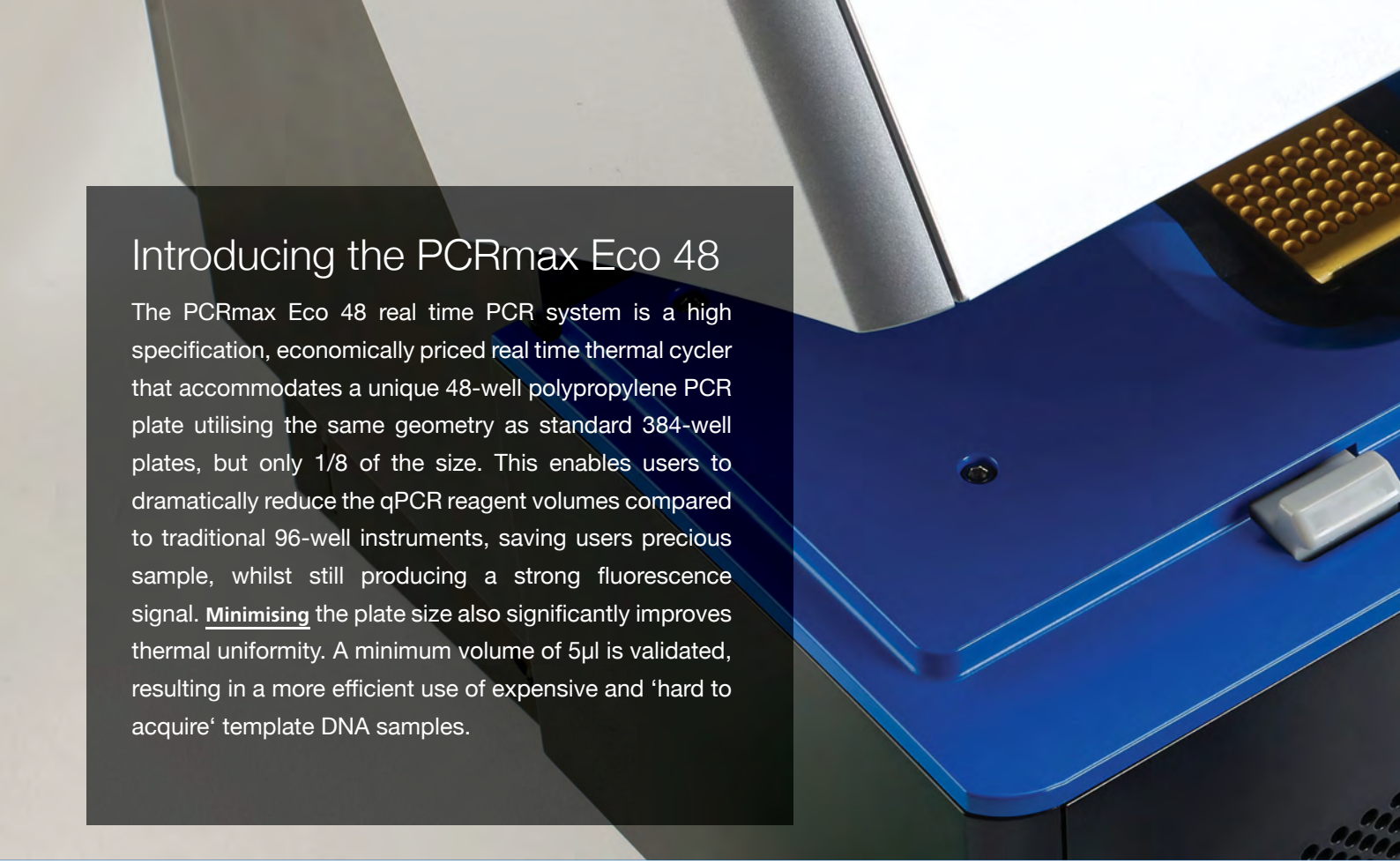
PCRmax®

Eco 48

Real Time PCR System

Cole-Parmer®
scientific experts



Introducing the PCRmax Eco 48

The PCRmax Eco 48 real time PCR system is a high specification, economically priced real time thermal cycler that accommodates a unique 48-well polypropylene PCR plate utilising the same geometry as standard 384-well plates, but only 1/8 of the size. This enables users to dramatically reduce the qPCR reagent volumes compared to traditional 96-well instruments, saving users precious sample, whilst still producing a strong fluorescence signal. **Minimising** the plate size also significantly improves thermal uniformity. A minimum volume of 5µl is validated, resulting in a more efficient use of expensive and 'hard to acquire' template DNA samples.

Speed. Confidence. Value. Sensitivity. Performance.

Key features

- MIQE compliant.
- HRM functionality is provided as standard and can discriminate class IV SNP 99.9% of the time.
- The Eco 48 can utilise four colours for easy multiplexing.
- Industry leading ±0.1°C temperature uniformity (recorded at 95°C no settle time).
- Suitable for both single labs and core facilities.
- High uniformity provides high quality data.
- Fast cycling enables several experiments per day, all at an economical price.
- Fastest block-based real-time PCR system with the ability to run 40 cycles in 20 minutes (or less when optimised).
- The PCRmax Eco 48 is an open platform that can utilise any chemistry, dye or PCR reagent.
- Calibrated for SYBR®, FAM™, HEX™, VIC™, ROX™ and Cy®5 fluorescent dyes.
- Easy to use software, streamlined for novices and experts.
- No need to run triplicates, to compensate for poor thermal uniformity of block.
- The Eco 48 format provides a small 34.5cm x 31cm (13.6" × 12.2") footprint that fits anywhere.

The Eco 48 Real-time system offers the qPCR capabilities of larger instruments in a compact, accurate footprint. Innovative features include a precise thermal system for unrivalled temperature control, an advanced optical system for highly sensitive fluorescence detection, a 48-well plate for flexible sample throughput, and intuitive, icon-driven software for error-free instrument operation.

