
Specifications

Microplates

All models accommodate standard 6-, 12-, 24-, 48-, 96- and 384-well microplates with 128 x 86 mm geometry, and support:

- **Absorbance mode:** plates up to 0.8" (20.30 mm) high
- **Fluorescence/Luminescence modes:** plates up to 1.25" (31.75 mm) high
- **PCR tube trays** up to 1.25" (31.75 mm) high (may require an adapter)

All models read 6-, 12-, 24-, 48-, 96- and 384-well microplates

Injector models dispense to 6-, 12-, 24-, 48-, and 96-well microplates

Hardware and Environmental

Light Source:**Absorbance**

Xe flash light source

10 W max average power

Life: 1 billion flashes

Fluorescence

Tungsten quartz halogen

20 W

Life: 1000 hours

Dimensions:

16" D x 15" W x 10" H (40.6 cm x 38 cm x 25.4 cm)

Weight:

38 lb. (17 kg)

Environment:

Operational temperature 18° to 40°C

Humidity:

10% to 85% relative humidity (non-condensing)

Power Consumption:

100 VA max, 130 VA max with injectors

Absorbance

Accuracy, Linearity, Repeatability

All qualifications were conducted using 96-/384-well, flat bottom microplates.

Measurement Range: 0.000 to 4.000 OD

All qualifications were conducted with 96- and 384-well flat-bottom plates.

Accuracy:

0.000 to 2.000 OD $\pm 1.0\% \pm 0.010$ OD Normal and Rapid modes, 96-well plates

0.000 to 2.000 OD $\pm 2.0\% \pm 0.010$ OD Normal and Rapid modes, 384-well plates

2.000 to 2.500 OD $\pm 3.0\% \pm 0.010$ OD Normal and Rapid modes, 96- and 384-well plates

2.500 to 3.000 OD $\pm 3.0\% \pm 0.010$ OD Normal mode, 96-well plates

0.000 to 1.000 OD $\pm 1.0\% \pm 0.010$ OD Sweep mode, 96- and 384-well plates

Linearity:

0.000 to 2.000 OD $\pm 1.0\%$ Normal and Rapid modes, 96-well plates

0.000 to 2.000 OD $\pm 2.0\%$ Normal and Rapid modes, 384-well plates

2.000 to 2.500 OD $\pm 3.0\%$ Normal and Rapid modes, 96- and 384-well plates

2.500 to 3.000 OD $\pm 3.0\%$ Normal mode, 96-well plates

0.000 to 1.000 OD $\pm 1.0\%$ Sweep mode, 96- and 384-well plates

Repeatability:

0.000 to 2.000 OD $\pm 1.0\% \pm 0.005$ OD Normal and Rapid modes, 96- and 384-well plates

2.000 to 2.500 OD $\pm 3.0\% \pm 0.005$ OD Normal and Rapid modes, 96- and 384-well plates

2.500 to 3.000 OD $\pm 3.0\% \pm 0.005$ OD Normal mode, 96- and 384-well plates

0.000 to 1.000 OD $\pm 2.0\% \pm 0.010$ OD Sweep mode, 96- and 384-well plates

For the above performance, the Gain on the Optics Test should be below 10.0.

Optics

λ **range:** 200 to 999 nm

λ **accuracy:** ± 2 nm

λ **repeatability:** ± 0.2 nm

λ **bandpass:** 2.4 nm

Detector: Photodiodes (2)

Read Modes

The Synergy™ HT supports the following read modes:

- **Normal** mode is the slowest of the three available modes. After positioning the well over the probe, the instrument waits 100 milliseconds before taking the measurement (8-flash data collection).

❖ **Note:** The 100 ms delay is to allow for more complete fluid settling. If the OD is > 2.000, the reader takes 64 more measurements (64-flash data collection).

- **Rapid** mode is faster than Normal mode because the instrument does not wait before taking the measurement, and performs an 8-flash data collection even for ODs > 2.000.
- **Sweep** mode is the fastest of the three available modes. The plate carrier sweeps each row past the optics channel without stopping, collecting data with a single flash at each well as it goes by.

Read Timing

The following read times are based on a single- or dual-wavelength measurement. Actual reading times can vary, depending upon the wavelength, read mode, and other reading parameters selected. In Normal read mode (see above), the optical density of the solution affects timing as well.

Endpoint read time is from plate start to plate stop. Kinetic read time is from A1 to A1 read positions.

