

# 7. Specifications

## 7.1. SpectraMax Plus<sup>384</sup> Specifications

Thermal specifications for microplates used in the SpectraMax Plus<sup>384</sup> apply to flat-bottom microplates with isolated wells.

All other microplate specifications apply to standard 96-well polystyrene flat-bottom microplates.

Performance specifications for cuvette readings apply only to aqueous solutions having solute molal concentrations less than 0.4 M.

When pathlength compensation is applied to microplate absorbance measurements, agreement with cuvette absorbance measurements for the same solution requires that the solution volume in the microplate well is between 100  $\mu\text{L}$  and 300  $\mu\text{L}$ .

Technical specifications are subject to change without notice.

PHOTOMETRIC PERFORMANCE	
<b>Wavelength range</b>	190–1000 nm
<b>Wavelength selection</b>	Monochromator tunable in 1-nm increments
<b>Wavelength bandwidth</b>	$\leq 2.0$ nm full width half maximum
<b>Wavelength accuracy</b>	$\pm 1.0$ nm across wavelength range
<b>Wavelength repeatability</b>	$\pm 0.2$ nm
<b>Photometric range</b>	0 to 4.000 OD
<b>Photometric resolution</b>	0.001 OD
<b>Photometric accuracy/linearity (microplate), 0–2.0 OD</b>	190–1000 nm $< \pm 1.0\%$ and $\pm 0.006$ OD
<b>Photometric accuracy/linearity (cuvette), 0–2.0 OD</b>	190–1000 nm $< \pm 1.0\%$ and $\pm 0.005$ OD
<b>Photometric precision (repeatability), 0–2.0 OD</b>	190–1000 nm $< \pm 1.0\%$ and $\pm 0.003$ OD
<b>Stray light</b>	$\leq 0.05\%$ at 230 nm
<b>Photometric stabilization</b>	Instantaneous

<b>Photometric drift</b>	None — continuous referencing of monochromatic input
<b>Calibration</b>	Automatic before first kinetic read and before every endpoint reading
<b>Optical alignment</b>	None required
<b>Light source</b>	Xenon flash lamp (5 Watts)
<b>Average lamp lifetime</b>	1 billion flashes
<b>Illumination</b>	Top down (microplates); horizontal (cuvettes)
<b>Photodetectors</b>	Silicon photodiode
<b>PHOTOMETRIC ANALYSIS MODES</b>	
<b>Standalone</b>	<ul style="list-style-type: none"> <li>• Single wavelength Absorbance or %Transmittance reading of the cuvette (or test tube)</li> </ul>
<b>Using SoftMax Pro</b>	<ul style="list-style-type: none"> <li>• Express data as Absorbance or %Transmittance</li> <li>• Single wavelength reading of microplate and/or cuvette</li> <li>• Multiple wavelength (up to six) reading of microplate or cuvette</li> <li>• Kinetic and kinetic graphics of microplate and/or cuvette</li> <li>• Spectral scan (190–1000 nm) of microplate and/or cuvette</li> </ul>

MEASUREMENT TIME (CALIBRATION OFF)	
<p><b>Microplate read time (endpoint) — standard read*</b></p> <p>*Measurement conditions: endpoint, column priority (for dual-wavelength measurements), calibrate off.</p>	<ul style="list-style-type: none"> <li>• 96 wells in 9 seconds (single wavelength)</li> <li>• 96 wells in 19 seconds (dual wavelength, 425 &amp; 650 nm)</li> <li>• 384 wells in 29 seconds (single wavelength)</li> <li>• 384 wells in 59 seconds (dual wavelength, 425 &amp; 650 nm)</li> </ul>
<p><b>Microplate read time (endpoint) — speed read*</b></p> <p>*Measurement conditions: endpoint, column priority (for dual-wavelength measurements), calibrate off.</p>	<ul style="list-style-type: none"> <li>• 96 wells in 5 seconds (single wavelength)</li> <li>• 96 wells in 12 seconds (dual wavelength, 425 &amp; 650 nm)</li> <li>• 384 wells in 16 seconds (single wavelength)</li> <li>• 384 wells in 34 seconds (dual wavelength, 425 &amp; 650 nm)</li> </ul>
<p><b>Microplate kinetic read intervals</b></p>	<ul style="list-style-type: none"> <li>• 96 wells, 9-second minimum interval between readings (single wavelength)</li> <li>• 1 column, 2-second minimum interval between readings (single wavelength)</li> <li>• 384 wells, 29-second minimum interval between readings (single wavelength)</li> </ul>
<p><b>Cuvette read time (endpoint)</b></p>	<ul style="list-style-type: none"> <li>• 1 second (single wavelength)</li> </ul>
<p><b>Cuvette kinetic read intervals</b></p>	<ul style="list-style-type: none"> <li>• 2-second minimum interval between readings (single wavelength)</li> </ul>
SCAN SPEED	
<p><b>Cuvette: normal scan</b></p>	45*K nm/min (K = wavelength interval)
<p><b>Cuvette: speed scan</b></p>	130*K nm/min
<p><b>Microplate: normal scan</b></p>	33*K nm/min (8-well strip); 21*K nm/min (16-well strip)
<p><b>Microplate: speed scan</b></p>	135*K nm/min (8-well strip); 77*K nm/min (16-well strip)

