Label-free, Real-time Molecular Interaction Analysis

With GCI biosensor

With WAVEchip

With waveRAPID

Benefits

High Sensitivity
Sample Robustness
Ease-of-use
Save your time and costs

creoptix sensors

wave system

Next-generation bioanalytical instruments for drug discovery.

Label-free, Real-time Molecular Interaction Analysis

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The wave of the future in kinetics

WAVE core

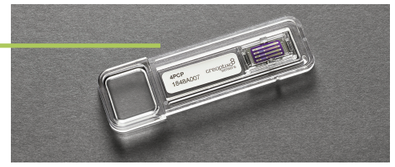
Proprietary sensor technology for highest sensitivity

WAVE sampler

Temperature-controlled autosampler for plates and vials

WAVE chip

Microfluidics and sensor chip in one consumable



WAVE control

Intuitive software for instrument control and automated data evaluation

High performance and flexibility

Main Features

High Sensitivity

—

GCI biosensor

High signal-to-noise ratio for high sensitivity

Engineered around a proprietary Grating-Coupled Interferometry (GCI) technology, the Creoptix WAVE system builds on waveguide interferometry to achieve superior resolution in signal and time. With low limits of detection, the WAVEsystem generates accurate kinetic rates, affinity constants, and concentrations of label-free biomolecular interactions, even at low analyte abundance, with no loss of definition.

Work with low immobilization levels

Work with large ligand-to-an alyte molecular weight (MW) ratios

Sample robustness

—

WAVEchip

Innovative microfluidic cartridge

Innovative design and patented microfluidic cartridge to support crude samples, pathogenic samples, harsh solvents, and large particles up to 1000 nm normally only achieved with plate-based assays for kinetic analysis not possible before

No-clog for crude samples

Chemical-friendly for harsh solvents

No valves for fast transitions

Automated data evaluation

—

waveRAPID

Automated software

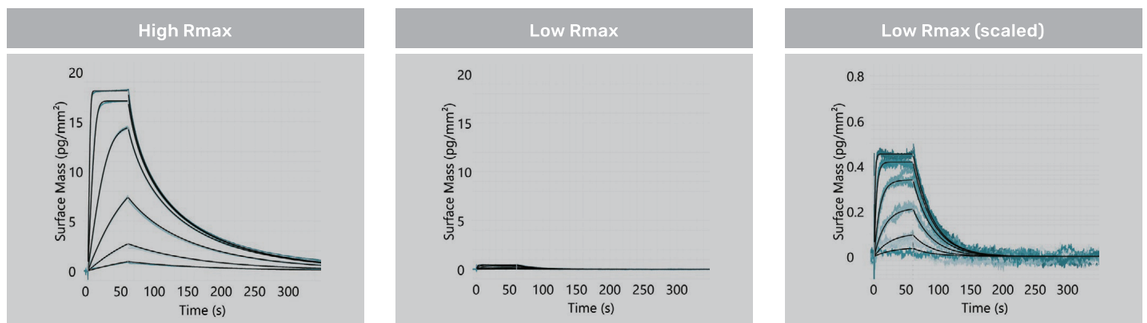
Move seamlessly moves from sample to data in a simple stepwise process, generating outputs at the touch of a button. The intuitive workflow and software wizards guide the user through experimental set up, kinetic evaluation and report generation, with open access formats supporting both LIMS integration and export of data files.

waveRAPID-Kinetics(on-rate, off-rate, affinity and Rmax) from a single well

DIrect Kinetics - automated data evaluation

Small molecules can’t hide anymore

With the industry’s fastest kinetics and utmost sensitivity, the WAVEsystem offers a whole new level of previously unattainable interaction data.



