

Femto Pulse

Технические характеристики

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Assess High Molecular Weight and Low Quantity Nucleic Acids

The advanced design of the Agilent Femto Pulse system provides researchers with a platform to separate high molecular weight (HMW) DNA fragments and detect nucleic acids into the femtogram range from low concentration samples. By using a pulsed-field power supply, the Femto Pulse system can separate DNA smears and fragments as large as 165,000 bp in about 1.5 hours, which is 10x faster than pulsed-field gel electrophoresis (PFGE). Ultra sensitivity kits allow for unparalleled DNA fragment detection as low as 50 fg/ μ L input concentration. The Femto Pulse system allows you to eliminate PFGE from long-read NGS library preparation, size bacterial artificial chromosomes (BACs), and conserve precious sample with one instrument.



Applications for the Femto Pulse system include analysis of:

- HMW genomic DNA analysis
- Large DNA fragment libraries
- BAC clones
- Single cell genomic DNA and total RNA
- Low concentration NGS library preparations
- cfDNA
- FFPE nucleic acid isolates
- Single or multiple DNA fragments

M5330AA

Streamline Complex Workflows

The Femto Pulse system helps you streamline complex workflows without compromising data quality. From shaving days off long-read NGS library preparation to conserving precious sample, this system offers you numerous benefits for complex workflows and challenging samples.

Fast separation of high molecular weight samples

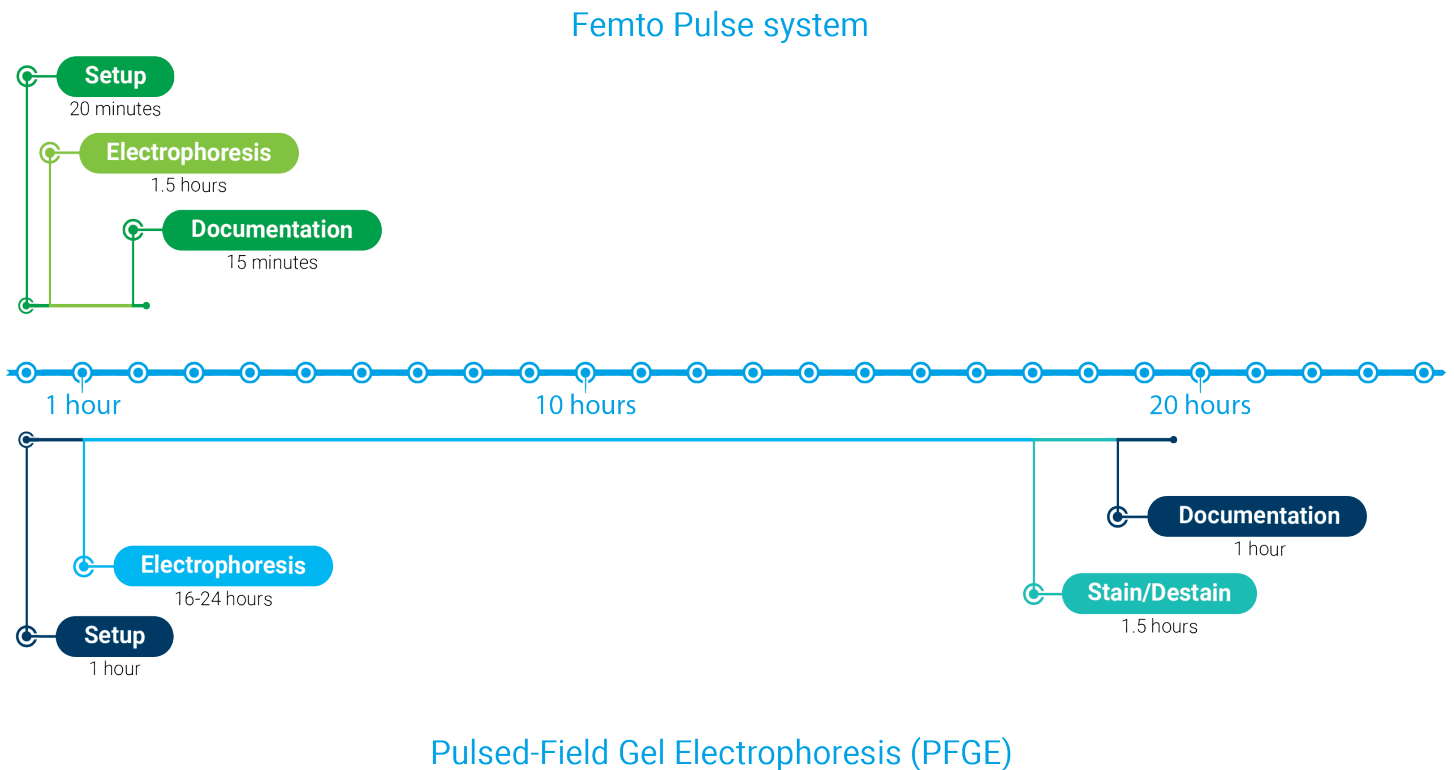
- Accurate sizing of DNA smears and fragments up to 165 kb
- Complete separations of high molecular weight samples in about 1.5 hours
- Eliminate pulsed-field gel electrophoresis from long-read NGS library preparation and BAC analysis