TEMPERATURE REGULATION	
<b>Reading chamber</b>	Isothermal when temperature regulation is not enabled
<b>Range</b>	4°C above ambient to 45°C when temperature regulation enabled. The ambient temperature must be >20°C to achieve temperature regulation at 45°C.
<b>Resolution</b>	± 0.1°C
<b>Accuracy</b>	± 1.0°C for microplate and cuvette chamber
<b>Temperature uniformity at equilibrium</b>	± 0.5°C at 37°C
<b>Chamber warm-up time</b>	15–30 minutes (measured on air) after initiation of temperature regulation
<b>Temperature regulation</b>	4 sensors
<b>Drift</b>	± 0.2°C (regulated)
<b>Temperature regulation diagnostics</b>	Temperature regulation system is continuously monitored and updated
<b>Evaporation</b>	Plate lid required to minimize evaporative cooling
<b>Recommended microplate</b>	Flat-bottom microplates with isolated wells and lid
AUTOMIX WITH SOFTMAX PRO	
<b>Plate mixing modes</b>	Selectable: off, once prior to any reading, and once prior to and between kinetic readings
<b>Plate mixing duration</b>	Selectable: 1 to 999 seconds (three-second default)

COMPATIBILITY	
<b>Microplates</b>	Standard and half-area 96-well flat-bottomed microplates (0.3 mL), 384-well flat-bottomed microplates. Polystyrene plates for wavelengths above 340 nm; UV transparent plates above 220 nm; quartz plates above 190 nm.
<b>Cuvettes</b>	Standard height (45 mm) cells with 10 mm pathlength (12.5 mm x 12.5 mm outside) with minimum inside width of 4 mm (typical for 3 mL volume cells). See Section 8.3., "Cuvettes in SpectraMax Plus <sup>384</sup> " for more information.
<b>Test tubes</b>	12 x 75 mm test tubes can be used in the cuvette chamber with the test tube cover.
GENERAL INSTRUMENT	
<b>Display</b>	2-x-20-character backlit LCD
<b>Operating panel</b>	8-key membrane keypad
<b>Self-diagnosis</b>	Continuous on-board diagnostics
<b>Spill control</b>	Drawer mechanism and reading chamber assembly protected from accidental spillage by drainage ports
<b>Computer interface</b>	8-pin DIN RS-232 serial (double shielding required)
<b>Printer interface</b>	Parallel 25-pin to Centronics (double shielding required)
<b>Microplates supported</b>	All 96-well and strip-well microplates, including lids

ENVIRONMENTAL	
<b>Operating temperature</b>	15°C to 40°C
<b>Operating humidity</b>	0 to 70%, non-condensing
<b>Storage temperature</b>	-20°C to 65°C
PHYSICAL	
<b>Size (h x w x d)</b>	8.6" (220 mm) x 22.8" (580 mm) x 15" (380 mm)
<b>Weight</b>	30 lb (13.6 kg)
<b>Power consumption</b>	< 250 W
<b>Line voltage and frequency</b>	90–250 VAC autoranging, 50/60 Hz

## 7.2. SpectraMax 340PC<sup>384</sup> Specifications

Thermal specifications for microplates used in the SpectraMax 340PC<sup>384</sup> apply to flat-bottom microplates with isolated wells.

All other microplate specifications apply to standard 96-well polystyrene flat-bottom microplates.

Technical specifications are subject to change without notice.

PHOTOMETRIC PERFORMANCE	
<b>Wavelength range</b>	340–850 nm
<b>Wavelength selection</b>	Monochromator tunable in 1-nm increments
<b>Wavelength bandwidth</b>	≤ 2.0 nm full width half maximum
<b>Wavelength accuracy</b>	± 1.0 nm across wavelength range
<b>Wavelength repeatability</b>	± 0.2 nm across all optical channels
<b>Photometric range</b>	0 to 4,000 OD
<b>Photometric resolution</b>	0.001 OD
<b>Photometric accuracy/linearity (microplate), 0–2.0 OD</b>	340–850 nm < ± 1.0% and ± 0.006 OD