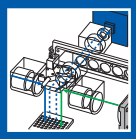
The Eco 48 Workflow

The Eco 48 workflow is based on three simple steps:

- Load samples into the 48-well plate using the backlit EcoDock and place the plate into the Eco 48.
- Run experiment.
- The Eco 48 software provides instrument control, data collection, and data analysis. The most common qPCR parameters are automatically in place. These can be easily changed to meet specific experimental requirements.

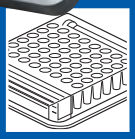
PC not supplied

Intuitive icons lead researchers through setup, run and analysis quickly and easily

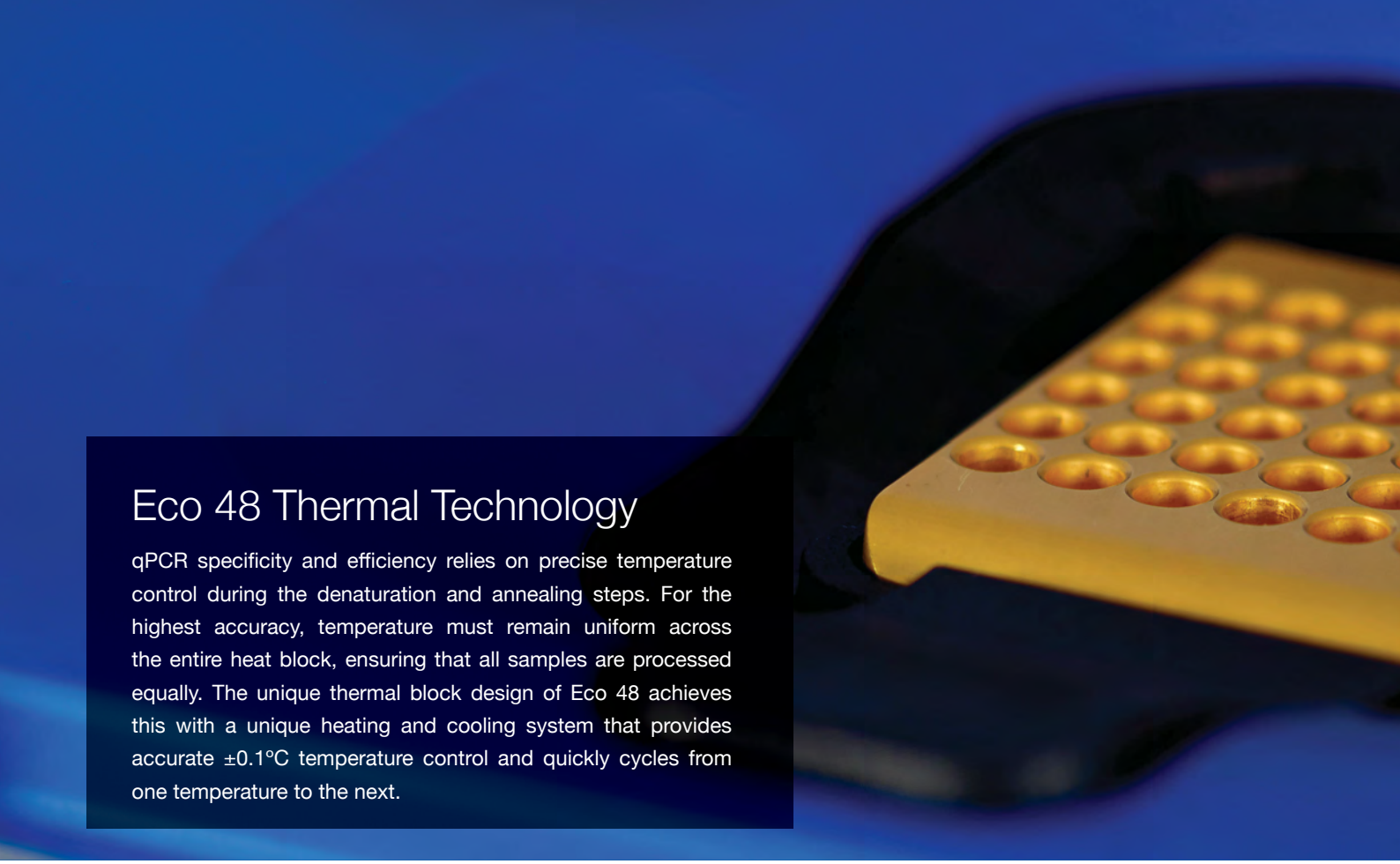


Sensitive optical system delivers precise detection for a range of fluorophores

Convenient 48-well format meets the throughput needs of most researchers



Unique thermal system provides unmatched temperature control for the most accurate results



Eco 48 Thermal Technology

qPCR specificity and efficiency relies on precise temperature control during the denaturation and annealing steps. For the highest accuracy, temperature must remain uniform across the entire heat block, ensuring that all samples are processed equally. The unique thermal block design of Eco 48 achieves this with a unique heating and cooling system that provides accurate ±0.1°C temperature control and quickly cycles from one temperature to the next.

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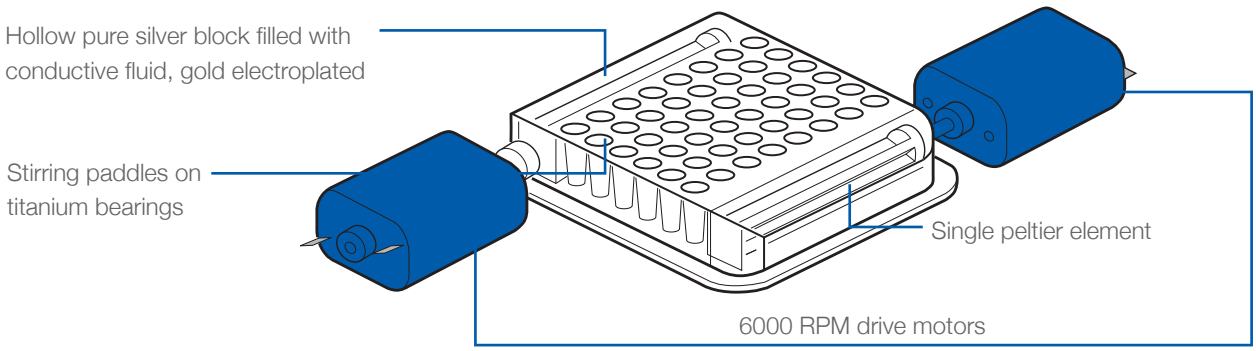


Eco 48 Thermal System

To achieve true temperature control the Eco 48 thermal system consists of a precisely electroformed 48-well hollow silver block containing conductive fluid. The block is heated and cooled by a single Peltier device, with an agitator assembly consisting of two paddles driven by electromagnetic motors. During PCR cycling, the paddles move rapidly, circulating the fluid across the 48-wells, allowing the block to achieve high ramp rates, thus reducing the overall experiment time.

