CFX Opus
Real-Time PCR Systems

BIO-RAD

CFX OPUS REAL-TIME PCR SYSTEMS

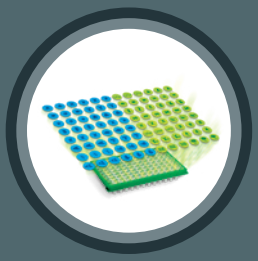
CONSISTENCY MODERNIZED

The CFX Opus Real-Time PCR Systems are the next evolution in quantitative PCR (qPCR) from Bio-Rad Laboratories. With improved thermal performance and our proprietary, accurate optical shuttle system, your data will be more consistent. A sleek, modern design includes a refreshed and easy-to-use interface with more flexible connectivity options for data management and instrument control.

HAVE CONFIDENCE IN YOUR ENTIRE GENOMICS WORKFLOW

Unlike many suppliers, Bio-Rad offers everything you need for real-time PCR experiments, from sample preparation to data analysis. Simplify and optimize your workflow with our robust suite of reagents, instruments, and software, so that you can get publication-quality data every time.

Cell Lysis and RNA Isolation
- Aurum Total RNA Mini Kit
- Aurum Total RNA 96 Kit
- Aurum Total RNA Fatty and Fibrous Tissue Kit
- PureZOL RNA Isolation Reagent
- SingleShot Cell Lysis Kits



Target Selection
- PrimePCR Assays
- PrimePCR Pathway Panels
- PrimePCR Custom Plates

Reaction Setup
- SsoAdvanced Universal Supermixes
- iTaq Universal Supermixes
- Reliance One-Step Multiplex Supermix
- iTaq One-Step Universal Kits
- SingleShot Cell Lysis RT-qPCR Kits
- iScript Reverse Transcription Supermix for RT-qPCR
- iScript gDNA Clear cDNA Synthesis Kit
- PCR Plastics

Detection
- CFX Family of Real-Time PCR Systems

Analysis
- CFX Maestro Desktop Software
- BR.io Web-Based Cloud Platform

MODERN CONNECTIVITY

More Connectivity Options than Ever

Bio-Rad recognizes that you need instruments that are as connected as you are. In addition to Ethernet connectivity, CFX Opus Systems are able to connect directly to a wireless network (WiFi) for completely wireless operation and data retrieval. Need flexibility? CFX Opus Systems are capable of stand-alone operation and direct data transfer to a USB memory device or can be connected to a PC.

With internet connectivity, CFX Opus Systems can be programmed to send your data and any notifications directly to your email, eliminating the need to check on the machine during the run. New network drive access also allows you to save your data directly to your local network* for easy access by collaborators or from other network-connected locations.

CFX Opus Systems can also be linked to Bio-Rad's BR.io cloud platform, providing a modern, connected workflow for the instrument.

Flexibility: Setup and Analysis Where and When You Want

Work Anywhere with the BR.io Cloud Platform

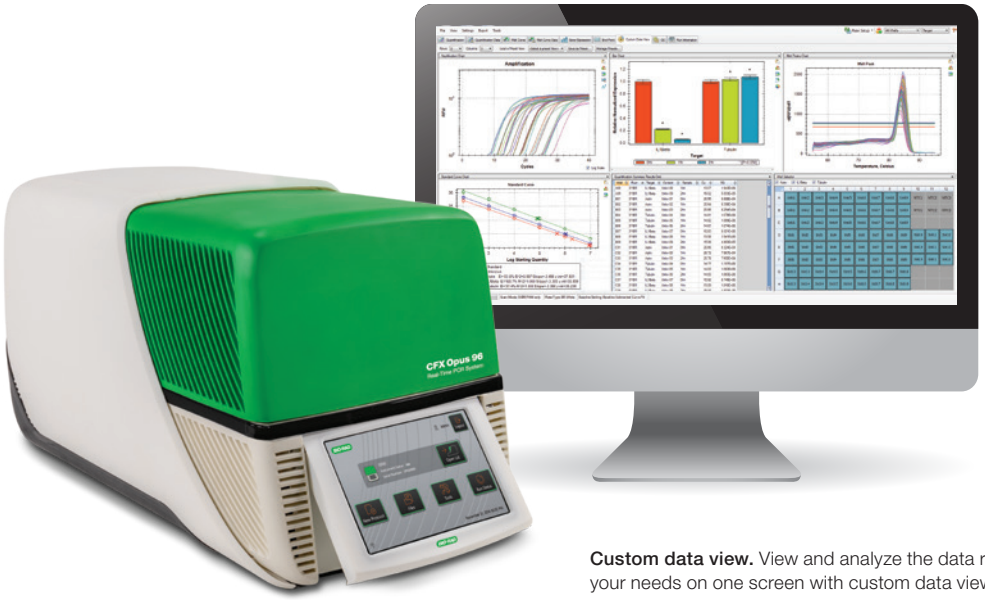
BR.io, Bio-Rad's new cloud data management and analysis platform, seamlessly integrates with CFX Opus Systems to provide remote setup, instrument monitoring, and data management capabilities without the need for an instrument-connected PC. The BR.io cloud platform can be accessed from any computer using a Safari or Chrome web browser, with no software installation required. Get the most out of your instrument by setting up experiments and retrieving data remotely, minimizing time needed at the instrument. Your data are stored securely in the cloud, where they can be viewed and analyzed anywhere you have internet access.

