

# Octet<sup>®</sup> R4 System

The Perfect Balance  
Between Cost and  
Throughput for  
Your Biomolecule  
Characterization Needs



## Key Features and Benefits

- High sensitivity system designed for customers looking for high throughput at low cost
- Flexibility of field upgrade to an 8-channel Octet<sup>®</sup> system for higher throughput and full GMP compliance
- Get high-quality kinetic screening and affinity characterization
- Microfluidics-free Dip and Read format reduces assay time and maintenance cost
- Crude sample compatibility saves valuable time by eliminating the need for sample pre-treatment
- Four parallel, independent channels provide fast results
- Versatility to detect and analyze a diverse range of biomolecules from small molecules to viruses
- Non-destructive sampling to conserve precious samples for other assays
- Equipped with sample plate cooling for temperature-sensitive proteins and assays
- Easy to learn and use
- Integrated acquisition and analysis software eliminates dependency on external software.

## Product Information

The 4-channel Octet® R4 system offers an advanced, fluidics-free approach to protein analysis, with a wide variety of off-the-shelf Dip and Read biosensors for rapid binding kinetics and quantitation analysis. This system utilizes Sartorius' label-free Bio-Layer Interferometry (BLI) technology, enabling direct detection of specific proteins and other biomolecules – even in complex mixtures like crude cell culture supernatants and lysates. Priced for customers looking for a balance between throughput and cost, this system provides higher throughput than the 2-channel Octet® R2 system and the same sensitivity as the 8-channel Octet® R8 system, but at a lower price.

This system can be used for a wide range of analyses including kinetic analysis, quantitation of IgGs and other proteins, reagent qualification, immunoassay development, bioprocess development, quality analysis, crude antibody screening, epitope binning/mapping, ligand binding assays and small molecule analysis, cell signaling mechanism studies and infectious disease monitoring. Analysis can be done using a single to all four channels, enabling flexibility in sample throughput.

## Making Quality Analysis Affordable and Flexible

The Octet® R4 system provides a low-cost option for customers looking for high throughput sample analysis, without any compromise on the assay sensitivity. It comes with the flexibility of upgrading to the higher channel Octet® R8 system when higher throughput is needed. The upgrade is performed on-site within a single visit by trained Sartorius engineers, which minimizes instrument and operator downtime and saves on the cost of time of shipping the old unit to the factory. In addition, sample reuse capability and minimal preparation time combined with robust instrumentation, reduces significant equipment and reagent costs. Optional biosensor regeneration further lowers assay cost per sample. All Octet® platforms come with integrated Octet® BLI Discovery Software for data acquisition and the Octet® Analysis Studio Software for HT data analysis.

