MiniSeq™ Sequencing System

The power of proven Illumina sequencing in an approachable and easy-to-use research tool.

Highlights

- **Accessible Illumina sequencing**
  Affordable to acquire and cost-effective to run, even with low numbers of samples
- **Push-button operation and simple data analysis**
  Walk away library-to-results solution with onboard data analysis
- **Highly flexible to fit research demands**
  Supports a broad range of DNA and RNA sequencing applications for examining single genes to entire pathways
- **End-to-end support**
  Illumina scientists and engineers provide installation, training, and support, from assay design through data analysis

Figure 1: The MiniSeq System—By harnessing advances in SBS chemistry and simple, streamlined workflows, the MiniSeq System delivers a library-to-results solution that is powerful and easy to use.

Introduction

The MiniSeq System (Figure 1) delivers the quality and reliability of Illumina next-generation sequencing (NGS) technology in a powerful, accessible benchtop sequencer with a small footprint. It enables researchers to take control of their sequencing projects. This small, robust system turns a broad range of NGS methods into approachable, easy-to-use research tools. With the MiniSeq System, there is no need to wait to batch samples for sequencing on a high-throughput instrument; researchers can sequence on demand. It circumvents the iterative, time-consuming testing of Sanger sequencing and qPCR to allow for interrogation of individual genes to entire pathways with full-gene coverage. Laboratories of any size can perform a range of sequencing methods to deliver results and advance their research.

Powerful sequencing made simple

The MiniSeq System features a simple, integrated, library-to-results workflow that enables sequencing of both DNA and RNA with minimal hands-on time (Figure 2). It is ideal for targeted research applications such as cancer sequencing and gene expression profiling. Onboard, touch-screen data analysis with a simple, intuitive user interface eliminates the need for specialized equipment or bioinformatics expertise. Illumina scientists are available at every point along the way with support and guidance, enabling researchers to focus on making the next breakthrough discovery.

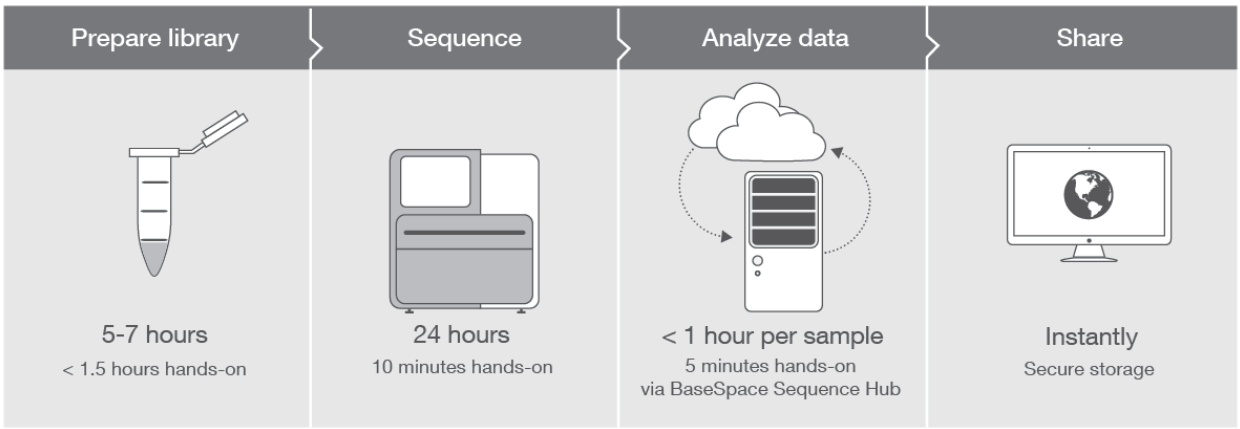

Figure 2: MiniSeq System sequencing workflow—The MiniSeq System offers a simple, integrated workflow from library preparation to onboard data analysis. Workflow times will vary by experiment and assay type. Details shown are for a sequencing run using the AmpliSeq™ for Illumina Sequencing Solution and a read length of 2 × 150 bp.

