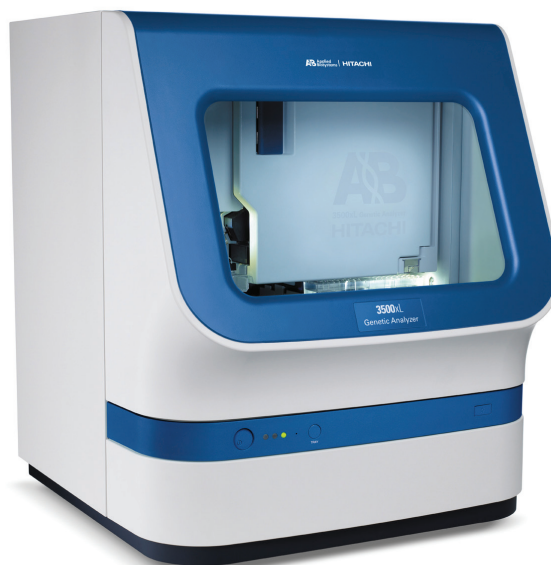


3500 and 3500xL Series Genetic Analyzers

Key features

- 8-capillary 3500 System and 24-capillary 3500xL System
- Advanced thermal system design improves temperature control for demanding DNA fragment analysis applications
- Single-line 505 nm, solid-state long-life laser — utilizes a standard power supply and doesn't require heat removal
- Significantly improved signal uniformity from instrument to instrument, run to run, and capillary to capillary
- Powerful, integrated data collection and primary analysis software provide real-time assessment of data quality
- Radio frequency identification (RFID) technology records key consumable administrative information, tracks usage and warns users of replacement status
- Advanced multiplexing capabilities for DNA fragment analysis with up to six unique dyes
- Superior application flexibility — one array and one polymer used for most applications
- Simple setup, operation and maintenance — the easiest-to-run, easiest-to-own DNA sequencer to date
- Validated for use with Applied Biosystems™ MicroSEQ™ identification and forensics applications



Overview

The Applied Biosystems™ 3500 Series Genetic Analyzers are specifically designed to support the demanding performance needs of validated and regulated environments while retaining the unsurpassed application versatility that life science researchers expect. The 8-capillary 3500 and 24-capillary 3500xL Genetic Analyzers continue to set the standard in capillary electrophoresis.

System components

The Applied Biosystems™ 3500 and 3500xL Genetic Analyzers are supplied as follows:

- Capillary electrophoresis instrument
- 8-capillary (3500 System) or 24-capillary (3500xL System) array and polymer
- DNA sequencing and/or fragment analysis reagents and consumables for system qualification
- Dell™ computer workstation with flat-screen monitor
- Integrated software for instrument control, data collection, quality control and auto-analysis of sample files for basecalling and fragment sizing

System consumables

The following consumables are for use on the 3500 Series Systems:

Capillary arrays: The internally uncoated capillaries are supplied in assemblies of 8 or 24 capillaries per array, with a built-in frame for easy installation. Arrays are available in 36 cm and 50 cm capillary lengths to support multiple applications and run