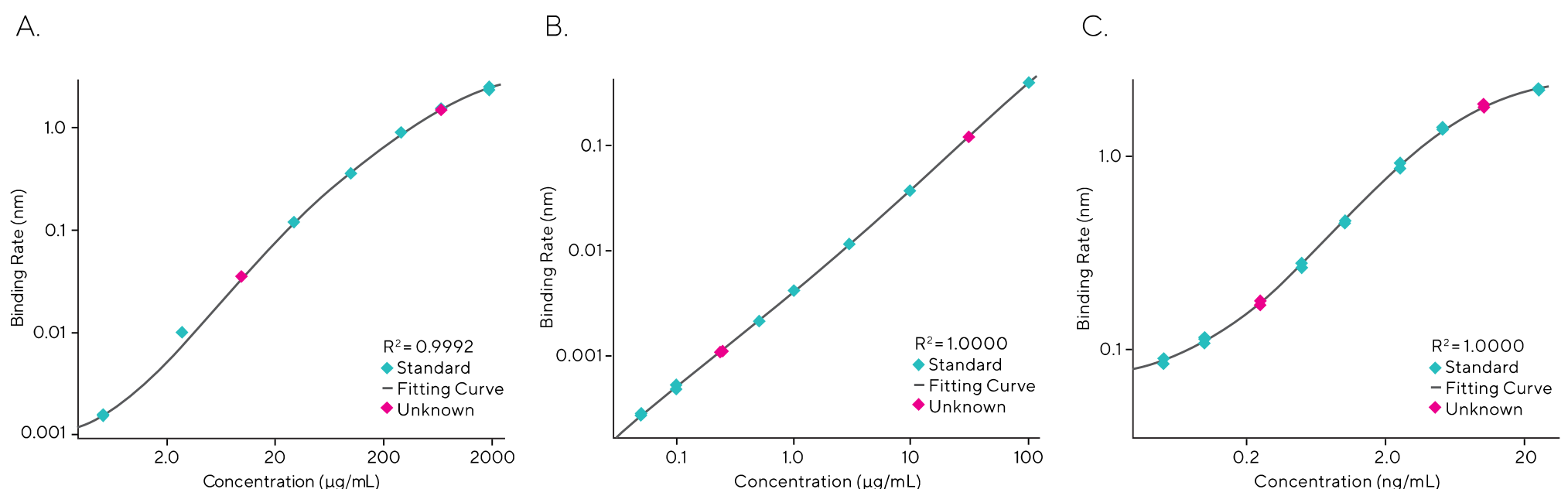


Figure 1: **Quantitation Assays.**

A) Detection of Human IgG and unknown samples using Protein A Biosensors on the Octet® R4 system with assay parameters of 400 rpm speed, 2 minutes per sample, at 30°C. The standard curve (0.5–2000 µg/mL) is shown on a log-log scale fitted with the unweighted 5-parameter logistic (5PL) regression model.

B) Detection of Human IgG and unknown samples using Protein A Biosensors on the Octet® R4 system with assay parameters of 1000 rpm speed, 5 minutes per sample, at 30°C. The standard curve (0.05–100 µg/mL) is shown on a log-log scale fitted with the unweighted 5-parameter logistic (5PL) regression model.

C) Detection of MabSelectSure analyte and unknown samples using Protein A Biosensors on the Octet® R4 system. The standard curve (0.05–25 ng/mL) is shown on a log-log scale fitted with the weighted 4-parameter logistic (4PL) regression model.

## Quantitation Assays

The Octet® R4 system directly measures the presence of specific proteins and other molecules in solution with minimal interference from complex matrices. Accurate and reproducible concentrations can be determined in as little as 2 minutes per sample using a simple, one-step assay (Figure 1A). High sensitivity in quantitation can be easily achieved by increasing read time and shake speed as shown in Figure 1B. Even higher sensitivity can be achieved to sub-ng/mL levels with 2-step or 3-step assay formats as shown in Figure 1C, allowing automated measurement of contaminants such as host cell proteins and residual protein A, faster and more precisely than ELISA. Process economics can be improved further by regenerating and re-using the biosensors.

## Kinetic Assays

The Octet® R4 system monitors binding events in real time to calculate on rates ( $k_a$ ), off rates ( $k_d$ ) and affinity constants ( $K_D$ ). The superior sensitivity of the system enables measurement of small (Figure 2) and large (Figure 3) molecules and kinetic constants over a broad range. The sample plate temperature can be controlled from 15–40°C, which enables reliable kinetic determinations at different temperatures for temperature-sensitive proteins. Additional advantages of sample cooling include the ability to rapidly determine