Ligand: CAII (29kDa) at two different immobilization levels
Analyte: Acetazolamide (222.25 Da)

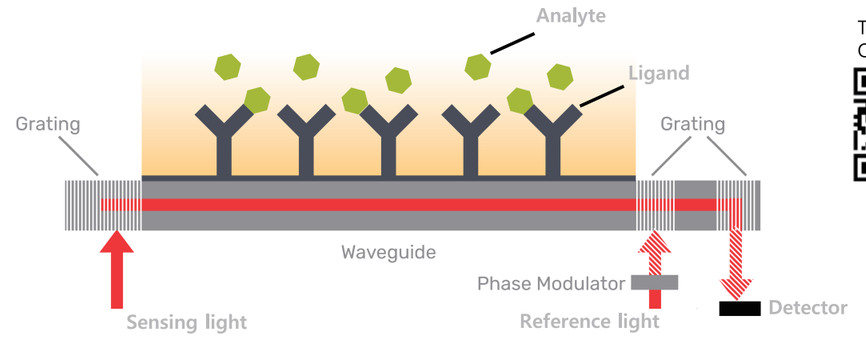
creoptix sensors

Grating-Coupled Interferometry (GCI)

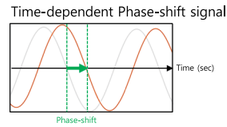
High Signal to Low Noise
High Sensitivity
High Signal Stability for Strong Binders
High Time Resolution

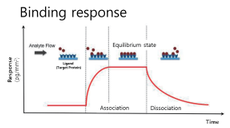
Grating-Coupled Interferometry

Unrivalled flexibility and high sensitivity



Take Photo
QR Code





Grating-Coupled Interferometry (GCI) is a surface-based, label-free biosensing technique.

When target molecules (e.g. proteins) are attached to the sensor surface, binding of analytes leads to an increase in mass and hence to a change in the refractive index within the evanescent field near the surface.

In GCI, refractive index changes on a sensor surface are measured as time-dependent phase-shift signals. The long light-to-sample interaction length of the waveguide provides intrinsically high signal-to-noise levels

General specification sheet

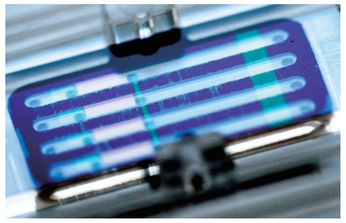
item	spec
Noise	< 0.01 pg/mm^2 @ 1 Hz
Drift	< 0.3 pg/mm^2/min
Readout Frequency	1, 10 and 40 Hz
Association Rate Constant (k_a, $M^{-1}s^{-1}$)	Small molecules: 1 x 10^2 – 5 x 10^7 Large molecules: 1 x 10^2 – 3 x 10^9
Dissociation Rate Constant (k_d, s^{-1})	10^{-6} – 10
Equilibrium Constant (K_D)	1 pM – 1 mM

creoptix sensors

WAVEchip

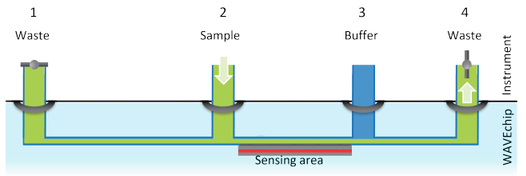
No-clog Microfludics design
Crude sample available
Fast Transition for Weak Binders

No-clog Microfluidics and Fast-Transition

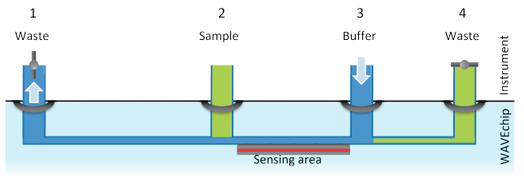


No-Clog for Crude Samples

No-clog microfluidics accommodates of a broad range of sample types to preserve activity and biological context, saving time from detrimental purification steps and clogging that takes other systems



