Bio-Plex™

System and Technology

A World of Information
From a Single Drop

BIO-RAD

Introduction to the Bio-Plex System

The Bio-Plex suspension array system is a flexible, easy-to-use bioassay system for the simultaneous detection and quantitation of up to 100 different analytes in a single microplate well. Multiplexing with the Bio-Plex system yields data that are linked within a system so that complex relationships and pathways of biomolecules can be revealed.

Multiplex With a Single Drop

- Use as little as 12 µl of serum or other biological sample per multiplex assay
- Dramatically increase the amount of useful data per sample
- Increase sample throughput
- Directly correlate data from multiple analytes to reveal complex relationships and pathways of biomolecules
- Perform immunoassays, enzyme assays, receptor-ligand assays, DNA hybridization assays, and more

Unsurpassed Multianalyte Detection

System Integration for Optimal Results

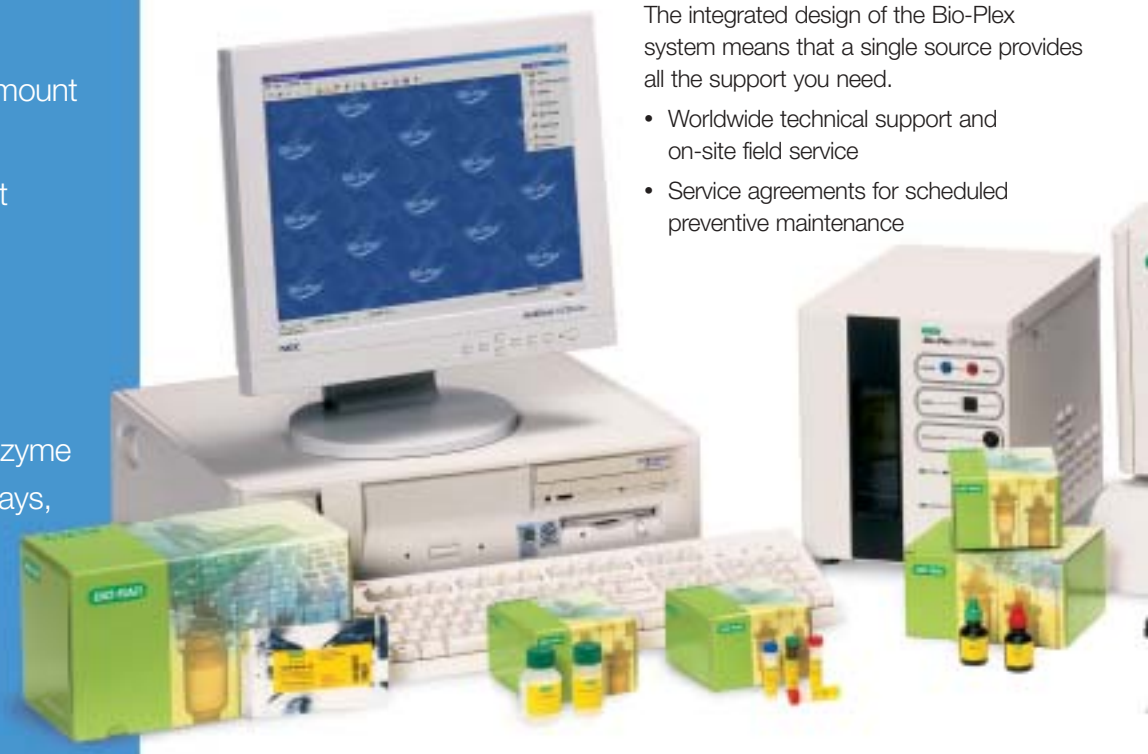
The Bio-Plex system is designed, manufactured, and tested as a complete, fully integrated system combining hardware, Bio-Plex Manager™ software, system validation and calibration tools, assays, and beads. The fully integrated and validated system ensures accurate and reproducible assay results. It also gives you access to xMap technology and all these other benefits:

- Standardized single-source system components for error-free operation
- Simplified operation with automated startup, shutdown, validation, and calibration functions
- Enhanced dynamic range and recovery with immunoassays
- Powerful dedicated data reduction software
- Easy-to-use reports
- Installation and operation qualification (IQ/OQ) certification

Support That Maintains Your Productivity

The integrated design of the Bio-Plex system means that a single source provides all the support you need.

- Worldwide technical support and on-site field service
- Service agreements for scheduled preventive maintenance



Bio-Plex Assays and Reagents

Ready-to-run Bio-Plex assay kits are available in premixed multiplex and singleplex configurations.

Assay kits
- Cytokines
- Phosphoproteins

Assay reagents
- Amine coupling kit
- COOH beads

Bio-Plex System Software

The only integrated system control and data analysis package for xMAP technology.

Unique features
- StatLIA 4PL and 5PL curve fitting
- Automated functions
- Percentage recovery calculations

High-Throughput Fluidics (HTF) System

The Bio-Plex HTF system allows the processing of microplates without refilling system fluid containers after each run.

and Quantitation

The Technology

The Bio-Plex array system utilizes xMAP technology to permit the multiplexing of up to 100 different assays within a single sample. The system uses a liquid suspension array of 100 sets of 5.5 µm beads, each internally dyed with different ratios of two spectrally distinct fluorophores to assign it a unique spectral address (Figure 1). Each set of beads can be conjugated with a different capture molecule; the conjugated beads can then be mixed and incubated with sample in a microplate well to react with specific analytes. Capture molecules can include:

- Enzyme substrates
- DNA
- Receptors
- Antigens
- Antibodies

To detect and quantitate each captured analyte, a fluorescently labeled reporter molecule that specifically binds the analyte is added. Figure 2 illustrates use of a capture molecule for a Bio-Plex sandwich immunoassay. Following incubation, the contents of each microplate well are drawn into the Bio-Plex array reader, and precision fluidics align the beads in single file through a flow cell where two lasers excite the beads individually (Figure 3). The red classification laser excites the dyes in each bead, identifying its spectral address. The green reporter laser excites the reporter molecule associated with the bead, which allows quantitation of the captured analyte. High-speed digital signal processors and Bio-Plex Manager software record the fluorescent signals simultaneously for each bead, translating the signals into data for each bead-based assay.