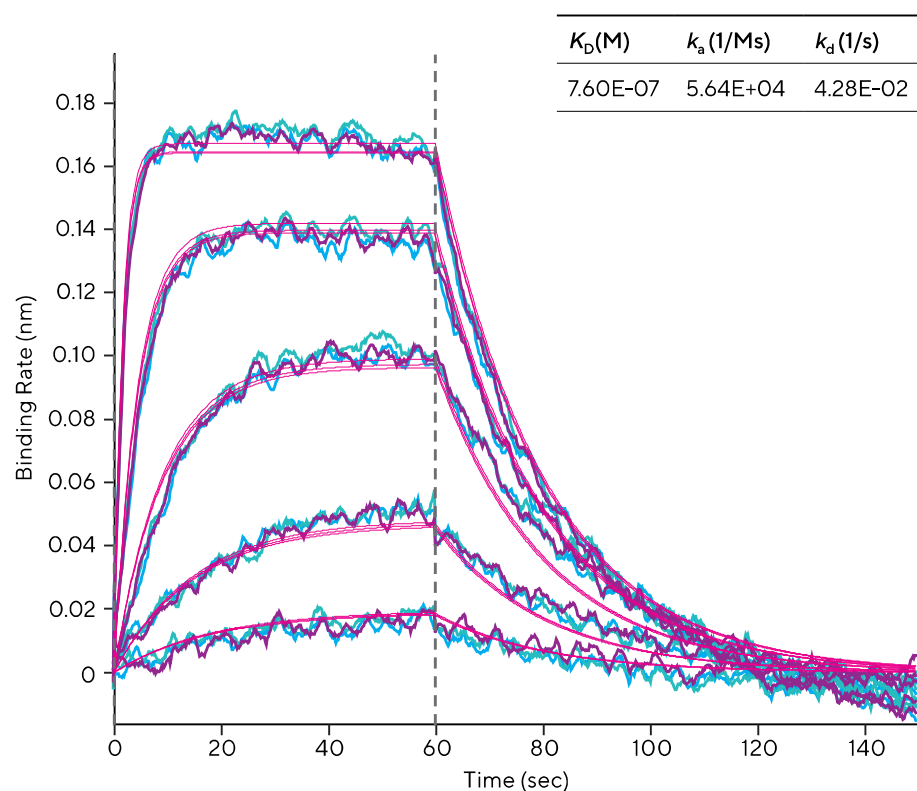


Figure 2: **Small Molecule Characterization.**

Kinetic analysis of the interaction between a ligand, biotinylated-carbonic-anhydrase and the small molecule analyte Furosemide (330.7 Da) with Super Streptavidin (SSA) Biosensors at 1000 rpm and 25°C on an Octet® R4 system. Furosemide working solutions were prepared in serial dilutions of 0.1, 0.3, 1.0, 3.0, 10.0  $\mu$ M (n=2) respectively. Data was processed and curve fitted using a 1:1 binding model.

binding rate constants at multiple temperatures to extrapolate thermodynamic measurements. The Octet® R4 system's channels can be used independently to measure samples for screening purposes or in tandem, pairing the sample read with a dedicated reference for high-quality kinetic characterization.