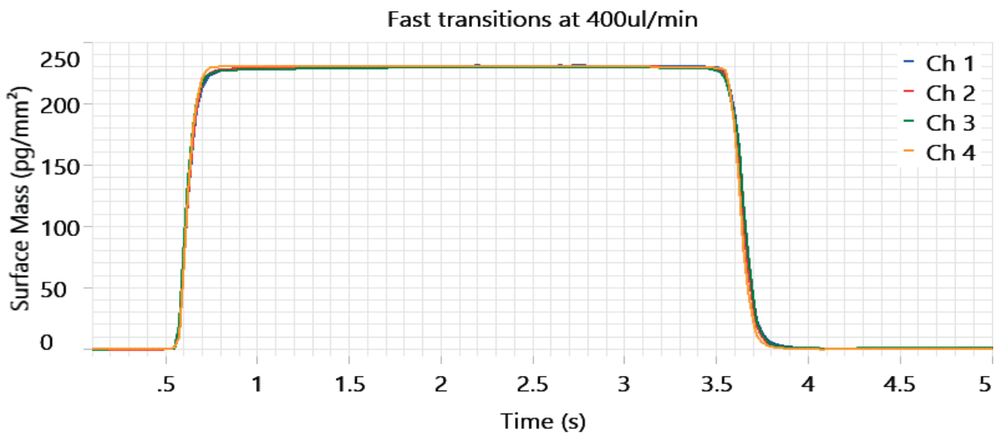
Association



Dissociation

No Microvalves for Fast Transitions

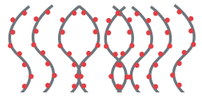
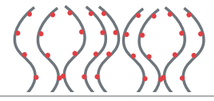
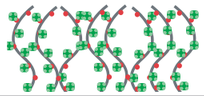
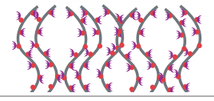
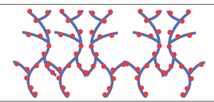
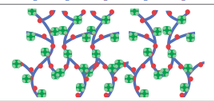
The cartridge design enables ultra-fast transition times of 150 msec for reliable determination of off-rates of 10 sec^{-1} (half-life of 69 ms), enabling the kinetic study of weakly binding fragments.



Compatibility

- 100% Serum & plasma & cell supernatant
- Non-traditional solvents, including high percentages of acetonitrile and DMSO
- Viscous detergents and additives to solubilize membrane proteins
- Cell membrane preps, partially solubilized, unpurified material
- Virus-like particles (VLPs), liposomes, or nanodiscs used as solubilization structures
- Large binding partners: nanoparticles and crude membrane preps

WAVE chips QUICKGUIDE

WAVE chip	Special Characteristics	Matrix		Immobilization Modality				Capacity		Suggested Applications	Great for*
		PC	CMD	COV	BIOTIN	HIS	OTHER	HIGH	LOW		
PCH 	Thick hydrogel	✓		✓				▲		Large ligand-to-analyte molecular weight ratio. General purpose.	
PCP 	Quasi-planar	✓		✓					▼	Large ligands and/or analytes such as proteo-/liposomes, viruses, VLPs.	
PCL 	Thick hydrogel with reduced charges	✓		✓ 1					▼	Complex matrices such as serum, culture supernatant.	
PCH-STA 	Streptavidin-coated	✓			✓			▲		Biotinylated ligands. General purpose.	
PCP-STA 	Quasi-planar, streptavidin-coated	✓			✓				▼	Large biotinylated ligands and/or analytes such as proteo-/liposomes, viruses, VLPs.	
PCH-NTA 	NTA-functionalized	✓				✓		▲		His-tagged ligands. General purpose.	
PCP-NTA 	Quasi-planar, NTA-functionalized	✓				✓			▼	Large His-tagged-ligands and/or analytes such as proteo-/liposomes, viruses, VLPs.	
PCP-PAG 	Protein A/G-functionalized	✓					IgG		▼	Antibody (IgG) ligands.	
PCP-LIP 	Quasi-planar, lipid anchors	✓					Lipid		▼	Hydrophobic ligands such as liposomes, membrane vesicles or fragments. Compatible with large ligands and/or analytes.	
PCZ 	Zwitterionic polymer	✓							▼	Acidic protein and/or negatively charged ligands. Recommended for positively charged analytes. High non-fouling properties.	
DXH Upon request 	Thick hydrogel		✓	✓				▲		General purpose.	
DXH-STA Upon request 	Streptavidin-coated		✓		✓			▲		Biotinylated ligands. General purpose.	