Design developed at the Caltech Laboratories of Nobel Laureate David Baltimore

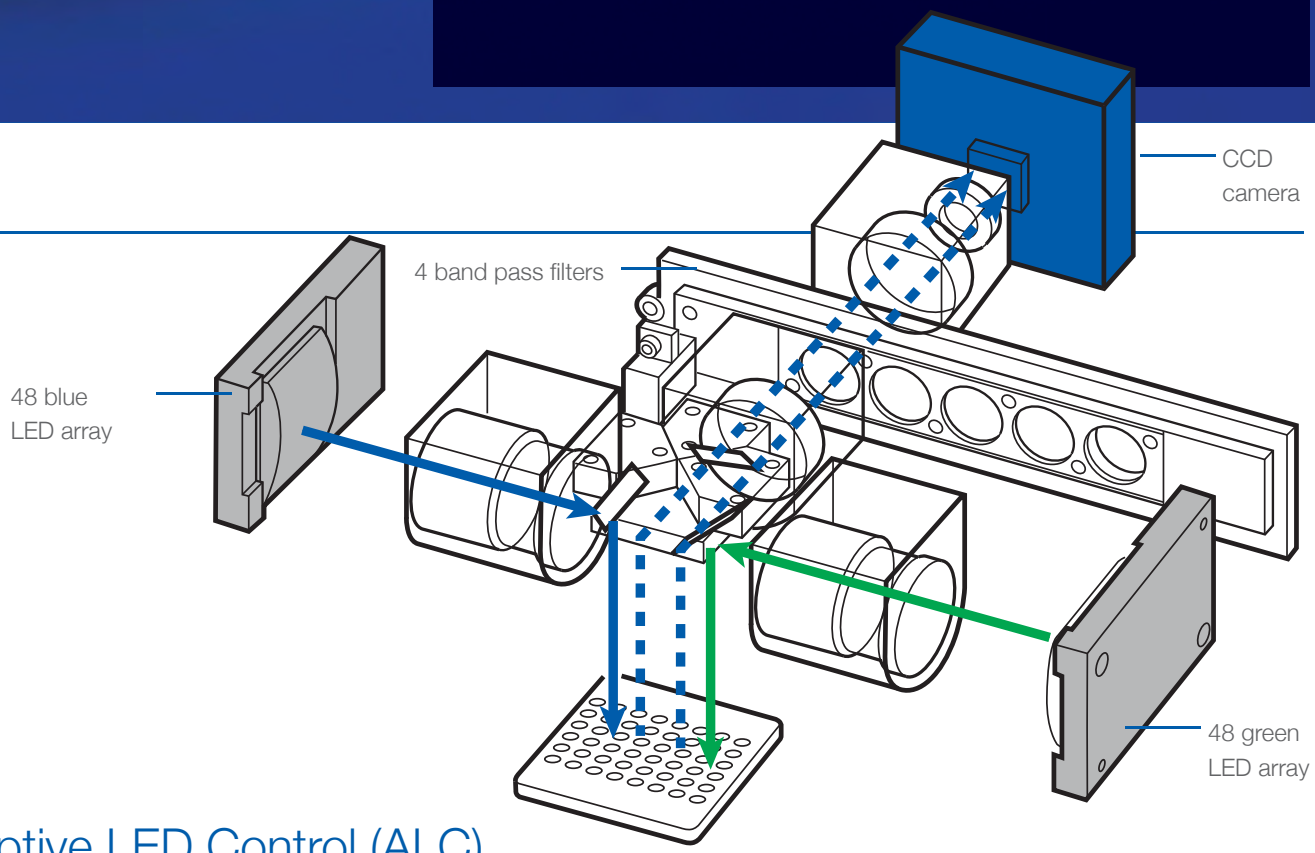
This unique design delivers industry leading thermal stability of ±0.1°C virtually eliminating thermal non-uniformity and preventing edge effect. The result is higher qPCR performance, tighter Cq, greater PCR efficiency, higher R^2 and the ability to perform demanding HRM applications.

Fast, uniform temperature control is important because accurate dwell temperatures ensure primers bind most efficiently and polymerase enzymes work optimally, generating the maximum yield of target DNA. The hermetically sealed hollow block contains a conductive fluid and two opposing agitators driven by electromagnetic motors. During PCR cycling, these agitators rapidly circulate fluid throughout the hollow block, transferring heat from the peltier quickly and evenly.

Optical Technology

The Eco 48 Real Time PCR system contains an advanced high-performance optical system that delivers precise and sensitive fluorescence detection, facilitating all 4-colour multiplex applications.

The system is provided factory-calibrated for use with SYBR®, FAM™, HEX™, VIC™, ROX™, Cy®5 and can also be used with any qPCR fluorophores overlapping with these calibrated dyes. For excitation, two panels of 48 fixed LEDs provide excitation energy of distinct spectra, enabling broad range excitation. Each of the 48 LEDs illuminates a specific well location, eliminating the optical distortion created by most stationary optical systems. HRM analysis protocols are supported by continuous data acquisition during the melt for increased data collection and reduced run times, HRM of a full plate is less than 10 minutes. The user can change the plate setup and perform data analysis after the run is complete.