Table 1: Flexibility for multiple applications

Application	High-output reagent kit		Mid-output reagent kit	
	No. of samples	Run time[a]	No. of samples	Run time
Targeted DNA amplicon sequencing 207 amplicons 500× coverage 2 × 150 bp	96	24 hours	32	17 hours
Targeted expression profiling 65 targets 1 × 50 bp	384	7 hours	123	6 hours
Enrichment panel 1 Mb region 100× coverage 2 × 75 bp	23	13 hours	7	12 hours
Viral Pathogen Panel 1M reads/sample 1 × 100 bp (Rapid Kit)	20	< 5 hours	N/A[b]	N/A[b]
microRNA sequencing 5M reads/sample 1 × 36 bp	5	4 hours	2	4 hours
Small whole-genome sequencing 5 Mb genome 30× coverage 2 × 150 bp	50	24 hours	16	17 hours

a. Run times are without indexes.

b. N/A = not applicable

Streamlined sequencing workflow

The MiniSeq System provides an intuitive user interface and load-and-go operation, making it easy to learn and easy to use. It integrates clonal amplification, sequencing, and data analysis into a single instrument, eliminating the need to purchase and operate specialized, ancillary equipment. After library preparation using a simple, streamlined Illumina library prep kit, libraries are loaded into the MiniSeq System where sequencing is automated. It takes less than five minutes to load and set up a run on the MiniSeq System. Runs are complete in less than a day, and data analysis is performed onboard the instrument or in BaseSpace™ Sequence Hub - the Illumina genomic computing environment. A suite of data analysis tools and a growing list of third-party BaseSpace Applications (Apps) empower researchers to perform their own informatics analysis easily.

By employing industry-leading Illumina sequencing by synthesis (SBS) chemistry and file format conventions, the MiniSeq System offers customers access to a broad ecosystem of established protocols, workflows, data sets, and data analysis tools.

Supports a wide range of applications

The MiniSeq System combines industry-leading Illumina NGS technology with a broad range of library preparation and data analysis solutions to deliver robust NGS tools in a simple, intuitive user experience. It offers cross-method flexibility, enabling easy transition between sequencing projects for both DNA and RNA applications. Demonstrated and optimized workflows are available for small RNA discovery, targeted resequencing, targeted RNA sequencing, and profiling of solid and hematological tumors (Table 1).

The MiniSeq System delivers a < 1-day turnaround for numerous sequencing methods. The output of the system allows researchers to sequence a broad range of samples per run:

- 1–96 targeted panel samples
- 1–384 gene expression profiling samples
- 1-12 small RNA (miRNA) profiling samples
- 1-20 viral pathogen RNA enrichment samples

The MiniSeq System is supported by the full suite of Illumina library preparation solutions, enabling library compatibility across the Illumina sequencing portfolio. This allows researchers to scale up studies easily to the higher throughput NextSeq™ Series of Sequencing Systems or perform follow-up studies on the MiSeq™ Series of Sequencing Systems (Figure 3).

Industry-leading SBS chemistry delivers high accuracy

At the core of the MiniSeq System is industry-leading Illumina SBS chemistry, the most widely adopted NGS technology worldwide.[1] This proprietary reversible terminator–based method enables the massively parallel sequencing of millions of DNA fragments, detecting single bases as they are incorporated into growing DNA strands. The method significantly reduces errors and missed calls associated with strings of repeated nucleotides (homopolymers). The low cost-per-base allows deeper sequencing for more sensitivity and greater accuracy (Table 2).

Table 2: MiniSeq System performance parameters

Flow cell configuration[a]	Read length (cycles)	Output (Gb)	Run time[b]	Data quality[c]
High-output kit	300	~ 7.5	~ 24 hours	Q30 > 80%
Up to 25M single reads	150	~ 4	~ 13 hours	Q30 > 85%
Up to 50M paired-end reads	75	~ 2	~ 7 hours	Q30 > 85%
Rapid kit Up to 20M single reads	100	~ 2	< 5 hours	Q30 > 85%
Mid-output kit Up to 8M single reads Up to 16M paired-end reads	300	~ 2.5	~ 17 hours	Q30 > 80%

a. Actual performance parameters may vary based on sample type sample quality, and clusters passing filter.

b. Times include cluster generation, sequencing, and base calling with quality scores on a MiniSeq System.

c. The percentage of bases > Q30 is averaged over the entire run.

Push-button data analysis and streamlined bioinformatics

The MiniSeq System features onboard data analysis in an intuitive user interface. The instrument computer processes base calls and quality scores generated during the sequencing run. Researchers have several options for data analysis.

Local Run Manager software is a multifunctional, integrated onboard solution. Local Run Manager not only allows users to create a sequencing run, monitor status, and view results, but also analyze data. It is easily accessed through a web browser and integrates with the instrument control software. Samples to be sequenced and analysis input files are recorded, and onboard data analysis is automatically performed upon completion of the sequencing run. This produces alignment information, structural variants, expression analysis, small RNA analysis, and more for each sample based on the user-specified analysis workflow.