Legend: polycarboxylate(PC), carboxymethyldextran (CMD), covalent functionalization through -NH_2, -SH, -CHO, -OH and -COOH(COV), streptavidin/biotin coupling(biotin), His-tag/NTA-coupling (His)

*Applications: Small molecules/FBDS · Serology · Membrane proteins · Biologics

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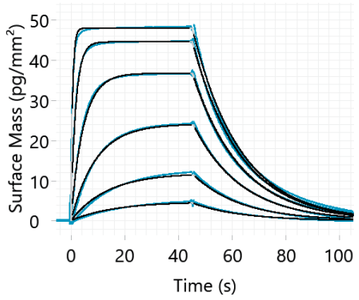
For specific questions on our applications, contact us through support@creoptix.com

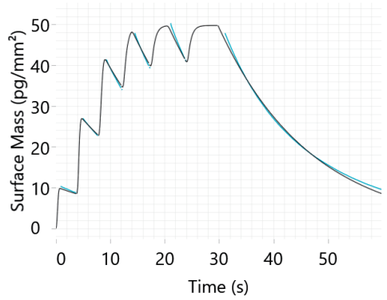
waveRAPID technology

Multi-Cycle Kinetics (MCK)



Prepare 6 dilutions per 1 sample
Inject 6 times, and Obtain 1 data set

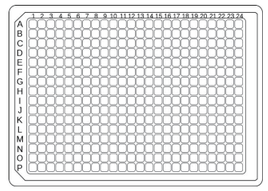
waveRAPID



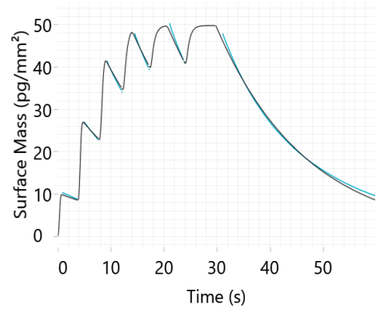
Prepare 1 dilution per 1 sample
Inject once, and Obtain 1 data set

Instead of relying on a titration series, **waveRAPID (Repeated Analyte Pulses of Increasing Duration)** injects a single concentration, pulsing the sample over the sensing surface at increasing durations, meaning kinetics can be derived from a single well.

Run more samples



A full 384-well plate



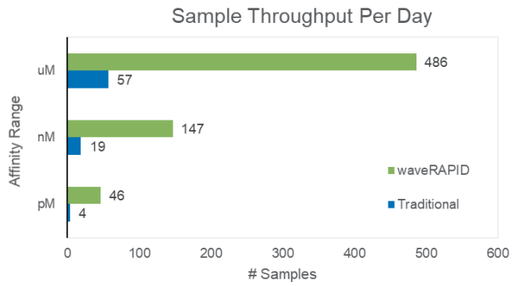
384-measurements

k_{on}
k_{off}
K_D
R_{max}

384-datasets

Analysis from a single well, not a titration series
Room on your plate for more samples

Save your time and cost



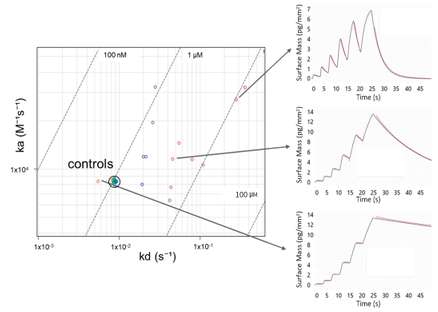
96 samples against 3 target proteins, traditional kinetics set up vs waveRAPID

