

The Ion PGM™ Sequencer

The fastest and most affordable benchtop sequencer

The Ion PGM™ Sequencer:

- Delivers the fastest run times of any next-generation sequencer, enabling a single-day workflow
- Supports three semiconductor chips with a range of prices and outputs for flexible and scalable projects
- Generates highly accurate 200 base reads with the majority of bases at $\geq Q30$
- Requires the lowest capital investment for the greatest research impact
- Is supported by a global community of users and developers—the Ion Community



The Ion PGM™ Sequencer performs real-time measurements of hydrogen ions produced during DNA replication. Ion semiconductor chips employ a massively parallel array of semiconductor sensors to directly translate genetic information (DNA) to digital information (DNA sequence). This groundbreaking technology enables rapid and scalable sequencing across a range of applications.

Fastest run times, fastest workflow

The Ion PGM™ Sequencer produces the fastest results of any benchtop next-generation sequencer, offering a one-day workflow for most applications. Because of the rapid cycle times possible with semiconductor sequencing, Ion PGM™ Sequencer runs are complete in as little as 30 minutes for 35 base runs on an Ion 314™ Chip, and only 4.5 hours for 200 base runs (up to 1 Gb of output) on a Ion 318™ Chip. Ion fragment libraries can be prepared in as little as 2 hours (Figure 1).

The AB Library Builder™ and Ion OneTouch™ Systems support the Ion PGM™ Sequencer and enable simple and automated library and template preparation, further enhancing ease of use. Software solutions, both from Ion Torrent and other vendors, enable easy-to-use and streamlined data analysis.

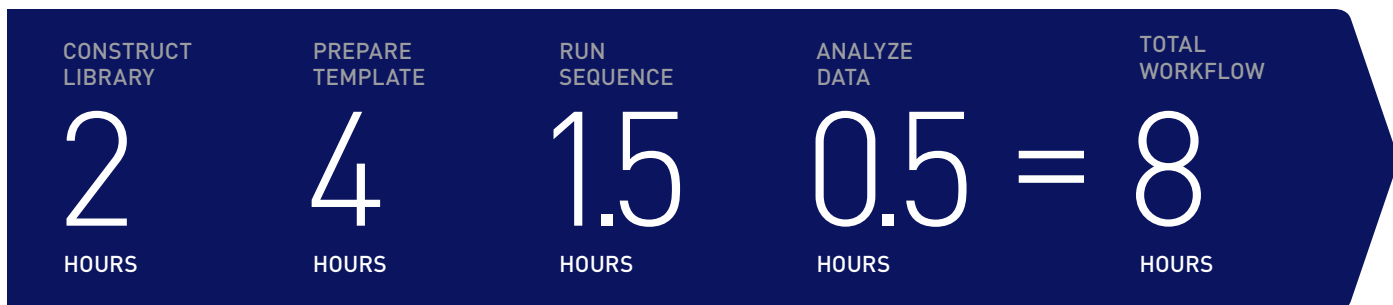


Figure 1. The Ion PGM™ Sequencer delivers the fastest run times and the fastest overall workflow of any next-generation sequencer. Workflow shown here is for 100-base reads on an Ion 314™ Chip and using the Ion Xpress™ Plus Fragment Library Kit.

The modular design of the Ion PGM™ System means that library preparation, template preparation, and sequencing can all be performed in parallel. Short run times, combined with the ability to prepare libraries and templates in advance, allow you to maximize the number of sequencing runs on the Ion PGM™ Sequencer—up to 15 runs per standard working day, depending on read length and chip.

Flexible and scalable projects

The Ion PGM™ Sequencer supports a range of outputs with three Ion semiconductor chips, providing flexibility for projects and costs. The ability to multiplex up to 96 samples with available kits (or as many as 384 samples using custom barcodes) further increases the flexibility of the system. The technology supports 35 to 200 base runs (Table 1), and protocols are available for single-end sequencing (SES), paired-end sequencing (PES), and mate-pair sequencing (MPS). Flexibility will increase in Q4 2012 with the release of protocols for SES reads up to 400 bases.

Accurate long reads for a broad range of applications

The Ion PGM™ Sequencer produces accurate long reads with more than 99% raw read accuracy, the majority of bases at ≥Q30, the lowest observed substitution error of any available next generation sequencer.

This attribute makes the technology ideally suited for targeted sequencing of gene panels—utilizing the Ion AmpliSeq™ target selection technology or other standard methods—as well as small genome sequencing, small RNA analysis, gene expression, and ChIP-Seq (Table 2). A range of easy-to-use kits are available for creating DNA libraries (using DNA fragmented by mechanical or enzymatic shearing) and RNA libraries.