Also, sequencing data can be run through a wide range of open-source or commercial pipelines developed for Illumina data, or instantly transferred, analyzed, archived, and shared securely with BaseSpace™ Sequence Hub. BaseSpace Sequence Hub is the only cloud ecosystem that offers direct instrument integration, enabling automatic encrypted data flow directly from the instrument into the cloud ecosystem for analysis, storage, sharing, and other forms of data management. Additionally, BaseSpace Sequence Hub users can monitor the status of their runs through the cloud portal or through the iOS app for BaseSpace.

Figure 3: Illumina NGS portfolio of benchtop sequencers—Illumina NGS systems offer solutions for virtually every application, sample type, and sequencing scale. Each delivers high data quality and accuracy with flexible throughput and simple, streamlined workflows. Data can be easily compared, exchanged, and analyzed in BaseSpace Sequence Hub.

Summary

The MiniSeq System is a small, robust benchtop sequencer that enables NGS to become an everyday tool in laboratories worldwide. Incorporating advances in SBS chemistry, the flexible MiniSeq System features push-button operation and streamlined library-to-results workflows that allow researchers to perform popular NGS applications. Its price point and cost-effective operation, even for low numbers of samples, makes the power of proven Illumina sequencing more accessible than ever.

Ordering Information

Order the MiniSeq System and reagents at www.illumina.com

System	Catalog no.
MiniSeq Sequencing System	SY-420-1001
Sequencing reagent kits	**Catalog no.**
MiniSeq High Output Kit (75 cycles)	FC-420-1001
MiniSeq High Output Kit (150 cycles)	FC-420-1002
MiniSeq High Output Kit (300 cycles)	FC-420-1003
MiniSeq Rapid Kit (100 cycles)	20044338
MiniSeq Mid Output Kit (300 cycles)	FC-420-1004

MiniSeq System specifications

Parameter	Specifications
Instrument configuration	RFID tracking for consumables
Instrument control computer (internal)[a]	Base unit: Intel Core i7-4700EQ 2.4 GHz CPU Memory: 16 GB DDR3L RAM Hard drive: 1 Tb Operating system: Windows 10 embedded standard
Operating environment	Temperature: 19°C to 25°C (22°C ± 3°C) Humidity: noncondensing 20%–80% relative humidity Altitude: less than 2000 m (6500 ft) Air quality: pollution degree rating of II, air particulate cleanliness levels per ISO9 (ordinary room air) or better Ventilation: up to 2048 BTU/hr @ 600 W For indoor use only
Light emitting diode (LED)	515 nm, 650 nm
Dimensions	W×D×H: 45.6 cm × 48 cm × 51.8 cm (18.0 in × 18.9 in × 20.4 in) Weight: 45 kg (99 lbs) Crated weight: 56.5 kg (125 lbs)
Power requirements	100–120 volts AC — A 15 Amp grounded 220–240 volts AC — A 10 Amp grounded
Radio frequency identifier (RFID)	Frequency: 13.56 MHz Power: supply 3.3 volts DC ± 5%, current 120 mA, RF output power 200 mW
Product safety and compliance	NRTL certified IEC 61010-1 CE marked to the Low Voltage Directive 2006/95/EC FCC/IC approved

a. Computer specifications are subject to change.

Learn more

To learn more about the MiniSeq System, visit www.illumina.com/systems/sequencing-platforms/miniseq.html

To learn more about sequencing applications on the MiniSeq System, visit MiniSeq System Literature to access relevant application notes

References

1. Data calculations on file. Illumina, Inc., 2017.

Maximize Performance and Productivity with Illumina Services, Training, and Consulting

Whether immediate help is needed during an instrument run, or in-depth consultations are required for sophisticated workflows, Illumina can help. Illumina service and support teams provide a full suite of expedient, customized solutions from initial trainings, to instrument support, and ongoing NGS consultations.

Illumina Professional Care Services Packs

Illumina offers Professional Care Services Packs, allotments of points that can be redeemed for discounted Illumina Professional Services. Benefits of Services Packs include:

- One-time investment—no need for additional, postsale expenditures
- Risk mitigation—bank points for unanticipated future services
- Savings—cost-effective versus a la carte pricing

Professional Services

Product Care Services

- Tiered Instrument Service Plans + Add-On Services
- Instrument Compliance Services
- Instrument On-Demand Services

Illumina University Training

- Instructor-Led Training at Your Chosen Facility
- Instructor-Led Training at an Illumina Training Center
- Online Courses
- Webinars

Illumina Consulting

- Proof-of-Concept Services for instrument and library preparation testing
- Concierge Services for design assistance and product optimization
- IT and Bioinformatics Hourly Consulting for personalized assistance

For more on Illumina support offerings, visit: www.illumina.com/services/instrument-services-training.html

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