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MiSeq® System

Focused power. Speed and simplicity for targeted resequencing and small-genome sequencing.

MiSeq System Highlights

- **Exceptional Data Quality**
  Highest-quality data demonstrated through peer-reviewed, scientific comparison
- **Simple and Intuitive Instrument Workflow**
  Highly automated system features a simple, easy-to-use instrument interface
- **Fastest Turnaround Time**
  Most rapid sequencing and variant detection for time-critical studies
- **Extensive Suite of Applications**
  Adjustable read length and flow cell options provide ultimate flexibility across a broad range of applications

Introduction

The MiSeq System offers the first end-to-end sequencing solution, integrating cluster generation, amplification, sequencing, and data analysis into a single instrument. Its small footprint—approximately 2 square feet—fits easily into virtually any laboratory environment (Figure 1). The MiSeq System leverages Illumina sequencing by synthesis technology (SBS), the most widely used, next-generation sequencing chemistry. With over 750 publications to date, the MiSeq System is the ideal platform for rapid and cost-effective genetic analysis.

Exceptional Data Quality

Illumina SBS chemistry is the most widely adopted next-generation sequencing technology. Exceptional data quality is achieved by SBS chemistry: a proprietary, reversible terminator-based method that detects single bases as they are incorporated into massively parallel DNA strands. Fluorescent terminator dyes are imaged as each dNTP is added and then cleaved to allow incorporation of the next base. With all 4 reversible, terminator-bound dNTPs present during each cycle, natural competition minimizes incorporation bias. Base calls are made directly from signal intensity measurements during each cycle, greatly reducing raw error rates compared to other technologies.[1–5] The result is highly accurate base-by-base sequencing that virtually eliminates sequence context-specific errors, even within repetitive sequence regions or homopolymers. Illumina sequencing delivers the highest yield of error-free data for the most sensitive or complex sequencing samples (Figure 3).

Simple and Intuitive Instrument Workflow

The MiSeq System offers straightforward, easy-to-follow instrument control software. Perform simple instrument operations with an intuitive touch screen interface, use plug-and-play reagent cartridges with RFID tracking, consult on-screen video tutorials, and enjoy step-by-step guides throughout each sequencing workflow.

All MiSeq Systems include onboard data analyis and access to BaseSpace®— the Illumina genomic analysis platform. BaseSpace provides real-time data uploading, simple data analysis tools, internet-based run monitoring, and a secure, scalable storage solution. A suite of data analysis tools, and a growing list of third-party BaseSpace Apps, empowers researchers to perform their own informatics. BaseSpace also enables fast and easy data sharing with colleagues or customers. To learn more, visit www.illumina.com/basespace.

Fast Turnaround Time

For results in hours rather than days, the combination of rapid library preparation and the MiSeq System delivers a simple, accelerated turnaround time (Figure 2). Prepare your sequencing library in just 90 minutes with Nextera® library prep reagents, then move to automated clonal amplification, sequencing, and quality-scored base calling in as little as 4 hours on the MiSeq instrument. Sequence alignment can be completed directly on the onboard instrument computer with MiSeq Reporter software or through the BaseSpace platform within 3 hours.

Figure 1: MiSeq System

The compact MiSeq System is well suited for rapid, cost-effective next-generation sequencing.

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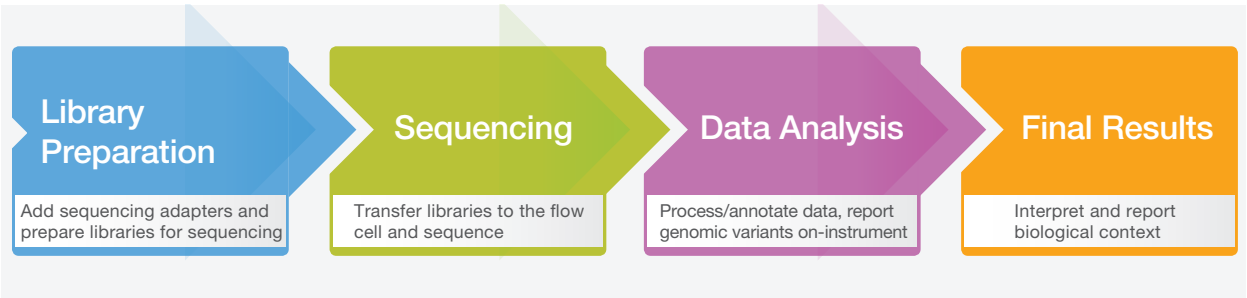
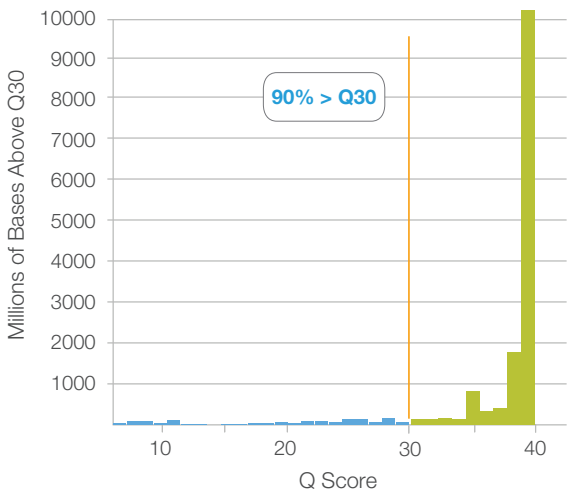
Figure 2: MiSeq Workflow



The revolutionary workflow of the MiSeq System enables rapid turnaround time for next-generation desktop sequencing. Samples were prepared with the Nextera XT library prep kit. Four-hour sequence time includes cluster generation, sequencing, and quality-scored base calling with dual surface scanning for a 1 × 36 base pair run on a MiSeq system with MiSeq Control Software v2.4.