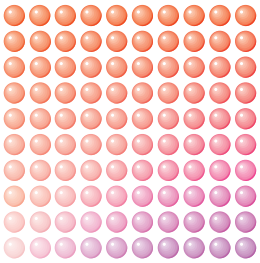


Fig. 1. Bio-Plex assays are designed using microscopic beads, each with a different color code, or spectral address, to permit discrimination among multiplex assays.

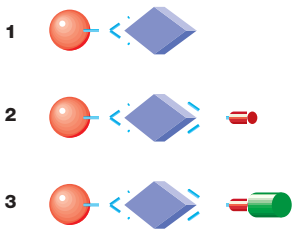


Fig. 2. In a typical Bio-Plex assay, a capture molecule conjugated to a color-coded bead binds to a target analyte (1) followed by binding with biotinylated detection antibody (2) and a reporter molecule, streptavidin-PE (3).

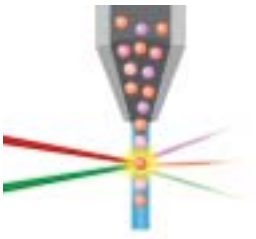


Fig. 3. In the Bio-Plex array reader, a red classification and a green reporter laser illuminate individual beads to identify each bead's spectral address and associated reporter signal.

Bio-Plex Array Reader and Microplate Platform
The flow-based, dual-laser array reader classifies each bead and its associated assay, and quantitates the amount of analyte captured in each assay. The microplate platform permits automated processing of samples from 96-well microplates in ~30 min.

Bio-Plex Validation and Calibration Tools
To ensure accurate and reproducible assay results, the Bio-Plex system includes tools for validation of system fluidics, the reporter and classification channels, laser alignment, and daily system calibration.

A World of Information

Bio-Plex System Specifications

Bio-Plex Array Reader

Operating temperature	15–30°C (59–86°F)
Humidity	10–90%, noncondensing
Input voltage range	100–240 V, 1.5 A, 47–63 Hz
Lasers	
Reporter laser	532 nm, >10 mW frequency-doubled diode; 30 x 60 µm elliptical beam
Classification laser	635 nm, 10 mW diode; 30 x 60 µm elliptical beam
Fluidics	
Sheath flow rate	90 µl/sec
Cuvette pathlength	200 µm
Sample injection rate	60 µl/min
Electronics	
Reporter channel detection	Photomultiplier tube, A/D resolution 14 bits
Classification and doublet discriminator channel detection	Avalanche photodiodes with temperature compensation, A/D resolution 12 bits
Communications interface	RS-232
Signal processing	
Measurement resolution	15 bits effective
Processor modes	Linear, with logarithmic or linear display option
Dynamic range	70 dB
Dimensions (W x D x H)	43 x 51 x 23 cm (17 x 20 x 9")
Weight	23 kg (60 lb)

Bio-Plex Microplate Platform

Operating temperature	15–30°C (59–86°F)
Humidity	10–90%, noncondensing
Input voltage range	100–240 V, 0.4 A, 47–63 Hz
Communication interface	RS-232
Plate capacity	One 96-well microplate ≤2 cm (0.75") thick
Dimensions (W x D x H)	44 x 61 x 8 cm (17.3 x 24 x 3")
Weight	14.4 kg (32 lb)

Bio-Plex High-Throughput Fluidics (HTF) System

Operating temperature	15–30°C (59–86°F)
Humidity	20–80%, noncondensing
Input voltage range	100–240 V, 0.4 A, 47–63 Hz
Dimensions (W x D x H)	20 x 30 x 25 cm (8 x 12 x 10")
Weight	9 kg (20 lb)

Ordering Information

Catalog #	Description
Bio-Plex System*	
171-000001	**Bio-Plex Suspension Array System**, 100–240 V
171-000005	**Bio-Plex Suspension Array System**, 100–240 V, with high-throughput fluidics (HTF) system

* Bio-Plex systems include array reader, microplate platform, PC, monitor, Bio-Plex Manager software, calibration kit, validation kit, maintenance, calibration, and validation (MCV) plate II, 20 L sheath fluid, instructions

Bio-Plex System Accessories

171-000050	**High-Throughput Fluidics (HTF) System**, 100–240 V
171-000055	**Sheath Fluid**, 20 L
171-002001	**Communication Cable**, 5 ft
171-002010	**Sheath Fluid Bottle**, 1 L
171-002012	**Sheath Waste Bottle**, 2 L
171-002020	**Sample Needle**, long (11.6 cm/4.6")
171-002023	**Needle Guide**
171-002026	**Needle Adjustment Wrench**
171-002030	**Protective Shield for Sample Needle**

Bio-Plex Validation and Calibration Accessories

171-203000	**Bio-Plex Validation Kit 3.0**, includes optics validation, reporter validation, classify validation, and fluidics validation bead sets for approximately 50 validation routines
171-203031	**Bio-Plex MCV (Maintenance, Calibration, and Validation) Plate II**
171-203060	**Bio-Plex Calibration Kit**, includes CAL1 and CAL2 calibration beads for approximately 50 daily calibration routines

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Life Science Group

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