CFX Maestro Software for Powerful Data Analysis

For more advanced data analysis, turn to CFX Maestro Software for CFX Real-Time PCR Systems. CFX Maestro Software is designed to work seamlessly with CFX Opus Systems for creation of publication-quality figures and automatic statistical analysis.

* Network File Systems v4 and earlier.

POWERFUL SOFTWARE



Custom data view. View and analyze the data relevant to your needs on one screen with custom data view.

With CFX Maestro Software You Can:

- **Perform automatic statistical analysis in seconds** — run *t*-tests or analyze your data using one-way analysis of variance (ANOVA) with just a few mouse clicks
- **Extract more meaningful information from each run** — analyze data using bar charts, box and whisker plots, dot plots, clustergrams, scatter plots, or volcano plots
- **Create and export publication-ready graphics** — annotate graphs with *P* values, text, and arrows to call out specific data. Change colors, fonts, and legends. Export graphs at any size and resolution for presentations, posters, or publication
- **Integrate PrimePCR Assays easily** — save time with predesigned and validated PrimePCR Primers and Plates. Drag and drop your PrimePCR worksheet into CFX Maestro Software to instantly create your plate setup. Post-run, check run quality with the PrimePCR controls analysis tool
- **Work anywhere, on a PC or Mac** — with both PC and Mac versions of CFX Maestro, you can analyze your data on your own computer, anytime, without the need for an internet connection (Mac version is for data analysis only and does not provide instrument control)
- **Perform further data analysis using qbase+ Software** — CFX Maestro Software comes with a premium license for qbase+ Software to further enhance your data analysis capabilities

Precision Melt Analysis Software

Precision Melt Analysis Software imports and analyzes data files generated by the CFX family of Real-Time PCR Systems to genotype DNA samples based on their thermal denaturation. The software can be used for a variety of applications, including gene variant discovery, single nucleotide polymorphism (SNP) screening, identification of insertions, deletions, or other unknown mutations, and analysis of methylated DNA percentage in unknown samples.

The Security You Need

The Security Edition of CFX Maestro Software integrates the power of CFX Opus Real-Time PCR Systems with tools that allow U.S. FDA 21 CFR Part 11 compliance.

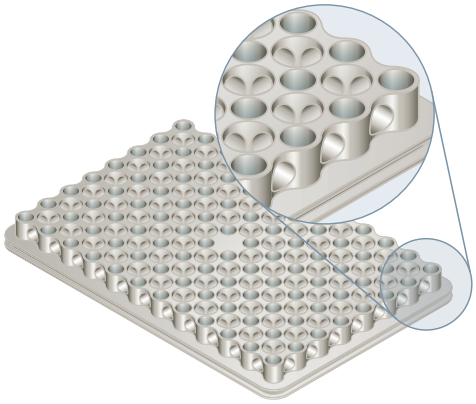
Have confidence in the security of your data, thanks to:

- **Mandatory password-protected login** — valid Windows User Profile (local or directory) and password are required
- **Hardware protection key (HASP HL key)** — key must be attached to a USB port on the computer to use the software
- **File encryption** — files cannot be opened or edited using other programs
- **Automatic file checking** — integrity and validity are checked each time a file is opened
- **Electronic signatures** — more than one electronic signature can be applied to any file that can be opened with the software
- **Time- and date-stamped audit trails** — read-only information in the audit trail can be viewed only while the data file is open

UNIFORM THERMAL CYCLING

Superior Uniformity

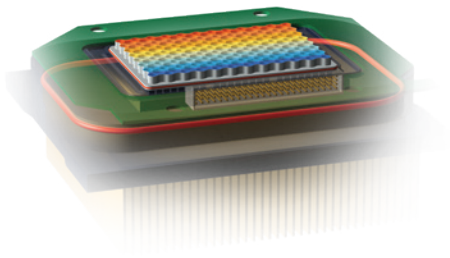
We took a great block and made it even better. The CFX Opus Systems use an improved version of the CFX Touch Systems' block to offer exceptional performance and uniformity while keeping compatibility with our consumables. With the best thermal uniformity and accuracy Bio-Rad has ever produced, you'll never worry about using the block from edge to edge again, even with highly sensitive assays.