Table 1. Sequencing throughput and performance specifications.¹

Run module ^{4,5}	Throughput ²			Configuration		Performance	
	Average run time (minutes)	Average throughput, 3500xL (samples/day)	Average throughput, 3500 (samples/day)	Array separation distance (cm)	Polymer type	Resolution range in ≥90% of samples	KB QV20 CRL ³ in ≥90% of samples
RapidSeq36_POP7	≤30	≥1,104	≥368	36	POP-7	≤40 to ≥500	≥600
FastSeq36_POP7	≤60	≥552	≥184	36	POP-7	≤40 to ≥600	≥750
RapidSeq36_POP4	≤45	≥720	≥240	36	POP-4	≤40 to ≥400	≥400
RapidSeq36_POP6	≤65	≥504	≥168	36	POP-6	≤40 to ≥500	≥600
BDX_RapidSeq36_POP7	≤30	≥1,104	≥368	36	POP-7	≤40 to ≥500	≥600
BDX_FastSeq36_POP7	≤60	≥552	≥184	36	POP-7	≤40 to ≥600	≥750
BDX_RapidSeq36_POP4	≤45	≥720	≥240	36	POP-4	≤40 to ≥400	≥400
BDX_RapidSeq36_POP6	≤66	≥494	≥164	36	POP-6	≤40 to ≥500	≥600
RapidSeq50_POP7	≤40	≥840	≥280	50	POP-7	≤40 to ≥550	≥500
StdSeq50_POP6	≤135	≥240	≥80	50	POP-6	≤20 to ≥600	≥600
FastSeq50_POP7	≤65	≥504	≥168	50	POP-7	≤40 to ≥600	≥700
StdSeq50_POP7	≤125	≥264	≥88	50	POP-7	≤40 to ≥700	≥850
ShortReadSeqPOP7	≤30	≥1,104	≥368	50	POP-7	≤40 to ≥400	≥300
RapidSeq_BDX_50_POP7	≤40	≥840	≥280	50	POP-7	≤40 to ≥550	≥500
StdSeq_BDX_50_POP6	≤140	≥240	≥80	50	POP-6	≤20 to ≥600	≥600
FastSeq_BDX_50_POP7	≤65	≥504	≥168	50	POP-7	≤40 to ≥600	≥700
StdSeq_BDX_50_POP7	≤125	≥264	≥88	50	POP-7	≤40 to ≥700	≥850
ShortReadSeq_BDX_POP7	≤30	≥1,104	≥368	50	POP-7	≤40 to ≥400	≥300
MicroSeq_POP7	≤125	≥264	≥88	50	POP-7	≤40 to ≥700	≥850
MicroSeq_POP6	≤135	≥240	≥80	50	POP-6	≤20 to ≥600	≥600

1. The specifications are reported using long-read sequencing standard.

2. Throughput (samples/day) is determined by the total number of samples that can be run in 23 hours (allows time for sample preparation, instrument maintenance and warm-up).

3. QV20 CRL is defined as the longest uninterrupted segment of bases with an average of QV ≥20, calculated over a sliding window of 21 base pairs.

4. The fast ShortReadSeq module collects 300 bp in 30 minutes for operations requiring short verification of sequence content (e.g., clone QC verification).

5. BDX classified run modules are optimized with the 3500 Series Systems to obtain more usable data when sequencing reactions are purified using the Applied Biosystems™ BigDye™ XTerminator™ Purification Kit.

- 8- or 24-capillary array
- 505 nm solid-state laser
- Polymer pump
- Performance Optimized Polymer (POP) pouch
- Anode Buffer Container (ABC)
- 96- and 384-well plates (8-tube strips also available)
- Cathode Buffer Container (CBC)



methodologies. The 36 cm and 50 cm arrays have been optimized for many applications for use with POP-7™ Polymer, POP-6™ Polymer, and POP-4™ Polymer run modules. This provides users with flexibility to select their ideal run times and read length needs. The 3500 and 3500xL capillary arrays are specified for 160 injections.

POP-7, POP-6, and POP-4 Performance Optimized Polymers: The 3500 and 3500xL POP-7, POP-6, and POP-4 polymers are designed in ready-to-use, load-and-run pouches. POP polymers are available in three sizes: 96 samples (a maximum of 12 injections on the 3500 System or 5 injections on the 3500xL System), 384 samples (a maximum of 60 injections on the 3500 System or 20 injections on the 3500xL System), and 960 samples (a maximum of 120 injections on the 3500 System or 50 injections on the 3500xL System). The pouch

has adequate polymer to support the stated number of samples or injections, plus additional volume for initial setup and installation operations. Most applications may be run with POP-7 polymer, along with the 50 cm array or 36 cm array.