Conserve samples with femtogram level sensitivity

- DNA fragment input concentrations as low as 50 fg/ μ L
- Save rare or limited samples for critical downstream analyses
- A single dilution of sample is all that is needed before running on the system

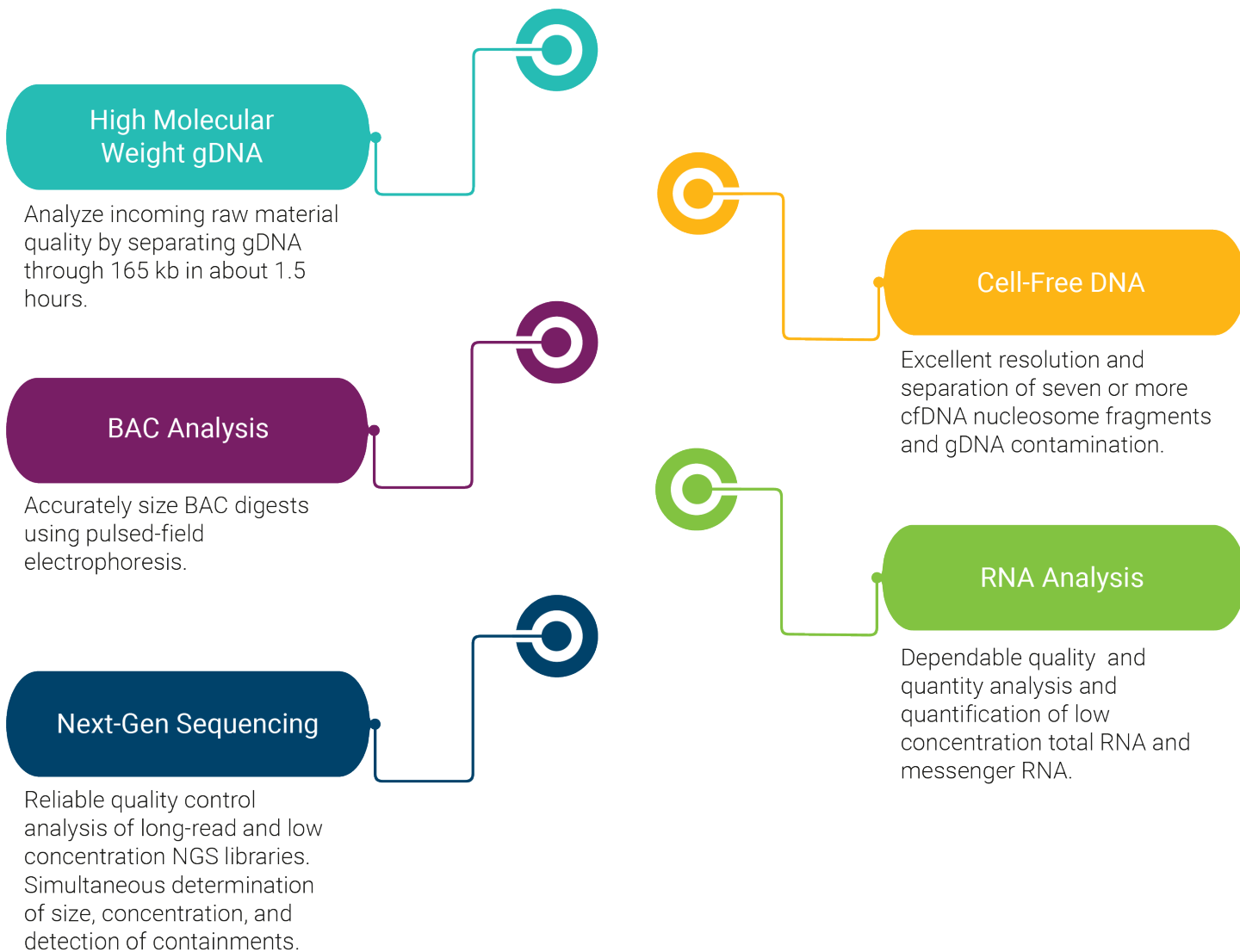
Results in a fraction of the time

In just around two hours, the Femto Pulse can provide results that used to take over 20 hours to achieve.



Solutions for Challenging Samples

The Femto Pulse system uses quantitative and qualitative kits to assess challenging DNA and RNA samples in a wide range of applications. These kits enable the analysis of high molecular weight genomic DNA, BACs, RNA, and low concentration nucleic acid samples. With markers and calibrated ladders, these kits enable the accurate sizing and quantification of DNA and RNA samples.



Assess Challenging Nucleic Acid Samples with the Femto Pulse System

When you are working with precious samples, running QC can be a challenge. Traditional methods require a large portion of sample, significantly reducing the amount available for downstream applications. The Femto Pulse system allows you to use as little as 50 fg/ul input concentration of a DNA fragment, conserving your precious samples.

Diverse kit offerings allow the Femto Pulse system to assess various challenging samples.