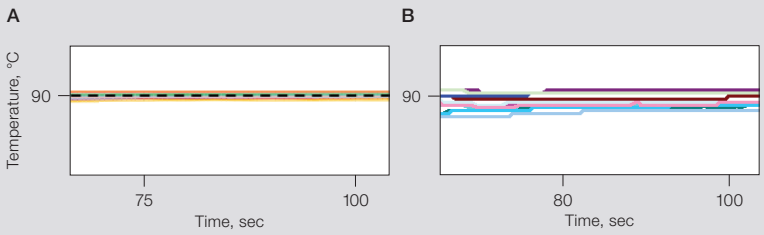


Bio-Rad's patented reduced-mass sample block heats and cools more quickly than standard blocks, improving thermal uniformity and minimizing edge effects.

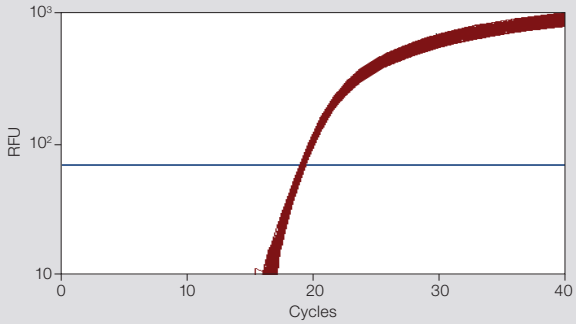
Efficient Optimization

Determining the optimal temperature for primer annealing is crucial for efficient and specific target amplification. The thermal gradient feature of the CFX Opus Systems allows you to optimize your assay in a single experiment, minimizing the use of precious samples and reagents and saving valuable research time. At any step in a protocol, users can program a temperature gradient of up to 24°C across the reaction block, with exceptional temperature uniformity and reproducibility within each gradient zone.

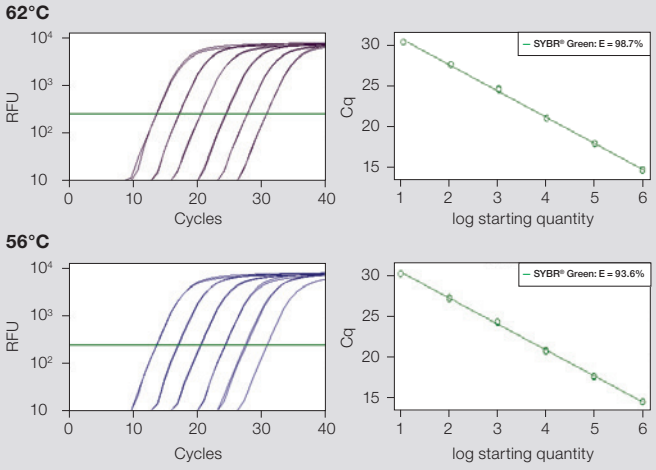




Superior thermal uniformity for reproducible results. The temperature measured by probes in 15 wells across a sample block. **A**, temperatures across the sample block vary by ±0.3°C for the CFX Opus Systems, an improvement of 0.1°C over **B**, the temperature variability across the CFX Touch Systems' sample block.



Excellent uniformity. *IL-1β* plasmid template diluted to 10^5 copies/reaction amplified in the presence of a FAM dye–labeled detection probe with iQ Supermix. Graph shows 96 replicates of 10 µl reactions. Average quantification cycle (Cq) = 19.81 ± 0.10. RFU, relative fluorescence units.



Thermal gradient experiment for optimizing annealing temperature. A tenfold dilution series (10^6 to 10 copies) of plasmid containing *GAPDH* template was amplified in the presence of SYBR® Green using a protocol with an annealing thermal gradient ranging from 55 to 68°C. Results are presented for two temperatures, showing 62°C as optimal in this case. Cq, quantification cycle; RFU, relative fluorescence units.

ROBUST OPTICAL DESIGN

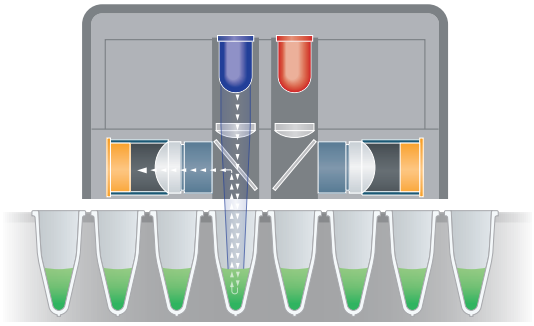
The solid-state optical technology of the CFX Opus Systems provide sensitive detection for precise quantification and target discrimination. Scanning just above the sample plate, the optics shuttle individually illuminates and detects fluorescence from each well with high sensitivity and consistency. In either acquisition mode, the optical system automatically collects data from all wells, so you can enter or edit well information on your own schedule without fear of losing data to annotation mistakes.