Endpoint, 96-well plate:	Single 630 nm	Dual 630/450 nm
Normal Read Mode	57 sec	106 sec
Rapid Read Mode	47 sec	86 sec
Sweep Read Mode	23 sec	37 sec
Endpoint, 384-well plate:	Single 630 nm	Dual 630/450 nm
Normal Read Mode	159 sec	309 sec
Rapid Read Mode	121 sec	232 sec
Sweep Read Mode	38 sec	65 sec
Kinetic, 96-well plate:	Single 630 nm	
Normal Read Mode	49 sec	
Rapid Read Mode	39 sec	
Sweep Read Mode	14 sec	

Kinetic, 384-well plate:	Single 630 nm
Normal Read Mode	150 sec
Rapid Read Mode	111 sec
Sweep Read Mode	26 sec

Fluorescence

Read Timing

Because of the possible wide variations in setup, the following benchmark conditions are specified:

Excitation Filter:	485/20 nm
Emission Filter:	528/20 nm
Samples per well:	10
Delay before sampling:	350 ms
Delay between samples:	1 ms
96-well read:	89 sec
384-well read:	275 sec

Optical Probes

The Synergy HT is configured with a variety of probe sizes: 1.5 and 3 mm probes can be installed in either the top or bottom positions; the 5 mm probe can only be installed in the bottom position.

Sensitivity

5 mm probe:

Sodium Fluorescein (SF) (Bottom reading):

10 pg/ml solution of Sodium Fluorescein in PBS
 150 µL per well signal-to-noise ratio greater than 2.0
 Excitation 485/20, Emission 530/25
 Hellma 96-well quartz plate

Propidium Iodide (PI) (Bottom reading):

62.5 ng/ml solution of Propidium Iodide in PBS
 50 µL per well signal-to-noise ratio greater than 2.0
 Excitation 485/20, Emission 645/40
 Corning Costar® 96-well, black-sided, clear bottom plate

3 mm probe:

Sodium Fluorescein (SF) (Bottom reading):

20 pg/ml solution of Sodium Fluorescein in PBS
 150 μ L per well signal-to-noise ratio greater than 2.0
 Excitation 485/20, Emission 530/25
 Hellma 96 well quartz plate

Propidium Iodide (PI) (Bottom reading):

125 ng/ml solution of Propidium Iodide in PBS
 50 μ L per well signal-to-noise ratio greater than 2.0
 Excitation 485/20, Emission 645/40
 Corning Costar® 96-well, black-sided, clear bottom plate

Methylumbelliferone (MUB) (Top reading):

0.16 ng/ml solution of Methylumbelliferone in CBB
 300 μ L per well signal-to-noise ratio greater than 2.0
 Excitation 360/40, Emission 460/40
 Corning Costar® black strips

1.5 mm probe:

Sodium Fluorescein (SF) (Bottom reading):

40 pg/ml solution of Sodium Fluorescein in PBS
 150 μ L per well signal-to-noise ratio greater than 2.0
 Excitation 485/20, Emission 530/25
 Hellma 96-well quartz plate

Propidium Iodide (PI) (Bottom reading):

250 ng/ml solution of Propidium Iodide in PBS
 50 μ L per well signal-to-noise ratio greater than 2.0
 Excitation 485/20, Emission 645/40
 Corning Costar® 96-well, black-sided, clear bottom plate

Methylumbelliferone (MUB) (Top reading):

0.31 ng/ml solution of Methylumbelliferone in CBB
 300 μ L per well signal-to-noise ratio greater than 2.0
 Excitation 360/40, Emission 460/40
 Corning Costar® black strips

Optional Time-Resolved Fluorescence

- Delay 0 or 20 μ s to 16000 μ s
- Integration interval 20 to 16000 μ s
- Times adjustable in 10 μ s increments

Incubation

- Temperature control range from 4° over ambient to 50°C
- Temperature variation $\pm 0.50^{\circ}\text{C}$ across the plate @ 37°C (250 μL per well with the plate sealed)

Shake

- Low, Medium, High and Variable shaking speeds
- Shake duration is programmable by the user

Injector Model

The following specifications apply to Synergy™ HT models with injectors:

Plate Type:	Dispenses to standard 6-, 12-, 24-, 48-, and 96-well microplates with 128 x 86 mm geometry
Dispense Volume Range:	5-1000 μL with a 5-20 μL tip prime
Accuracy:	Dispensing deionized water with 0.1% Tween® 20 at room temperature: $\pm 1 \mu\text{L}$ at 5-50 μL $\pm 2\%$ at 51-1000 μL
Precision:	Dispensing a 200 μL solution of deionized water, 0.1% Tween 20, and dye at room temperature: $\leq 2.0\%$ for volumes of 50-200 μL $\leq 4.0\%$ for volumes of 25-49 μL $\leq 7.0\%$ for volumes of 10-24 μL $\leq 10.0\%$ for volumes of 5-9 μL