At or below the operating temperature of 25°C, all the polymer types are specified to be used on the instrument for up to 14 days or when the specific injection limits are reached, whichever comes first. If the operating temperature is above 25°C, POP-7 polymer is specified to be used on the instrument for up to 7 days or when the specific injection limits are reached, whichever comes first.

Buffers and conditioning reagent consumables: Similar to the 3500 System polymer pouches, the 3500 Series Genetic Analyzer Cathode Buffer,

Anode Buffer, and Conditioning Reagent are designed for ready-to-use, load-and-run installation. Consumable containers are disposed of when the maximum number of samples has been processed.

Cathode Buffer Container (CBC): Prefilled container with 1X Buffer to support all electrophoresis applications. The container has two separate compartments; the left side contains the cathode buffer for electrophoresis, and the right side contains spent polymer waste from the capillary wash between injections. The CBC is specified to be used on the instrument for up to 14 days after first installation (or a maximum of 240 injections on the 3500 System, or 100 injections on the 3500xL System, whichever comes first).

Table 2. Fragment analysis throughput and performance specifications.

Module name	Throughput ¹			Configuration	
	Average run time (minutes)	Average throughput, 3500 (samples/day)	Average throughput, 3500xL (samples/day)	Array separation distance (cm)	Polymer type
FragAnalysis50_POP7	≤40	≥840	≥280	50	POP-7
FragAnalysis50_POP6	≤100	≥336	≥112	50	POP-6
LongFragAnalysis50_POP7	≤125	≥264	≥88	50	POP-7
HID36_POP4	≤35	≥960	≥320	36	POP-4
HID36_POP4	≤26	≥424	≥1,272	36	POP-7
SNaPshot50_POP7	≤30	≥1,104	≥376	50	POP-7
FragAnalysis36_POP7	≤30	≥368	≥1,104	36	POP-7
FragAnalysis36_POP6	≤60	≥184	≥552	36	POP-7
FragAnalysis36_POP4	≤35	≥312	≥936	36	POP-4

Module name	Performance							
	General		Sizing precision ³ of 100% of alleles in ≥90% of samples			Multirun sizing ⁴ of 100% of alleles in ≥90% of samples		
	Resolution range ² in ≥90% of samples	Largest fragment collected in ≥90% of samples	50–400 bp	401–600 bp	601–1,200 bp	50–400 bp	401–600 bp	601–1,200 bp
FragAnalysis50_POP7	≤40 to ≥520	≥600	<0.15	<0.30	NA	<1 bp	<2 bp	NA
FragAnalysis50_POP6	≤20 to ≥550	≥600	<0.15	<0.30	NA	<1 bp	<2 bp	NA
LongFragAnalysis50_POP7	≤40 to ≥700	≥1,200	<0.15	<0.30	<0.45	<1 bp	<2 bp	<3 bp
HID36_POP4	≤60 to ≥400	≥420	<0.15	<0.30	NA	<1 bp	NA	NA
HID36_POP4	≤60 to ≥400	≥420	<0.15	NA	NA	<1 bp	NA	NA
SNaPshot50_POP7	≤40 to ≥120	≥120	<0.50	NA	NA	<1 bp	NA	NA
FragAnalysis36_POP7	≤60 to ≥500	≥600	<0.15	<0.30	NA	<1 bp	<2 bp	NA
FragAnalysis36_POP6	≤60 to ≥500	≥600	<0.15	<0.30	NA	<1 bp	<2 bp	NA
FragAnalysis36_POP4	≤60 to ≥400	≥600	<0.15	<0.30	NA	<1 bp	<2 bp	NA

1. Throughput (samples/day) is determined by the total number of samples that can be run in 23 hours (allows time for sample preparation, instrument maintenance, and warm-up).

2. Resolution range is defined as the range of bases over which the peak spacing interval divided by the peak width at half peak height is greater than 1.

3. Sizing precision is the standard deviation of sizes for a given allele size across all capillaries in the same run.

4. Multirun sizing specification is a measure of the precision of the 3500 System across multiple runs. For example, it would be expected that a 200 bp allele across 3 runs would have an average deviation of <1 bp in 90% of all samples.