Five-Target Multiplexing*

The CFX Opus 96 System can discriminate between up to five targets in a single reaction well. The optical filter sets are designed to maximize fluorescence detection for specific dyes in specific channels. At every position and with every scan, the optics shuttle is reproducibly centered above each well so the light path is always fixed and optimal. There is no need to sacrifice data collection in one of the channels to normalize to a passive reference. The CFX Opus 384 System offers all of these benefits with up to four targets per well.

Multiple Data Acquisition Modes

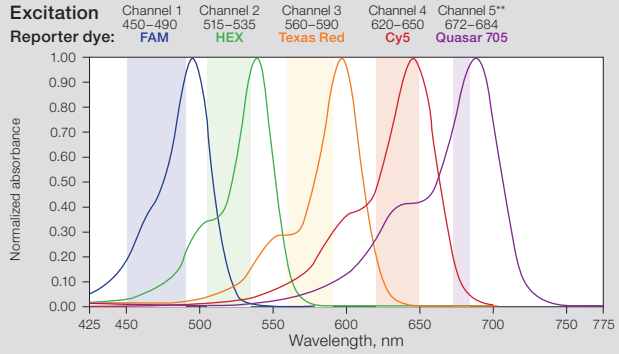
The CFX Opus Systems can acquire data using several modes. Choose to acquire data for SYBR® Green I, EvaGreen®, and single-color FAM protocols using the fast scan mode or choose to acquire data from all channels when performing multiplex protocols. The CFX Opus Systems include one channel with an LED-filter photodiode combination designated for single-color fluorescence resonance energy transfer (FRET) experiments, further expanding your experimental options. FRET mode can expand your experimental options to applications such as protein thermal shift (melt) analysis.

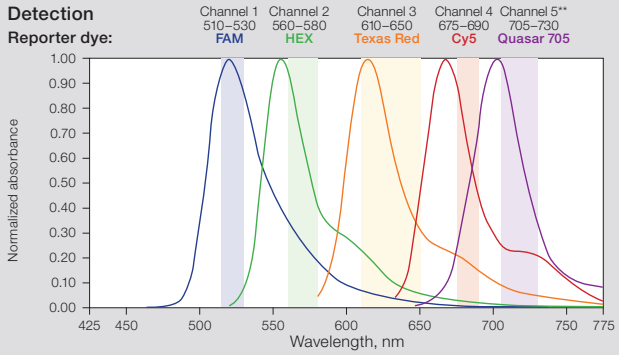


As the CFX Opus Systems' optics shuttle travels across the plate, light is focused into the center of each sample well. Side view of the optics shuttle shows the 450–490 nm LED firing and SYBR® Green emitting at 520 nm into the detector.

* Five-target multiplexing is available only for the CFX Opus 96 System. The CFX Opus 384 System has a maximum of four-target multiplex capability.

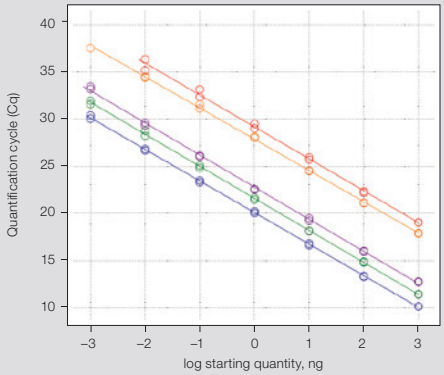
Discrete Channels for Multiplex Data Acquisition





** Channel available only on the CFX Opus 96 System.

Exceptional Performance of Five-Target Multiplex*



Reporter Dye	Assays	Efficiency, %	R^2	Slope
FAM	*ACTB*	99.0	1.000	–3.346
HEX	*NGFRP*	100.5	0.999	–3.311
Texas Red	*TBP*	97.6	0.997	–3.382
Cy5	*EF1a*	96.6	0.999	–3.406
Cy5.5	*GAPDH*	96.9	1.000	–3.397

The linear dynamic range in 5-plex one-step reverse transcription qPCR (RT-qPCR) reactions. Five targets across seven orders of magnitude (1 pg to 1 µg input RNA) were amplified using Reliance One-Step Multiplex Supermix on a CFX Opus 96 Real-Time PCR System. The results demonstrated exceptional performance with superior efficiency and linearity over a wide dynamic range.

Bio-Rad Laboratories, Inc.

Life Science Group

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