

Thermal gradient technology enables opposite sides of a thermal cycler block to be set to a different temperature. The wells across the block then span the set temperature range, creating a thermal gradient. A gradient can be used, for example, to optimize the annealing temperature of an assay in a single experiment by simply determining the temperature of the wells that yielded the best result.

The Palm-Cycler™ uses eight Peltier devices to actively heat and cool the block from 4 °C up to 99 °C. Peltier devices are controlled by four separate thermal sensors arranged across the block. The distribution of sensors enables a true linear gradient to be established via feedback loops from the sensors to the computer. Furthermore, Palm-Cycler software can interpolate and display the temperature of each column of wells in real-time during a run (see below).

With the Palm-Cycler, a linear gradient of between 1°C and 24°C can be set across the block.

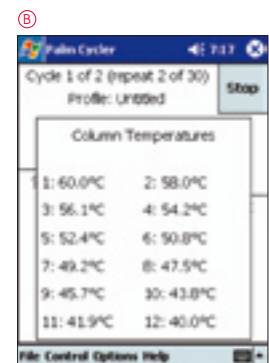
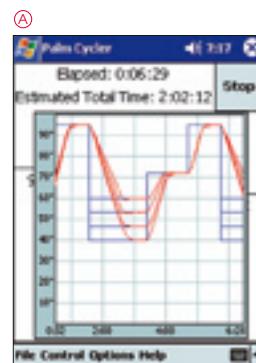
Unlike the Palm-Cycler, other thermal cyclers typically use fewer Peltier devices and sensors. A thermal gradient produced by these instruments can be very non-linear, having a fast thermal decay zone at one or more regions of the block. An asymmetric gradient such as this makes it very difficult to predict actual sample temperature in each well and makes optimization experiments prone to error.



Real-time Graphs

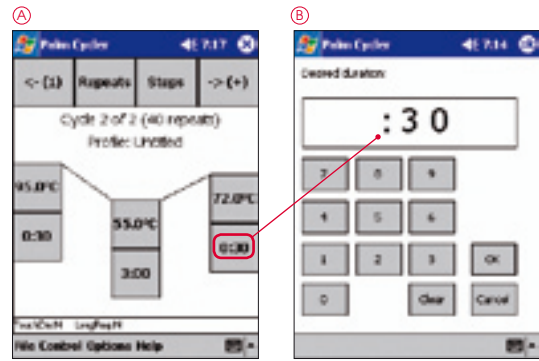
Palm-Cycler software graphically displays the current measured temperature across the block in real-time as cycling progresses, even for a thermal gradient (A opposite). Blue lines on the graph indicate target temperatures for each thermal sensor and the red lines report the measured temperature at each sensor location.

Four sensors across the Palm-Cycler block enable accurate interpolation of the temperature in each well. Shown opposite (B) are the interpolated temperatures of all twelve columns across a 96-well block (i.e. 12 columns x 8 rows) as displayed in real-time by the software.



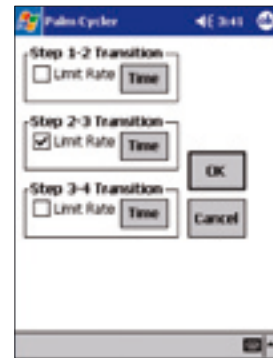
Programming Interface

Cycling programs are created and edited in *Program* mode. A program is graphically represented, as shown opposite for a three step program (A). The touchscreen interface makes the Palm-Cycler simple and intuitive to use; displayed parameters such as temperature, time, step number, or repeat number can be changed simply pressing on a displayed value to open an *Edit* dialog (B opposite).