3500 System operating specifications

Laser	Long-life, single-line 505 nm solid-state laser excitation source
Electrophoresis voltage	Up to 20 kV
Oven temperature	Active temperature control from 18°C to 70°C
Minimum computer requirements	Hardware: Intel™ Core™ i7-4770 OS Processor (Quad Core HT, 3.10 GHz Turbo, 8 MB, with HD Graphics 4600) Operating system: Windows 7 Installed RAM: 16 GB Hard drive: 2 x 500 GB SATA 3.0 Gb/s and 8 MB DataBurst Cache
Operating environment	Temperature: 15°C–30°C (room temperature should not fluctuate more than ±2°C during an instrument run) Humidity: 20–80% (noncondensing)
Main power voltage	100–240 V ±10% 50–60 Hz ±10%
Current	Maximum: 15 A
Maximum power dissipation	417 VA, 371 W (approximate, not including computer and monitor)
Dimensions	Width (closed door): 61 cm Width (open door): 122 cm Depth: 61 cm Height: 72 cm Weight: 82 kg (approximately)
Service and warranty	1-year limited warranty on parts and labor Service installation Application training

Anode Buffer Container (ABC):

Prefilled container with 1X buffer to maintain a source of ions and the correct pH for electrophoresis. The ABC is specified to be used on the instrument for up to 14 days after first installation (or a maximum of 240 injections on the 3500 System, or 100 injections on the 3500xL System, whichever comes first).

The Cathode and Anode Buffer Containers are made from a recyclable plastic material, reducing the systems' impact on the environment. Note that the containers are marked with

the #7 recycling symbol (Other-polycarbonate). Follow your local regulations for proper disposal.

Conditioning pouch: Prefilled pouch with a conditioning reagent used for priming the polymer pump, washing the pump between polymer type changes and during instrument shutdown. The pouch has sufficient volume for a one-time use.

Radio frequency identification (RFID) labeling

The 3500 Series Systems incorporate RFID labels on all capillary arrays, polymer pouches, buffer containers, and conditioning

pouches. These labels allow for tracking and reporting of consumable usage, lot and part numbers, expiration dates, and on-instrument lifetime. The tracked consumables data are stored and are retrievable from the 3500 Series Data Collection Software even if the consumable is removed from the instrument. The RFID labels also enable the Data Collection Software to remind users to replace the on-instrument consumables, as they may have expired or exceeded the recommended usage limit.

Instrument normalization reagent

The Applied Biosystems™ GeneScan™ 600 LIZ™ Size Standard v2 is specially formulated for dual-purpose use on the 3500 Series Systems. The reagent may be used as a size standard for DNA fragment sizing applications. In addition, the reagent can be used as a normalization standard by enabling the normalization feature in the Data Collection Software. The 3500 Series Systems, working together with the GeneScan 600 LIZ Size Standard v2 (and specific normalization software features) minimize instrument-to-instrument, run-to-run, and capillary-to-capillary variation.

Reagents

Reagents available for use with the 3500 Series Genetic Analyzers:

- BigDye™ Terminator v1.1 Cycle Sequencing Kit, BigDye™ Terminator v3.1 Cycle Sequencing Kit, and BigDye™ Direct Cycle Sequencing Kit
- GeneScan™ LIZ™ Size Standards
- GeneScan™ ROX™ Size Standards
- Application-specific kits

System software

Primary analysis with 3500 Series Data Collection Software

The Applied Biosystems™ 3500 and 3500xL Genetic Analyzers include data collection software with a simple user interface and clean design for easy display of consumable and array usage information, quick-start functionality, system maintenance reminders, and several other

convenient features. Basecalling and fragment sizing functionalities are performed within the primary data collection software, allowing for real-time data quality evaluation. An optional upgrade provides security, audit, and eSig features to assist research laboratory compliance with 21 CFR Part 11 requirements.