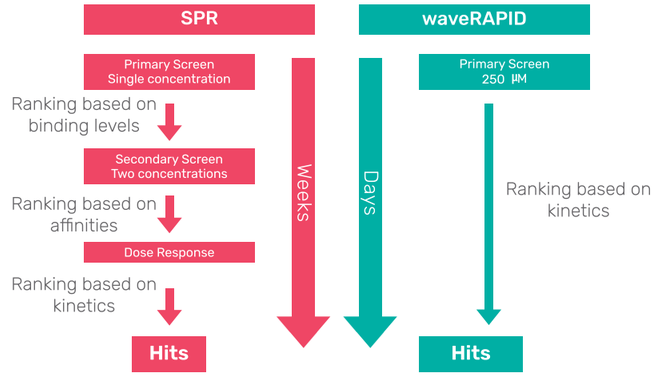
	WAVEdelta	Biacore T200	Biacore 8K
Number of Targets	2	2	2
Number of Samples	384	384	384
Type of Assay	waveRAPID	Kinetics	Kinetics
Affinity Range	nM	nM	nM
Runtime (h)	58	490	122
Samples / 24h	159	19	75

Exemplary assay run times and sample throughput comparing waveRAPID on the WAVEdelta to state-of-the-art technologies (Biacore T200, 8k) for full kinetic characterization of 384 samples on 2 targets.

- Keep projects moving by getting your binding data sooner
- Skip serial dilution for sample prep (less samples/buffer)
- Get binding data sooner (waveRAPID is 10x faster than traditional kinetics)
- Analyze big dataset in 3-5 minutes with “1-click” analysis

Get more insight





Speeding up the early stages of drug discovery is crucial to getting new medicines to the patients faster. On the commercial side, accelerating R&D will improve the profitability of new therapies and shorten time-to-revenue.

Get more insight by using waveRAPID capacity to screen broad kinetic range

Built-in wizard available for pM – mM range interaction

Don’t miss out on analytes with the desired kinetics

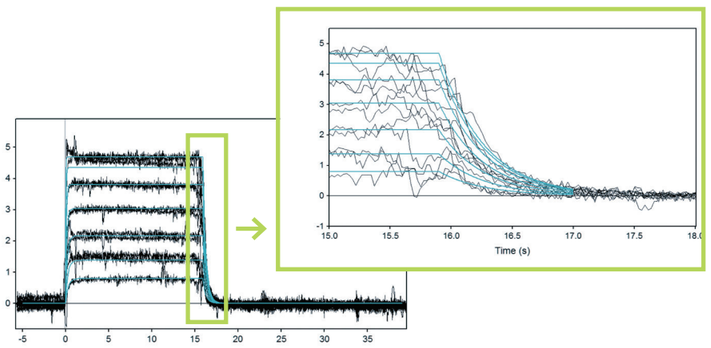
CONFIDENCE IN KINETIC MEASUREMENTS

Real is measuring kinetics of biological interactions in relevant contexts. Only the WAVE innovative microfluidic cartridge tolerates native, physiological and harsh conditions, providing access to new data not possible before.

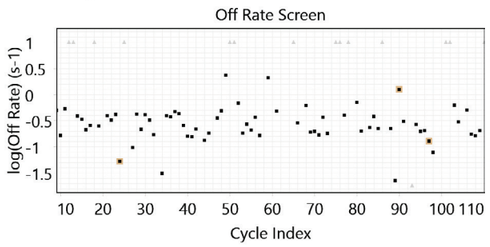
real is crude
SMALL MOLECULE DEVELOPMENT

Capture fast off-rates of weakly binding fragments and high-quali - ty low potency leads for more suc - cessful drug discovery.

- Separate binders from non–binders with off-rate kinetic analysis of crude reaction mixtures
- Resolve weak binders with off-rates as fast as 10 s^{-1}.
- Measure in non–traditional solvents, including high percentages of acetonitrile and DMSO.
- More space in the well plate to measure full kinetic data with only one injection using waveRAPID.
- Kinetic information in hours instead of

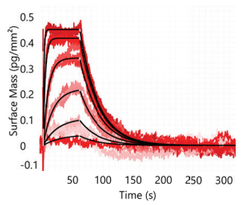


Ligand: carbonic Anhydrase II (29 kDa)
Analyte: Methylsulfonamide (95.1 Da)
K_{off} = 2.79 S^{-1}



Push the limits and generate high-quality binding kinetics with our sensitive GCI technology and resolve data at very low responses.