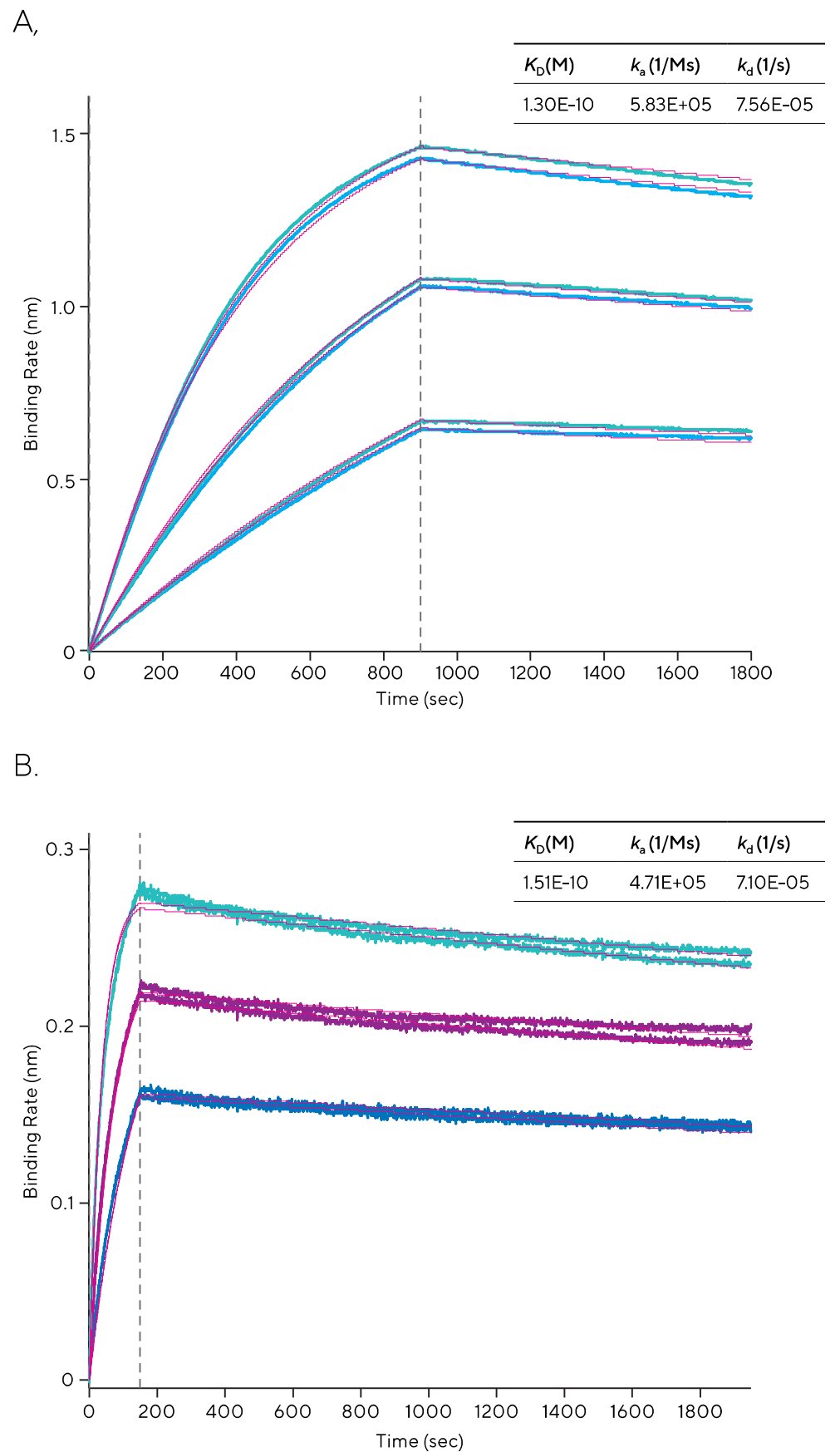


Figure 3: **Large Molecule Characterization.**

A) Kinetic analysis of the interaction between biotinylated human CD64 and humanized IgG1K monoclonal antibody with High Precision Streptavidin 2.0 (SAX 2.0) Biosensors at 1000 rpm and 25°C on an Octet® R4 system. Humanized IgG1K mAb working solutions were prepared in serial dilutions of 1, 2 and 4 nM (n=2) respectively. Data was processed and curve fitted using a 1:1 binding model.

B) Kinetic analysis of the interaction between biotinylated anti Her2 and Her2 protein with High Precision Streptavidin 2.0 (SAX 2.0) Biosensors at 1000 rpm and 25°C on an Octet® R4 system. Her2 working solutions were prepared in serial dilutions of 14.3, 28.5 and 57.0 nM (n=2) respectively. Data was processed and curve fitted using a 1:1 binding model.



# Octet® BLI Discovery and Analysis Studio Software

Pre-defined templates in Octet® BLI Discovery Software streamlines setup prior to running an assay and minimizes training needs. Octet® Analysis Studio Software can overlay data from multiple plates over an extensive range of parameters and metrics to analyze acquired data from an entire project, thereby reducing analysis time from hours to min-

utes. All settings in Octet® Analysis Studio Software can be saved and re-loaded for new similar datasets to speed up routine assays. The software can also generate customized reports of the experiments, combining various data elements such as graphs, text boxes, data tables, images and experimental details (Figure 4). These reports are ready to be uploaded to an electronic notebook or stored in the company database.

