illumina®

MiniSeq™ System

The power of proven Illumina sequencing, now more accessible than ever.

Highlights

- **Accessible Illumina Sequencing**
  Affordable-to-acquire and cost-efficient to run, even with low numbers of samples
- **Push-Button Operation and Easy 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: MiniSeq System—By harnessing the latest advances in SBS chemistry and simple, streamlined workflows, the MiniSeq System delivers a library-to-results solution that is more affordable than ever.

Introduction

The MiniSeq System (Figure 1) delivers the quality and reliability of Illumina next-generation sequencing (NGS) technology in our most affordable benchtop sequencer to date. It enables researchers to keep pace with technology and take control of their sequencing projects. This small, robust system turns a broad range of NGS methods into affordable, everyday research tools. With cost-efficient operation, even for low numbers of samples, there is no need to wait to batch samples for sequencing on a high-throughput instrument. With the MiniSeq System, researchers can sequence on demand. It circumvents the iterative, time-consuming testing of Sanger sequencing and qPCR to allow for interrogation of single genes to entire pathways with full-gene coverage. Now, laboratories of any size can perform a range of sequencing methods to deliver results and advance their studies.

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 like 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. The MiniSeq System has the smallest footprint of any Illumina sequencing system, allowing it to fit seamlessly onto laboratory benchtops (Figure 3). Illumina scientists are available at every point along the way with support and guidance, enabling researchers to focus on making the next breakthrough discovery.

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 5 minutes to load and set up a run on the MiniSeq System. Runs are complete in < 1 day, and data analysis is performed onboard the instrument or in the BaseSpace® platform - the Illumina genomic computing environment. A suite of data analysis tools, and a growing list of third-party BaseSpace Applications (Apps), empowers researchers to perform their own informatics analysis easily.

By employing the 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.

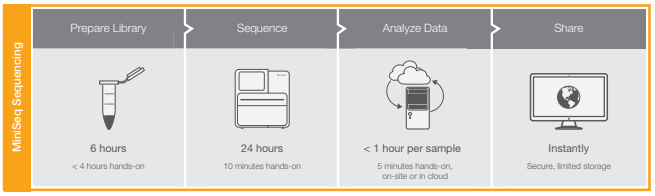

Figure 2: MiniSeq System Sequencing Workflow—The MiniSeq System offers a simple, integrated workflow from library preparation to onboard data analysis. Workflow times will vary by experiment and assay type. Details shown are for a TruSeq® Custom Amplicon sequencing experiment assuming 2 x 150 bp on instrument.

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Table 1: Flexibility for Multiple Applications

Application	High-Output Reagent Kit		Mid-Output Reagent Kit	
	No. of Samples	Run Time	No. of Samples	Run Time
Targeted Amplicon Sequencing 750 amplicons 1000× coverage 2 × 150 bp	28	24 hours	9	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
microRNA Sequencing 5 M 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

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.* 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 higher accuracy.

Versatile to Support 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.

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

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 Systems or perform follow-up studies on the MiSeq® Series Systems (Figure 3).

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 the

Figure 3: Illumina NGS Portfolio of Desktop Sequencers—Illumina NGS systems offer solutions for every application, sample type, and sequencing scale. Each delivers high data quality and accuracy with flexible throughput and simple, streamlined workflows. Data can be seamlessly compared, exchanged, and analyzed in BaseSpace.

*Data calculations on file. Illumina, Inc. 2015.

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Table 2: MiniSeq System Performance Parameters

MiniSeq System Sequencing Performance[a]					
Flow Cell Configuration	**Read Length (cycles)**	**Output (Gb)**	**Run Time[b]**	**Data Quality[c]**	**Required Input**
High-Output Kit Up to 25 M single reads Up to 50 M paired-end reads	300	~ 7.5	~ 24 hours	> 80% > Q30	1 ng-1 µg with Illumina Library Prep Kits
	150	~ 4	~ 13 hours	> 85% > Q30	
	75	~ 2	~ 7 hours	> 85% > Q30	
Mid-output Kit Up to 8 M single reads Up to 16 M paired-end reads	300	~ 2.5	~ 17 hours	> 80% > Q30	

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.

BaseSpace Environment (Cloud or Onsite). Downstream data analysis using the BaseSpace platform includes alignment and variant detection, annotation, visualization, and interpretation. The BaseSpace Environment offers data analysis Apps developed or optimized by Illumina, or from a growing ecosystem of third-party App providers. These Apps cover common analysis methods used with Illumina NGS data, including DNA amplicon, targeted RNA, small RNA, somatic variant calling, and more. BaseSpace Software empowers researchers to do their own informatics.

Summary

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

Table 3: MiniSeq System 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 7 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 ISO 9 (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
WxDxH: 45.6 cm x 48 cm x 51.8 cm (18 in x 18.9 in x 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.

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Ordering Information

System Name	Catalog No.
MiniSeq System	SY-420-1001
Kit	**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 Mid Output Kit (300 Cycles)	FC-420-1004

Learn More

To learn more about the next revolution in sequencing, visit www.illumina.com/Miniseq.

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
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- Instrument Compliance Services
- Instrument On-Demand Services

Illumina University Training
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- 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

Illumina • 1.800.809.4566 toll-free (US) • +1.858.202.4566 tel • techsupport@illumina.com • www.illumina.com

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