- Kinetics analyses of molecules with dramatically different size ratios.
- Reliable kinetics at R_{max} below 1 pg/mm².



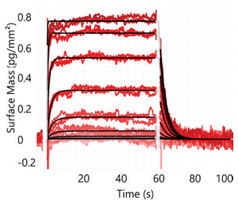
Kinetic parameters

Rmax = 0.481 pg/mm²

k_d = 3.38 x 1 0^{-2} s^{-1}

k_a = 8.52 x 10^5 M^{-1} s^{-1}

k_d = 39.7 nM



Kinetic parameters

Rmax = 0.844pg/mm²

k_d = 3.11 x 10^{-1} s^{-1}

k_a = 4.96 x 10^5 M^{-1} s^{-1}

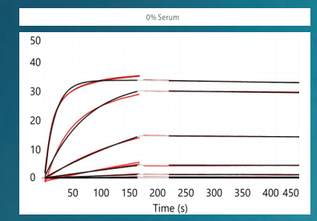
k_d = 627.7nM

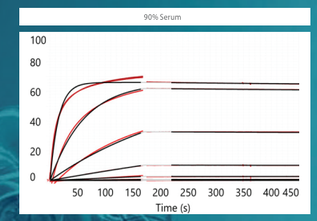
real is (less) diluted

SEROLOGY - SERUM, PLASMA AND MORE

Measure antibody kinetics in (un)diluted serum and plasma while reducing cross-contamination and potential clogging. Accurately measure binding kinetics in conditions closer to real life and **confidently characterize the tightest binders in:**

- 100% blood serum or plasma
- Cell extracts
- Cell culture supernatant





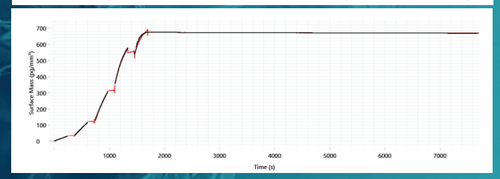
real is natural

BIOLOGICS DEVELOPMENT

Measure more than just affinity, even in the low pM range, while confirming and enrich ELISA data.

- Slow off-rate analysis of high-affinity binders
- Detection of anti-drug antibodies (ADA) in the low ng/ml range
- Identify the most effective antobody pairs in diagnostic development

Kinetics analysis with 24h dissociation of an antibody with low pM affinity



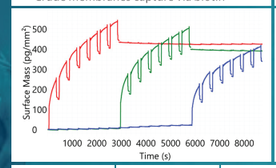
real is native

MEMBRANE PROTEINS

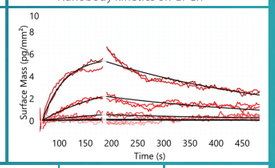
Stay close to native state in cell membrane and study interactions with large binding partners. Study bind ing kinetics onto membrane proteins and retain their conformation and activity for more successful drug discovery

- Push the limits and generate high-quality binding kinetics and resolve data at very low responses
- Save time and precious samples by studing membrane protein pharmacology using only partially solubilized, unpurified material

Crude membranes capture via biotin



Nanobody kinetics on GPCR



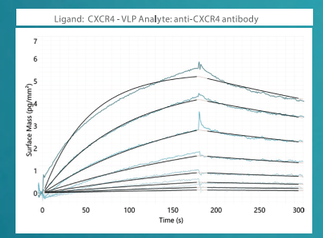
Kinetic parameters	Rmax = 6.435pg/mm²	k_a = 7.1 x 10^5 M^{-1} s^{-1}	k_d = 2.87 x 10^{-3} s^{-1}	k_d = 406.7 nM

Virus-like particles, liposomes, and nanodiscs present unique challenges

The resultant size of these structures - used to preserve membrane protein integrity and activity - combined with a tendency to aggregate, can cause microfluidics channels to clog. They can be run reliably and repeatedly on the WAVEsystem with no impact on performance or sensitivity to:

- Valveless microfluidics to analyze and characterize larger molecules.
- Ensure more reliable data by protecting the sensor from inadvertent handling.