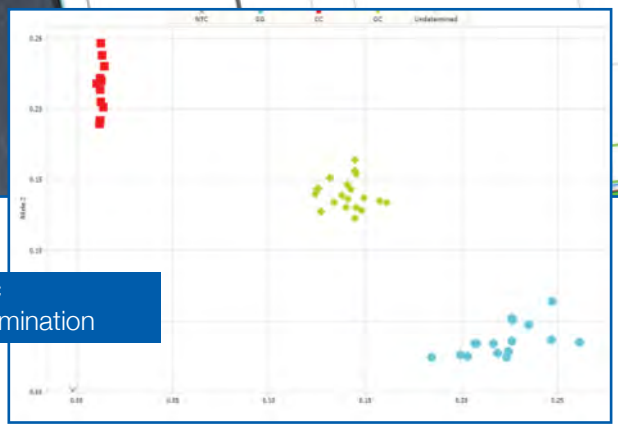
Adaptive LED Control (ALC)

ALC normalises variation in fluorescence across all wells at each cycle of a run and provides specific tuning for each LED following each PCR cycle.

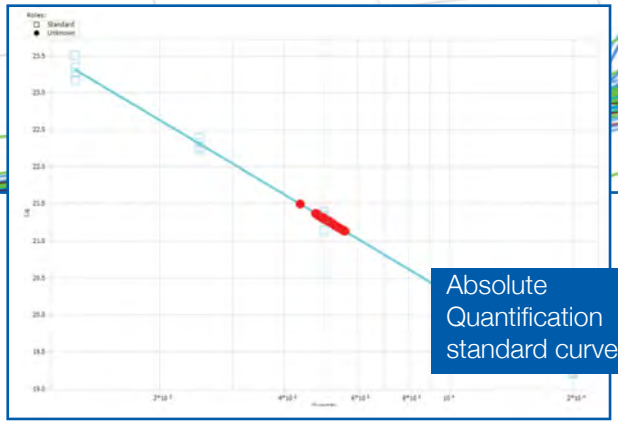
- Speeds up data collection because only 1 image is required to cover the full sample dynamic range.
- Expands the linear range of detection by reducing LED exposure to high emission wells and preventing premature detector saturation.
- LED adjustment following each amplification allows Eco 48 to reduce exposure time as signal intensity increases, maximising the linear range of emission detection.
- Minimise optical artefacts by keeping each well brightness similar to the CCD. This reduces the influence of a highly fluorescing sample on adjacent wells and avoids ‘blooming’; no artificats from adjacent wells.
- Maximise sensitivity by permitting an appropriate exposure level for each well, by dye, rather than compromise with a universal setting.

Applications

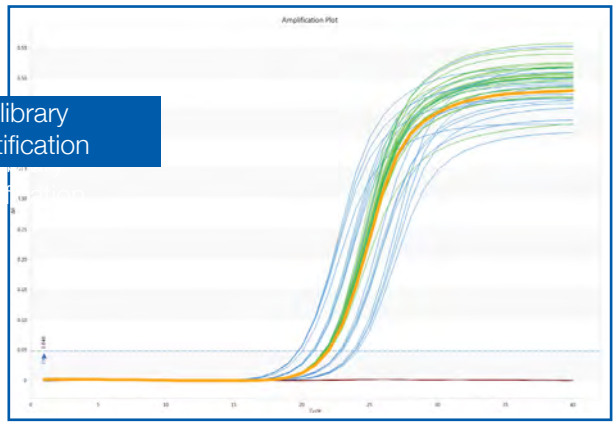
The PCRmax Eco 48 is a high performance instrument for demanding applications.