Figure 3: MiSeq Quality Score Distribution



Quality scores for a PhiX control library, 2 × 300 base pair run on a MiSeq System with MiSeq Control Software v2.4. This example shows 90% of bases sequenced above Q30.

Extensive Suite of Applications

Explore an ever increasing range of sequencing applications. With faster turnaround time and simplified workflows, the MiSeq System offers a cost-effective alternative to capillary electrophoresis (CE) for applications such as targeted resequencing, clone checking, and amplicon sequencing. Optimized analysis workflows are also available for small genome sequencing, 16S metagenomics, RNA sequencing, HLA sequencing, forensics, preimplantation genetic screening (PGS), and preimplantation genetic diagnosis (PGD), as well as highly multiplexed applications such as TruSeq® Custom Amplicon and TruSeq Custom Enrichment. Adjustable read lengths, flow cell options, and choice of single or paired-end reads allow unprecedented flexibility for matching data output to a broad range of experimental needs.

MiSeq System Specifications

Instrument Configuration
RFID tracking for consumables
MiSeq Control Software
MiSeq Reporter Software

Instrument Control Computer (Internal)*
Base Unit: Intel Core i7-2710QE 2.10 GHz CPU
Memory: 16 GB RAM
Hard Drive: 750 GB
Operating System: Windows 7 embedded standard
*Computer specifications are subject to change.

Operating Environment
Temperature: 22°C ± 3°C
Humidity: Noncondensing 20%–80%
Altitude: Less than 2,000 m (6,500 ft)
Air Quality: Pollution degree rating of II
Ventilation: Maximum of 1,364 BTU/h
For Indoor Use Only

Light Emitting Diode (LED)
530 nm, 660 nm

Dimensions
W×D×H: 68.6 cm × 56.5 cm × 52.3 cm (27.0 in × 22.2 in × 20.6 in)
Weight: 54.5 kg (120 lbs)
Crated Weight: 90.9 kg (200 lbs)

Power Requirements
100–240V AC @ 50/60Hz, 10A, 400 W

Radio Frequency Identifier (RFID)
Frequency: 13.56 MHz
Power: 100 mW

Product Safety and Compliance
NRTL certified IEC 61010-1
CE marked
FCC/IC approved

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MiSeq System Performance Parameters

MiSeq Reagent Kit v2

Read Length	Total Time*	Output
1 × 36 bp	~4 hours	540–610 Mb
2 × 25 bp	~5.5 hours	750–850 Mb
2 × 150 bp	~24 hours	4.5–5.1 Gb
2 × 250 bp	~39 hours	7.5–8.5 Gb

Reads Passing Filter†

Single Reads	12–15 M
Paired-End Reads	24–30 M

Quality Scores††

> 90% bases higher than Q30 at 1 × 36 bp
> 90% bases higher than Q30 at 2 × 25 bp
> 80% bases higher than Q30 at 2 × 150 bp
> 75% bases higher than Q30 at 2 × 250 bp

MiSeq Reagent Kit v3

Read Length	Total Time*	Output
2 × 75 bp	~21 hours	3.3–3.8 Gb
2 × 300 bp	~56 hours	13.2–15 Gb

Reads Passing Filter†

Single Reads	22–25 M
Paired-End Reads	44–50 M

Quality Scores††

> 85% bases higher than Q30 at 2 × 75 bp
> 70% bases higher than Q30 at 2 × 300 bp

* Total times include cluster generation, sequencing, and base calling on a MiSeq system enabled with dual surface scanning.

† Install specifications based on Illumina PhiX control library at supported cluster densities between 865–965 k/mm^2 clusters passing filter for v2 chemistry and 1200–1400 k/mm^2 clusters passing filter for v3 chemistry. Actual performance parameters can vary based on sample type, sample quality, and clusters passing filter.

†† The percentage of bases > Q30 is averaged across the entire run.

bp = base pairs, Mb = megabases, Gb = gigabases, M = millions

Ordering Information

Instrument Name	Catalog No.
MiSeq System	SY-410-1003

Learn More

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

References

1. Junemann S, Sedlazeck FJ, Prior K, Albersmeier A, John U, Kalinowski J, et al. Updating benchtop sequencing performance comparison. *Nat Biotechnol*. 2013;31:294-296.
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4. Quail MA, Smith M, Coupland P, Otto TD, Harris SR, Connor TR, et al. A tale of three next generation sequencing platforms: comparison of Ion Torrent, Pacific Biosciences and Illumina MiSeq sequencers. *BMC Genomics*. 2012;13:341.
5. Liu L, Li Y, Li S, Hu N, He Y, Pong R, et al. Comparison of Next-Generation sequencing systems. *J Biomed Biotechnol*. 2012;2012:251364.

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 consultation. Our support offerings include:

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- Instrument Compliance Services
- Instrument On-Demand Services

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- Instructor-Led Training at an Illumina Training Center
- Online Courses and Webinars

Illumina Consulting

- Proof-of-Concept Services for instrument and library preparation testing
- Concierge Services for design assistance and product optimization

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