Robust and easy to use

Ion semiconductor sequencing relies on a simple pH measurement. By eliminating the need for modified nucleotides or fluorescent/chemiluminescent reporters, and for expensive and complex optics and cameras, the Ion PGM™ Sequencer is a robust and cost-effective platform.

Packing a lot of power into a small footprint, the Ion PGM™ Sequencer offers streamlined setup. Installation, validation, and operation are simplified, allowing you to move rapidly from unpacking the box to starting your first sequencing runs. The simplicity of semiconductor technology delivers an instrument with a robust nature comparable to the long-standing thermal cycler technology.

Lowest capital acquisition cost

Compared to technologies that use fluorescence/chemiluminescence along with cameras and lasers, Ion semiconductor sequencing technology delivers instrument pricing that is 2–5 times more affordable. This low price point puts the Ion PGM™ Sequencer in a class of its own and has made next-generation sequencing more accessible to scientists than any other technology.

Global community

The Ion PGM™ Sequencer is supported not only by hundreds of dedicated people at Life Technologies Corporation, but also by more than 10,000 Ion Community members (as of June 2012). Growing by about 150 new members each week, the online Ion Community provides researchers with open protocols, data sets, and source code. Users can also access training videos and user guides and interact with other users of the technology.

Join the Ion Community at ioncommunity.iontorrent.com

Table 1. The Ion PGM™ Sequencer continues to keep pace with scalability demands—3 Mb to 1 Gb.

Chip	Expected sequencing run time			Expected output*		
	35 base reads	100 base reads	200 base reads	35 base reads	100 base reads	200 base reads
 Ion 314™ Chip	0.5 hr	1.5 hr	2.4 hr	3 Mb	10 Mb	20 Mb
 Ion 316™ Chip	0.7 hr	1.7 hr	3.1 hr	30 Mb	100 Mb	200 Mb
 Ion 318™ Chip	0.9 hr	2.4 hr	4.5 hr	300 Mb	500 Mb	Up to 1 Gb

*Expected output with >Q20 (>99%) aligned/measured accuracy and majority of bases ≥Q30. Paired end and mate pair sequencing protocols are available through the Ion Community.

Table 2. The Ion PGM™ Sequencer is a flexible solution for a variety of applications, library types, and areas of interest.

Applications			
DNA sequencing	RNA sequencing	Library types	Area of interest
<ul style="list-style-type: none"> • Small genome sequencing • Gene sequencing • Exome sequencing • Mitochondrial sequencing • HLA sequencing • SNP confirmation • Library assessment • 16S metagenomic sequencing • ChIP sequencing • Methylation analysis • <i>De novo</i> sequencing 	<ul style="list-style-type: none"> • Gene expression by sequencing • Small-RNA sequencing • Whole-transcriptome sequencing for low-complexity genomes 	<ul style="list-style-type: none"> • Single end reads • Paired end reads • Mate paired reads • Barcoded libraries 	<ul style="list-style-type: none"> • Agricultural research • Cancer research • Forensic science • Stem cell research • Epigenomics • Metagenomics • Ancient DNA genomics

Specifications for the Ion PGM™ Sequencer

Working environment (for indoor use only)	Temperature: 68–77°F (20–25°C) Humidity: 40–60%, noncondensing Altitude: <6,500 ft (2,000 m) Clearances: 4 in (10 cm) in rear 4 in (10 cm) on left side 8 in (20 cm) on right side 12 in (30.5 cm) from front edge of bench to sequencer bezel 8 in (20.3 cm) from front edge of bench to the conical tubes 36 in (90 cm) aisle in front of bench for operator access
Weight	Crated for shipment: 85 lb (39 kg) Free-standing: 65 lb (30 kg)
Other connections	iPod® device: standard iPod® device docking station Ethernet: gigabit or faster USB: 2 x USB 2.0 Gas supply: 0.25 in push-to-connect fitting Pressure: 35–45 psi Composition: nitrogen or argon gas (99.9% industrial grade or better)
Power	Voltage: 100–240 V Current: 9 A (max) Frequency: 50/60 Hz
Dimensions	Width: 24 in (61 cm) Depth: 20 in (51 cm) Height: 21 in (53 cm)
Additional equipment	PGM™ Torrent Server Ion OneTouch™ System

Find out more about the Ion PGM™ Sequencer products and support

To see our entire portfolio of instruments, kits, consumables, and software, go to lifetechnologies.com/ionproducts

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Printed in the USA. C0111106 0612