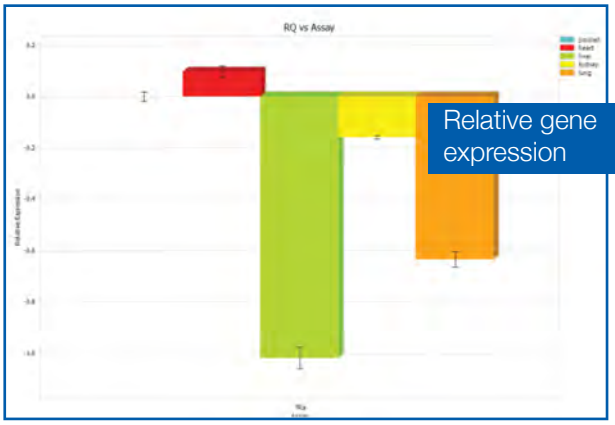
Allelic discrimination



Absolute Quantification standard curve



NGS library quantification



Relative gene expression

Absolute & Relative Quantitation

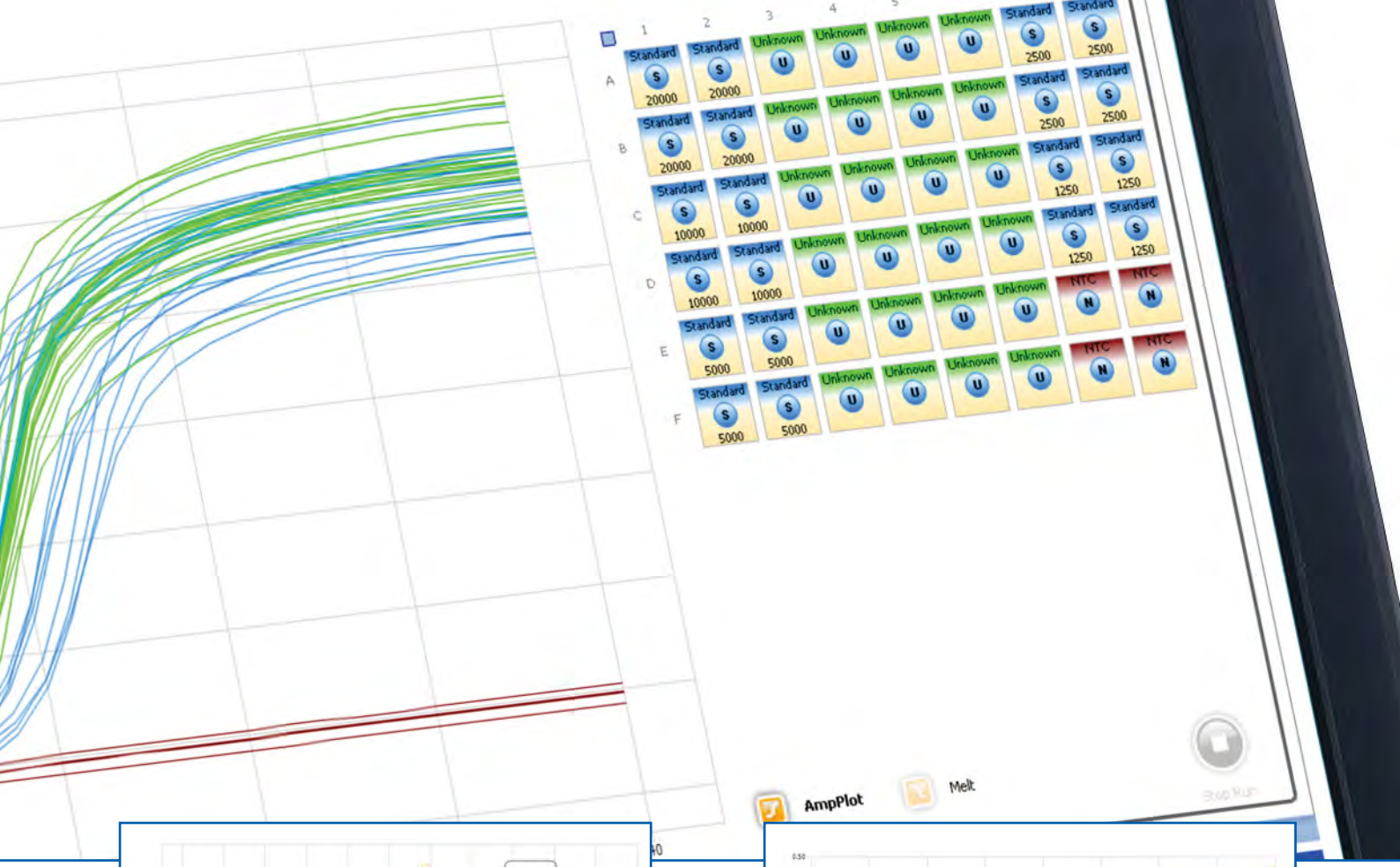
- Absolute quantification standard curves with efficiency calculation.
- Relative quantification using the ΔΔCq method with support for multiple reference gene normalisation.
- Relative gene expression with efficiency control.
- Next Generation Sequencing (NGS) library quantification.
- Copy Number Variation: insertions, deletions, inversions.
- RNA characterisation: siRNA and miRNA.
- Viral load.

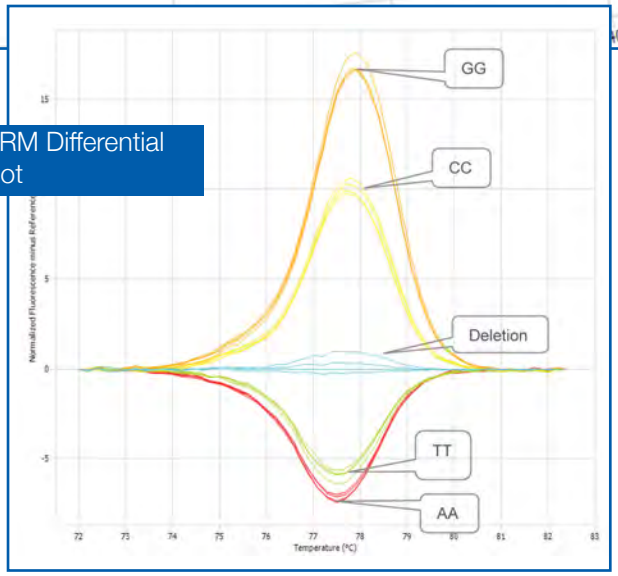
Genotyping and High resolution melting

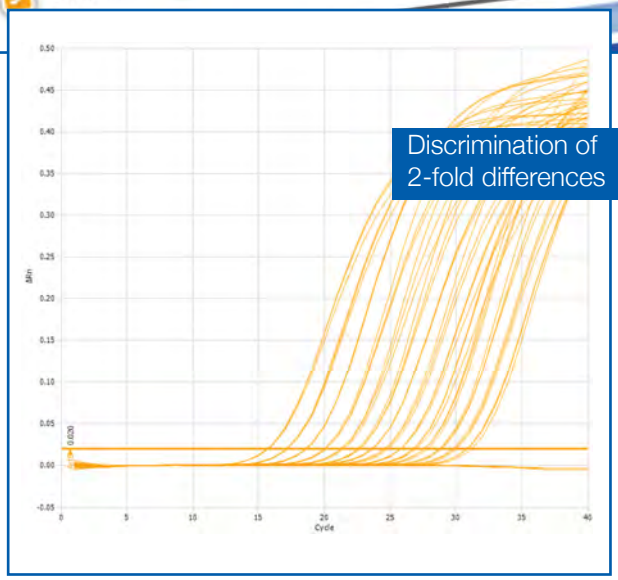
- Allelic discrimination.
- DNA methylation.
- SNP verification.
- Microbiology: pathogen detection and identification.

High resolution melting (HRM)

- Genotyping, methylation studies and mutation screening.