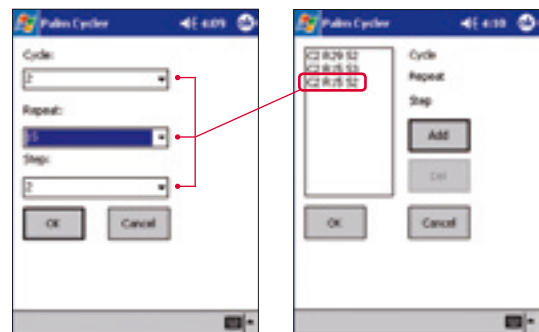
Ramp Rate Control

Thermal transition times (or ramp rates) can be precisely controlled by the *Limit Rate* function. *Limit Rate* allows the user to specify the time taken to transition from one set temperature to the next. For example, you can specify the transition from 55°C to 95°C to be, say, 15 minutes.



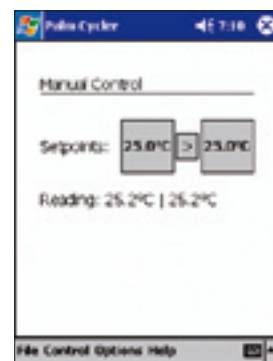
Hold Lists

The *Hold* function allows the creation of one or more pauses in the program. With this feature active, the unit will pause at the programmed point while emitting an alert beep. The set temperature will be held indefinitely until a *Continue* button is pressed. Holds are useful if there is a need to remove tubes or add reagents at a particular point in a run. The example opposite shows how a hold at Cycle 2, Repeat 15, Step 2 (C2 R15 S2) is set and added to a hold list.



Manual Control

In *Manual Mode*, the Palm-Cycler block can be set to hold a specified temperature for an indefinite time. This function is useful for incubating reactions such as DNA digestion or ligation. Simply select *Manual Mode* from the *Control* menu and key in the temperature desired. *Manual Mode* also supports a thermal gradient in which the upper and lower temperatures are set. In the example opposite no gradient has been set so the temperature does not vary across the block (here 25°C).



Touchdown and Long Range

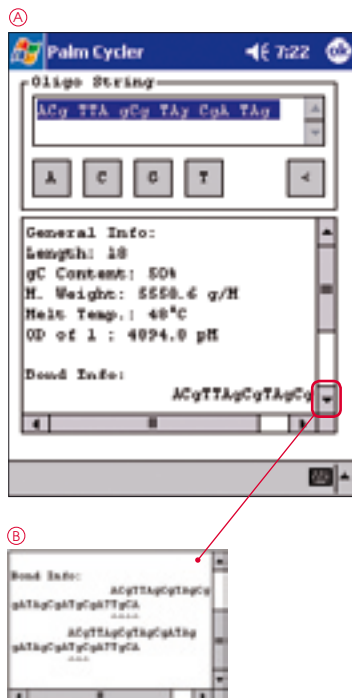
Touchdown and *Long Range* are auto-increment programming tools supported by the Palm-Cycler. *Touchdown* allows the temperature of a step to be automatically lowered by a set amount over a specified range of successive cycle repeats.

It is usually used as a mechanism to avoid primer-dimer artifacts by gradually lowering the annealing temperature during early cycle repeats of an amplification reaction.

Long Range programming enables the time of a particular step to be automatically increased by a set amount over a specified range of successive cycle repeats. *Long Range* programming is often used to provide gradually extended times for enzymatic polymerization of longer products during later cycle repeats of an amplification reaction. It is most useful for targets longer than about 1kb.

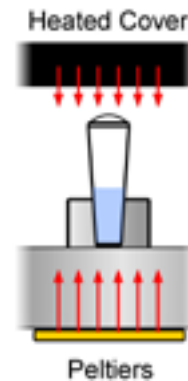
Oligo Calculator

Palm-Cycler software includes a full-featured oligo calculator as an aid to oligonucleotide design. In addition to a range of calculated values, the software self-aligns the oligo to show the occurrence of self-complimentary bonds. This can be used, for example, to identify palindromes and primer-dimers. Example oligo information is shown opposite (A). Scrolling the window down displays the self-aligned bond information (B).



Zero-Condensation Heated Lid Design

The Palm-Cycler uses a heated lid to keep the void air volume in the tube hotter than the reaction (see below). This drives any evaporation and condensation back into the cooler reaction liquid. Thus no oil or wax condensation barrier is needed.