Secondary analysis software options

- Applied Biosystems™ Sequencing Analysis Software with KB™ Basecaller for sequence basecall editing, re-basecalling, reporting, and printing
- Applied Biosystems™ Variant Reporter Software for mutation detection, SNP discovery, comparative sequencing, resequencing, validation, and sequence confirmation
- Applied Biosystems™ SeqScope™ Software for resequencing applications with library identification
- Applied Biosystems™ GeneMapper™ Software for microsatellite, LOH, SNP, MLPA, AFLP, and t-RFLP analyses
- Applied Biosystems™ GeneMapper™ *ID-X* Software for analysis of human identification data using Applied Biosystems™ AmpFISTR™ kits
- Applied Biosystems™ MicroSEQ™ ID Analysis Software for microbial sequence typing using MicroSEQ™ kits

Sample requirement

The 3500 Series Systems can analyze many types of templates prepared by a variety of sample preparation protocols. Samples are automatically injected directly from 96- or 384-well* microtiter plates. The 3500 Series Systems are also designed for use with 96-well Fast and 8-tube standard or Fast Strips.

* The 3500xL Genetic Analyzer is compatible with 384-well plates.

3500 Series Systems packages**3500****3500xL**

Package name	Description	Cat. No.	Cat. No.
3500 Series Genetic Analyzer for Resequencing and Fragment Analysis	3500 Series System with Data Collection Software, Sequencing Analysis, Variant Reporter, and GeneMapper Software packages. System package also includes DNA sequencing and fragment analysis reagent kits for system qualification.	4440462	4440463
3500 Series Genetic Analyzer for Resequencing	3500 Series System with Data Collection Software, Sequencing Analysis, and Variant Reporter Software packages. System package also includes DNA sequencing reagent kits for system qualification.	4440466	4440467
3500 Series Genetic Analyzer for Fragment Analysis	3500 Series System with Data Collection Software and GeneMapper Software. System package also includes DNA fragment analysis reagent kits for system qualification.	4440468	4440469
3500 Series Genetic Analyzer for Sequence Typing and Fragment Analysis	3500 Series System with Data Collection Software, Sequencing Analysis, SeqScape, and GeneMapper Software packages. System package also includes DNA sequencing and fragment analysis reagent kits for system qualification.	4440470	4440471

Ordering information

Product	Cat. No.
3500 Series Genetic Analyzers	
3500 Genetic Analyzer (8-capillary)	4405673
3500xL Genetic Analyzer (24-capillary)	4405633
System consumables and reagents	
3500xL 24-Capillary Array (36 cm)	4404687
3500 8-Capillary Array (36 cm)	4404683
3500xL 24-Capillary Array (50 cm)	4404689
3500 8-Capillary Array (50 cm)	4404685
POP-4 Polymer (96 samples)	A26070
POP-4 Polymer (384 samples)	4393715
POP-4 Polymer (960 samples)	4393710
POP-6 Polymer (96 samples)	A26071
POP-6 Polymer (384 samples)	4393717
POP-6 Polymer (960 samples)	4393712
POP-7 Polymer (96 samples)	A26073
POP-7 Polymer (384 samples)	4393708
POP-7 Polymer (960 samples)	4393714
Anode Buffer Container (ABC), 3500 Series	4393927
Cathode Buffer Container (CBC), 3500 Series	4408256
Septa Cathode Buffer Container, 3500 Series	4410715
Conditioning Reagent, 3500 Series	4393718
Hi-Di™ Formamide (25 mL), 1 bottle	4311320
Hi-Di™ Formamide 4X 5 mL bottles	4440753
BigDye Terminator v1.1 Cycle Sequencing Kit (1,000 rxns)	4337451
BigDye Terminator v3.1 Cycle Sequencing Kit (1,000 rxns)	4337456
BigDye XTerminator Purification Kit (1,000 rxns)	4376487

Go to lifetechnologies.com/3500 or contact your sales representative for more information