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Library quantification

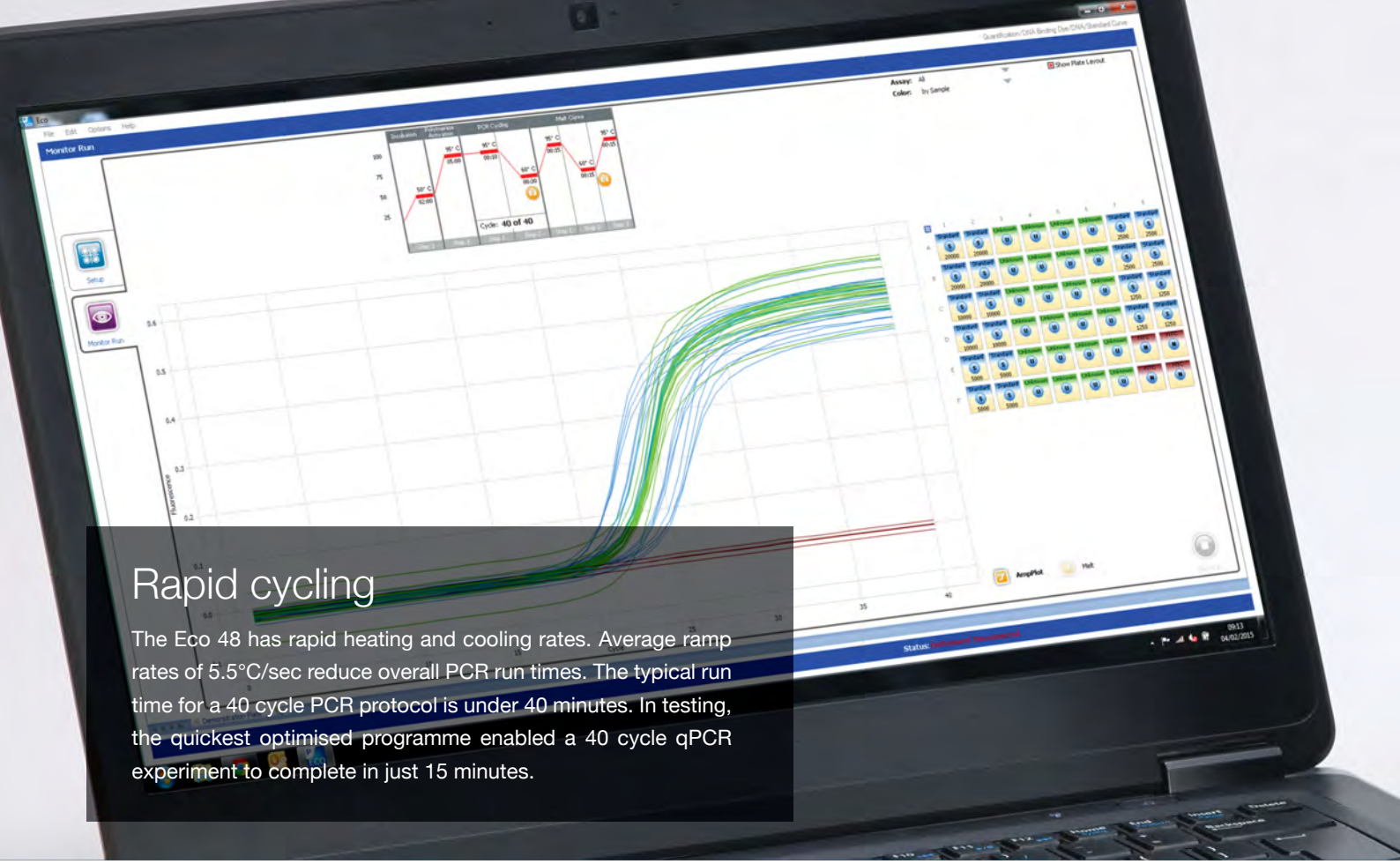
- qPCR is the most precise method for quantifying libraries prior to cluster generation.
- Works at concentrations below the detection threshold of conventional spectrophotometric methods.

Data

- Validation of array and sequencing quality data.

Designed for:

- Academic, Government and Corporate laboratories.
- Human research, AgriGenomics, Translational, Forensics and many more sectors.
- Probe, DNA Binding Dye and HRM chemistries.
- Gene expression, Viral detection, Sequencing Library Preparation, Genotyping and Mutation Screening applications.
- Eco 48 is for research use only.



Rapid cycling

The Eco 48 has rapid heating and cooling rates. Average ramp rates of 5.5°C/sec reduce overall PCR run times. The typical run time for a 40 cycle PCR protocol is under 40 minutes. In testing, the quickest optimised programme enabled a 40 cycle qPCR experiment to complete in just 15 minutes.