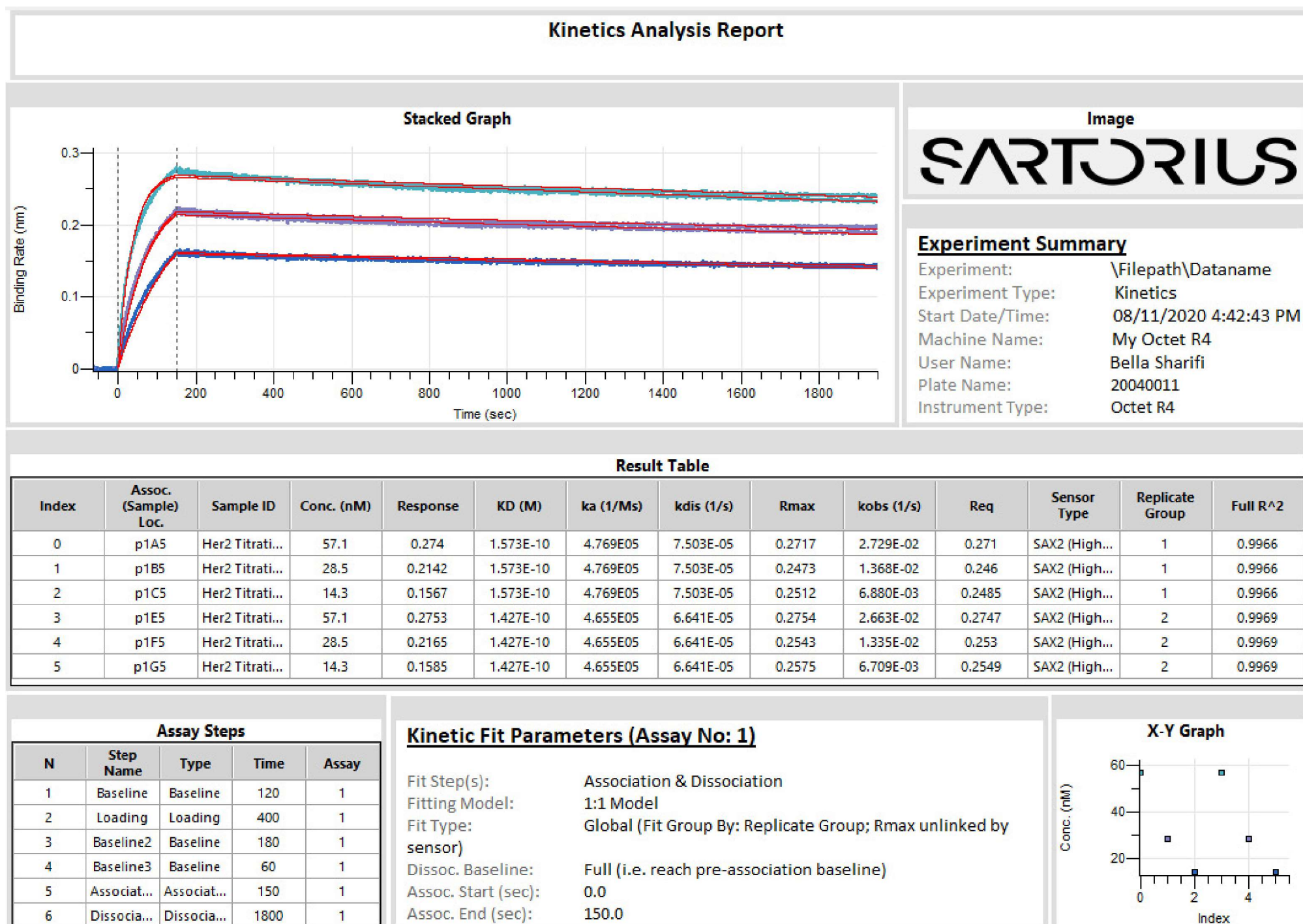


Figure 4: Octet® Analysis Studio Software version 12.2 and above enables creation of customized reports that can be uploaded into electronic notebooks and added to the database. In addition to the customized reports, Octet® Analysis Studio Software enables analysis of multiple plates and experiments together to maximize workflow efficiency.