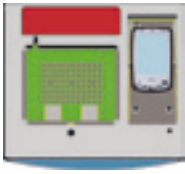
Thermal Calibration

In some situations it may be desirable to have the Palm-Cycler matched to an external thermal accuracy standard. The software includes an auto-calibration wizard in the *Help* menu to enable dynamic recalibration by the user.

The calibration process begins with measurement of Palm-Cycler well temperatures using a thermocouple probe of the desired accuracy. Measured temperatures are then used to overwrite existing Palm-Cycler calibration settings so that accuracy is matched to the probe.

Power Interruption and Auto-resume

If for any reason the Palm-Cycler is turned off, the power fails or the palmtop PC is disconnected during a run the palmtop PC will sound a warning alarm for 30 seconds. If reconnection occurs during that time the program will continue. If not, a *Disconnected* message appears onscreen indicating the name of the terminated program and the cycle, step and repeat number at which interruption occurred.



Palm-Cycler™

gradient thermal cycling

SPECIFICATIONS

Thermal Cycling System	Active heating and cooling using 8 Peltier elements + 4 Platinum sensors
Temperature Range	4°C–99°C
Temperature Accuracy	±0.25°C of set temperature, 1 minute after clock start
Temperature Uniformity	±0.5°C, 30 seconds after clock start
Temperature Resolution	0.1°C increments
Heating/Cooling Rate	2.0°C/sec maximum
Condensation control	Automatic using a heated lid design
Special Functions	Auto-resume on power fail, on-line logging and graphing, touchdown and long-range programming, linear thermal gradient (programmable up to 24°C), adjustable ramp rate, oligonucleotide calculator, program holds, manual mode, online help, thermal calibration wizard.
Configurations	<p><i>60-Well version (P/N 6000-000)</i></p> <ul style="list-style-type: none"> - Supported consumables: 0.5 mL tubes with attached caps <p><i>96-Well version (P/N 9600-000)</i></p> <ul style="list-style-type: none"> - Supported consumables: 0.2 mL tubes or strip tubes with flat or domed caps; 96-well high- or low-skirt plates with strip caps or an adhesive cover <p><i>384-Well version (P/N 3840-000)</i></p> <ul style="list-style-type: none"> - Supported consumables: 384-well plates with an adhesive cover
Dimensions	<p>H 220 mm (8.7") lid closed</p> <p>H 330 mm (13.0") lid open</p> <p>W 310 mm (12.2")</p> <p>D 295 mm (11.6"); 370 mm (14.6") including cables</p>
Weight	10.9 kg (24 lbs)
Electrical	100–120 VAC @ 4 Amp (50/60 Hz), 200–240 VAC @ 2 Amp (50/60 Hz)
Startup Accessories <i>(included)</i>	<p>Blue Silicon Pad (P/N 9601-007). Provided with 96- and 384-well configurations only</p> <p>Secure Key for Palm Device (P/N 9601-009)</p> <p>SD Memory Card 128 MB (minimum)</p> <p>Power Cable</p> <p>User Manual</p> <p>Palmtop PC accessories (manufacturer's standard set)</p>
Palmtop PC device <i>(minimum)</i>	<p>Hewlett Packard model hx2190b or later update: Intel® PXA270 Processor 312 MHz, Integrated Bluetooth® wireless technology, Integrated Compact Flash type II (CF) and Secure Digital (SDIO) slots, HP ProtectTools secured by Credant Technologies security application, 3.5" transfective TFT QVGA colour LED backlight touchscreen display, landscape and portrait display modes, Microsoft® Windows Mobile™ 5.0 Software for Pocket PC, Premium Edition, Removable/rechargeable 920 mAh battery, Integrated Serial IR, Protective plastic flip cover, Pocket versions of familiar applications like Microsoft Outlook®, Word, Excel®, and PowerPoint®</p>
Software	Supplied, with unlimited user license. Free upgrades by web download.
Warranty	2 years on instrument, manufacturers warranty on palmtop PC device

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