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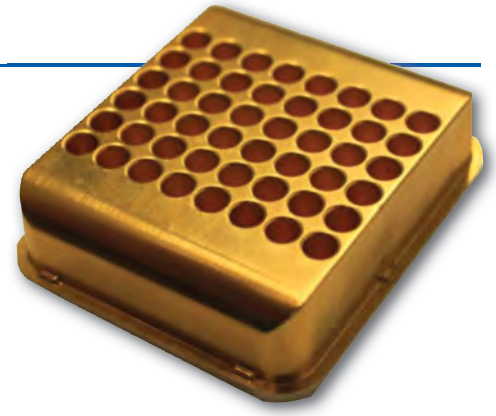
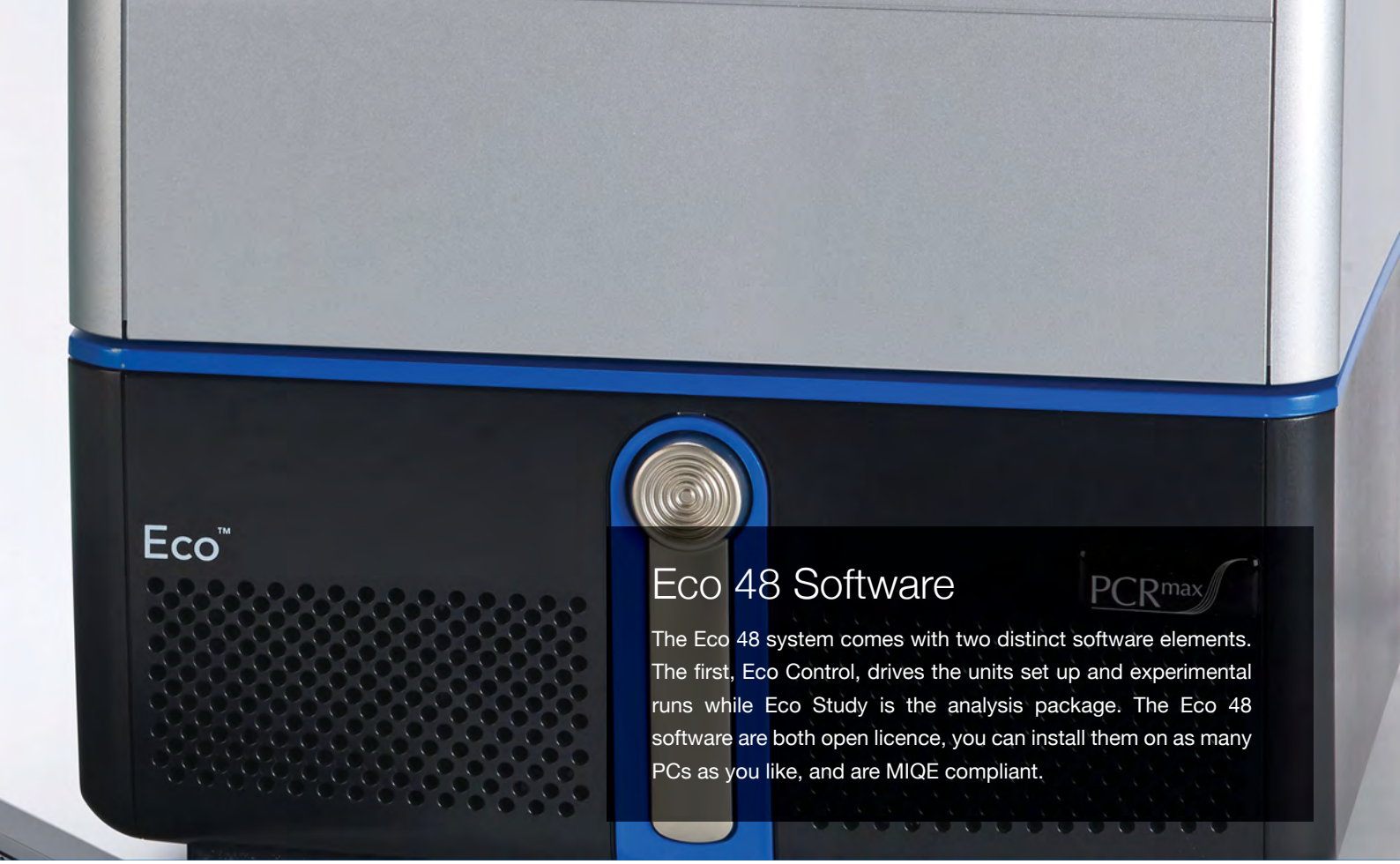
High throughput



Eco 48 thermal control is superior to traditional 96-well peltier systems where thermal efficiency decreases as distance from the peltier increases. With Eco 48, faster and more precise cycling increases sample throughput because the need for multiple replicates is reduced by increased uniformity across the block. Eco 48 well-to-well, plate-to-plate and instrument-to-instrument results are as consistent as running a single experiment. To take advantage of this, Eco 48 has a function in the software where different experiments are reliably combined. High uniformity reduces the need for experimental replicates which saves on samples, eliminates the need for more expensive instruments, reduces reagent running costs and ensures the entire plate of data is valuable.

Eco 48 wells HIGH uniformity - Run duplicates	24 samples Run time 40 minutes	36 samples per hour
±0.1°C uniformity means Eco 48 requires fewer replicates than a conventional 96 well system	The Eco 48 is capable of running 40 cycles in 40 minutes.	Fewer replicates and faster cycling allows Eco 48 to process more samples than a standard 96 well system.
Conventional 96 wells **LOW uniformity - Run triplicates**	**32 samples** **Run time 1 hour 20 minutes**	**24 samples** **per hour**

Results from multiple instruments can be combined together



Eco 48 Software

PCRmax

The Eco 48 system comes with two distinct software elements. The first, Eco Control, drives the units set up and experimental runs while Eco Study is the analysis package. The Eco 48 software are both open licence, you can install them on as many PCs as you like, and are MIQE compliant.

Software

EcoControl software.

- User-installable, intuitive, easy to use software that integrates user control, real-time data collection, and advanced data analysis.
- Supplied fully featured including HRM capability.
- New software version 5 enables a widened chemistry library and contains new thermal profiles.
- Facilitates rapid thermal cycling: 40 cycles in 40 minutes.
- Supplied on a USB stick.

EcoStudy software.

- Data analysis and Multi-Experiment Analysis.
- Allows higher throughput.
- Limitless sample volume.
- Supplied on a USB stick.

Easy-to-Use Interface

- Eco 48 software uses a unique icon-driven user interface to simplify experimental design and setup.
- Pre-set thermal profile defaults are provided for the most commonly used experimental protocols.
- Temperature and time for each protocol step can easily be changed by click-and-drag action with the mouse.
- Experiment templates can be customised and saved for future use.

Data Analysis

- With the Eco 48 system and software, data collection is monitored in real time, allowing researchers to access run viability immediately.
- The user-friendly data analysis interface also allows researchers to easily view the amplification plot, melt curve analysis, and the analysed results, including Cq values, PCR efficiency, R^2 and Y-intercept.
- Data can be exported into Excel or CSV and custom reports generated directly into PowerPoint or PDF formats.
- High-resolution images can be directly exported in multiple image formats, ready to use in any presentation.
- Conforms to Minimum Information for Publication of Quantitative Real-Time PCR Experiments (MIQE) guidelines, making data analysis and submission for publication review more efficient.

High-Performance Results

- Due to unmatched temperature control and an optical system designed for individual well monitoring, the Eco 48 system produces highly accurate, reliable results with PCR efficiencies between 90% and 110% and $R^2 > 0.99$ when using standard optimised assays.

EcoDock

The ergonomic plate loading dock allows for easy loading of the plate and is backlit to allow the user to easily visualise which wells have been loaded.

- Base with LED backlight.
- Plate adapter fits standard centrifuge rotors.
- Includes plate sealing tool.

What's in the box

Eco 48 Instrument
Dock and Squeegee
EcoControl and EcoStudy software USB stick
Plates (Pack of 50)
Plate seals (Pack of 50)
Power and Ethernet Cables

Ordering information

ECORT48	PCRmax Eco 48 Real Time PCR System, includes Accessories and Software (EcoStudy and EcoControl) PC not supplied
ECOPLATE48	Pack of 50 Eco 48 Real Time PCR Plates
ECOSEAL48	Pack of 50 Eco 48 Real Time PCR Plate seals

Also available

The Alpha Cycler range of end point PCR systems.