Ligand: CXCR4 - VLP Analyte: anti-CXCR4 antibody



Creoptix WAVE

GENERAL	
Noise (RMS)	<0.01 pg/mm² @ 1 Hz
Drift	<0.3 pg/mm²/min
Readout Frequency	1 Hz, 10 Hz or 40 Hz
Association Const. Range	$k_a = 10^2 – 5x10^7\ M^{-1}\ s^{-1}$ (small molecules) $k_a = 10^2 – 3x10^9\ M^{-1}\ s^{-1}$ (large molecules)
Dissociation Const. Range	$k_d = 10^{-6} – 10\ s^{-1}$
Analysis temperature range	15°C – 40°C
Molecular Weight Limit	No lower limit
waveRAPID Functionality	No
FLUIDICS	
Flow Channels / Path	2, parallel
Channel Referencing	1–4 and 4–1 or 2–3 and 3–2
Flow Cells	Sealed, disposable, integrated into disposable WAVEchip
Flow Rate	1 – 400 µl/min
Crude Sample Robustness	Yes
SAMPLE HANDLING	
Sample Capacity	2x microtiter plates (96 or 384 well, standard or deep well) or vial racks (48 positions of 1.5ml)
Buffer	1 buffer
Degasser	Built-in
Injection Volume	< 450 µl, 100 µl typical
Sample Volume Required	Injection volume plus 15-50 µl (application dependent)
Sample Storage Temperature	Ambient or 4°C – 20°C regulated
Sample Recovery	Yes
Automation	120h of unattended operation
DATA TREATMENT	
Information Provided	Kinetic affinity (k_a, k_d, K_D)
Graphs	Real-time curves, multiple curve overlays, fit, report point plots
Data Extraction	Curves, k_a, k_d, K_D tables, graphs, reports
Data Analysis	Fully automated data evaluation
Kinetic Models	Predefined models including 1:1 interaction, mass transport, heterogenous ligand, conformational change and bivalent
Direct Kinetics	Yes

Creoptix WAVEdelta

GENERAL	
Noise (RMS)	<0.01 pg/mm² @ 1 Hz
Drift	<0.3 pg/mm²/min
Readout Frequency	1 Hz, 10 Hz or 40 Hz
Association Const. Range	$k_a = 10^2 – 5x10^7\ M^{-1}\ s^{-1}$ (small molecules) $k_a = 10^2 – 3x10^9\ M^{-1}\ s^{-1}$ (large molecules)
Dissociation Const. Range	$k_d = 10^{-6} – 10\ s^{-1}$
Analysis temperature range	4°C – 45°C (max 20°C below ambient)
Molecular Weight Limit	No lower limit
waveRAPID Functionality	Yes
FLUIDICS	
Flow Channels / Path	4, parallel
Channel Referencing	Any combination of the 4 channels
Flow Cells	Sealed, disposable, integrated into disposable WAVEchip
Flow Rate	1 – 400 µl/min
Crude Sample Robustness	Yes
SAMPLE HANDLING	
Sample Capacity	2x microtiter plates (96 or 384 well, standard or deep well) or vial racks (48 positions of 1.5ml)
Buffer	Automatic switching between 4 buffers
Degasser	Built-in
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Sample Volume Required	Injection volume plus 15-50 dependent)
Sample Storage Temperature	Ambient or 4°C – 20°C regulated
Sample Recovery	Yes
Automation	120h of unattended operation
DATA TREATMENT	
Information Provided	Kinetic affinity (k_a, k_d, K_D)
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