# Octet® R4 System

## Technical Specifications<sup>1</sup>

### Technical information and specifications

Detection technology	Bio-Layer Interferometry (BLI)
Biosensor type	Disposable, single-use fiber optic biosensors with optional reuse by regeneration and/or re-racking in the sensor tray
Information provided	<ul style="list-style-type: none"> <li>▪ Yes/No binding</li> <li>▪ Kinetic and affinity analysis (<math>k_{obs}</math>, <math>k_a</math>, <math>k_d</math>, <math>K_D</math>)</li> <li>▪ Specific and selective detection of molecules, even in crude samples</li> <li>▪ Relative and absolute quantitation of specific proteins in crude matrices or purified samples</li> </ul>
Data presentation	<ul style="list-style-type: none"> <li>▪ Graphs displaying real-time kinetic binding traces, fitted result plots and residuals of fits</li> <li>▪ Concentration data analysis including calibration curves and output of tabulated concentration data</li> <li>▪ Tabulated kinetic data</li> <li>▪ Epitope binning and cross-blocking matrices and trace overlays</li> </ul>
Sample types	Proteins, antibodies, peptides, DNA, RNA, liposomes, viruses, VLPs and in various media including serum, buffers containing DMSO, periplasmic fractions, bacterial cells, nanoparticles, untreated cell culture supernatants and crude cell lysates
Number of spectrometers	4
Maximum simultaneous reads	4
Data collection rate	2, 5 or 10 Hz
Sample position and format	1 standard 96-well, black, flat bottom microplate
Sample volume	180–220 $\mu$ L/well, non-destructive testing
Orbital flow capacity	Static or 100–1500 rpm
Analysis temperature range	15–40°C, 1°C increments

<sup>1</sup> All specifications are subject to change without notice.

<sup>2</sup> Baseline noise and drift are tested at 25 °C.

### Kinetics

Workflow	Up to 4 assays in parallel
Molecular weight detection	> 150 Da
Analysis time per sample	Real-time kinetic binding experiments from 5 minutes to 4 hours
Association rate constant ( $k_a$ )	$10^1$ – $10^7$ M <sup>-1</sup> s <sup>-1</sup>
Dissociation rate constant ( $k_d$ )	$10^{-6}$ – $0.1$ s <sup>-1</sup>
Affinity ( $K_D$ ) constant	1 mM–10 pM
Baseline noise <sup>2</sup>	$\leq 4.0$ pm (RMS)
Baseline drift <sup>2</sup>	$\leq 0.12$ nm/hour

### Quantitation

Workflow	Up to 4 assays in parallel
Analysis time per sample	Human IgG quantitation in 2 minutes for 4 samples
Direct quantitation range for human IgG with Protein A Biosensor	0.05–2000 $\mu$ g/mL

### Instrument

Dimensions (H x W x D)	19.5 in x 22 in x 18.2 in (49 cm x 56 cm x 46 cm)
Weight	72 lb (32.7 Kg)
Electrical requirements	Mains: 100–120/200–240 VAC, 50/60 Hz, 4 A max
Power consumption	200 W (300 W peak)

### Data handling and storage

PC operating systems	Windows® 10 Professional, 64-bit Windows 7 Professional, 64-bit Windows 7 Professional, 32-bit
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### Compliance

Safety standards	CE, Nemko
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## Ordering Information

Part No.	UOM	Description
Octet® R4 / 30-0514	System	Includes Octet® R4 instrument, Octet® Software, desktop computer, LCD monitor, accessory kit and one-year warranty
41-0326	Kit	Octet® R4 Installation and Operational Qualification Kit

## Related Products

Part No.	UOM	Description
Octet® R8 / 30-0518	System	Includes Octet® R8 instrument, Octet® Software, desktop computer, LCD monitor, accessory kit and one-year warranty
Octet® R8-GxP Package / 30-0518-GxP	System	Includes Octet® R8 instrument, Octet® 21 CFR Part 11 Software, desktop computer, LCD monitor, accessory kit, IQOQ/PQ kits and services and one-year warranty
18-5132	Pack	Single-use evaporation covers to extend the experiment up to 12 hours. 3 covers per pack
18-1176	Kit	Octet® R8 Performance Qualification – Quantitation Kit
18-1177	Kit	Octet® R8 Performance Qualification – Kinetics Kit
18-1178	Kits Bundle	Octet® R8 Performance Qualification Kits Bundle
41-0325	Kit	Octet® R8 Installation and Operational Qualification Kit
50-0296	Pack	Octet® Software Validation Package

### Upgrade and Maintenance Services

Contact your regional sales representative for all the upgrade and maintenance services offered with the Modular Octet® R series configurations.

### More Information

For more information about Sartorius' Octet® platform for label-free, real-time detection of biomolecular interactions, applications and services, visit [www.sartorius.com/octet](http://www.sartorius.com/octet) or contact us directly at +1 888 OCTET 75.

### Technical Support

For technical questions please contact Sartorius Technical Support at [octetsupport@sartorius.com](mailto:octetsupport@sartorius.com).

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