Key Features:

- USB login/out and protocol protection.
- Independent block control on multiblock systems.
- Free Alpha Track App to remotely monitor run progress and system health.
- Gradient 96 or 384 well blocks in any configuration available.

Find out more information from www.ColeParmer.co.uk

Delta Seek qPCR detection kits

The Delta Seek kits from PCRmax cover the largest commercially available range of targets for any qPCR detection chemistry. If a particular target is not currently available PCRmax can look to design custom kits.

The range of kits cover:

- Human Pathogens.
- Veterinary & Agricultural.
- Food and Water Testing.
- Speciation Kits.
- Custom.

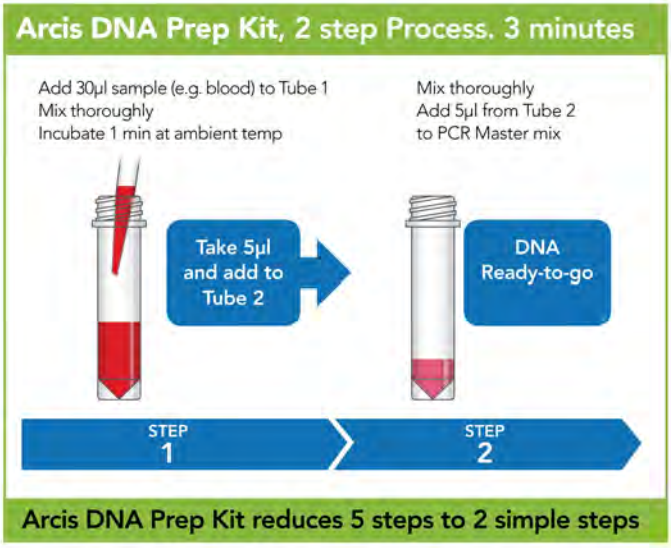
All Delta Seek kits are lyophilised and stable at room temperature for 18 months making shipment and storage simple.

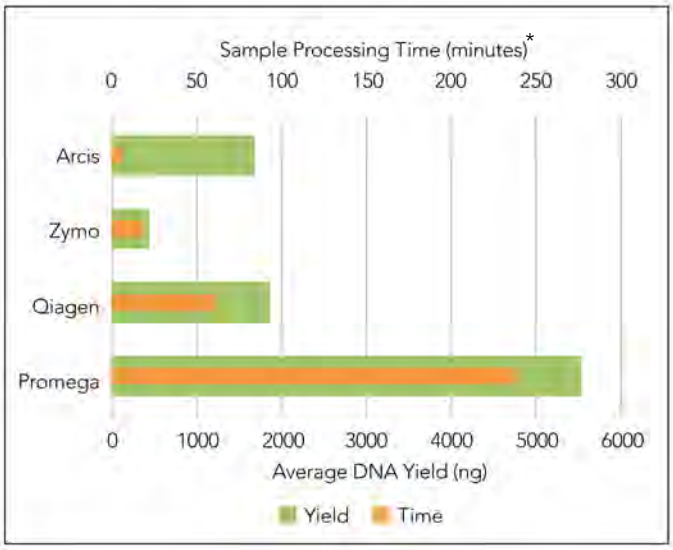
Complimentary Products: Arcis Prep Kit

ARCIS BIOTECHNOLOGY

Arcis DNA Prep Kit Protocol: Existing sample prep systems are often time-consuming and require laborious heating and centrifugation steps. The Arcis DNA Prep Kit requires only 2 steps and takes less than 3 minutes.

DNA Yield vs Sample Processing Time: These competitors to Arcis DNA Prep Kit all require additional instrumentation and the processing times range from 20 minutes to 4 hours.





*A comparison of PCRdirect® Ultra-Fast Sample Prep with 3 commercial DNA extraction kits. Fothergill J and Hilliam Y, University of Liverpool (2015)

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Eco 48 Technical Specification

High resolution melt	Yes
Volume per well	Validated for 5 to 20µl
Detection sensitivity	1 copy
Temp uniformity	±0.1˚C
Temperature range	35 to 100˚C
Average ramp rate	5.5˚C/sec
Thermal system	Proprietary hollow silver block, Peltier-based system with conductive fluid
Block format	48-well block
Consumables	48-well custom plates and optical adhesive seals
Optical system	Dual LED excitation (452–486 nm and 542–582 nm). CCD camera 4 emission filters (505–545nm, 562–596nm, 604–644nm, 665–705nm)
Calibrated dyes	SYBR®, FAM™, HEX™, ROX™, Cy®5. Additional dyes within the wavelength range compatible with Eco 48 filters are supported with no additional calibration required for implementation
Passive reference dyes	Use of ROX™ is supported, but optional
Data collection	Data collected in all four filters for all wells regardless of plate setup. Plate setup for data analysis can be altered after run completes. Melt curve analysis supports continuous data acquisition in a single filter to provide increased data point collection and reduced run times
PCR cycle time (standard)	40 cycles in less than 40 minutes
PCR cycle time (FAST)	40 cycles in less than 20 minutes
Dynamic range	>9 logs
Calibration	Not required
Installation	Plug and play design. Installed by experienced or novice scientists
Precision	Discriminates 5,000 and 10,000 template copies with 99% confidence
Warranty	1 year (parts and labour included)
Voltage	100–240 V
Frequency	50/60 Hz
Nominal current draw	5A
Peak power	500W (typical power is 180W)
Software	Multiple-license Eco 48 system software is included at no additional cost. All chemistries supported. Applications include Absolute Quantification, Relative Quantification, Allelic Discrimination, High Resolution Melt (HRM)
Dimensions closed (WxDxH)	34.5cm x 31cm x 32cm (13.6 in × 12.2 in × 12.6 inches)
Dimensions open (WxDxH)	34.5cm x 31cm x 37cm (13.6 in × 12.2 in × 14.5 inches)
Weight	13.6 Kg (30 lb)

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experts in life science products

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