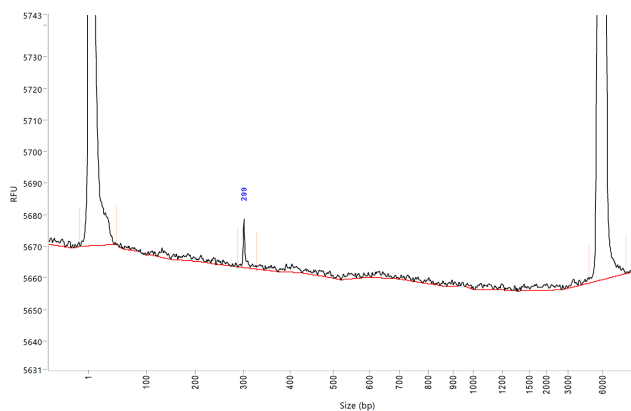


Figure 1. 300 bp fragment diluted down to 60 pg/μL was analyzed using the Ultra Sensitivity NGS kit (p/n FP-1101). The fragment is clearly defined above the baseline demonstrating the ultra sensitivity capabilities of the Femto Pulse system.

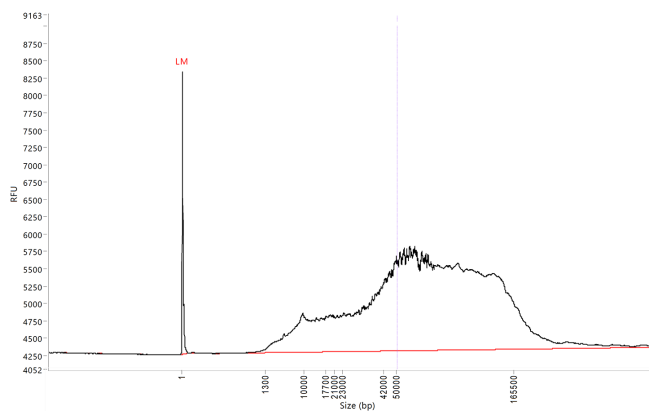


Figure 2. High molecular weight gDNA extraction was separated using the Genomic DNA 165 kb kit (p/n FP-1004) (Extended Pulsed-Field Method) demonstrating the Femto Pulse system's ability to provide superior sizing and quantification of HMW smears.

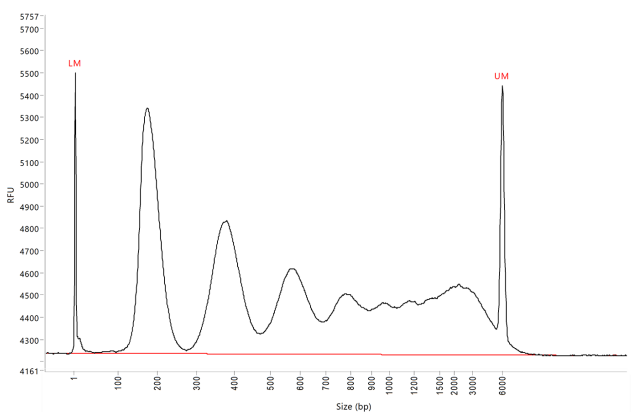


Figure 3. Extracted cfDNA was analyzed using the Ultra Sensitivity NGS kit (p/n FP-1101) at an input concentration of 250 pg/μL. The ultra sensitivity and resolution of the Femto Pulse system allows detection beyond the three major cfDNA nucleosomes along with contaminating gDNA.

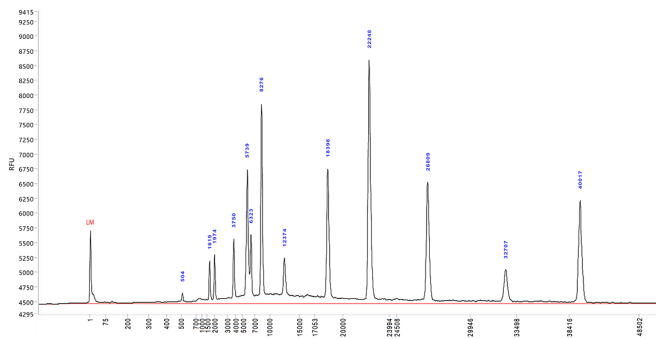


Figure 4. A restriction digest was analyzed on the 55 kb BAC kit (p/n FP-1003). This pulsed-field method increases resolution and peak sharpness allowing accurate sizing and quantification of higher molecular weight fragments.

Features of the Femto Pulse System

Understanding the challenges researchers face with precious samples, the Femto Pulse system was built on the Fragment Analyzer system platform and given features to address those challenges. The addition of a pulsed-field power supply, flexibility in run programming, and the automation of key steps combine to help you analyze low-concentration, high molecular weight nucleic acids faster.



Powerful separation

Pulsed-field capillary electrophoresis allows the separation of DNA through 165 kb.

Flexible throughput automation

Load and program the separation of up to 288 nucleic acid samples for unattended analysis.

Versatile sample analysis

Use up to two gel types to automate the separation of different sample types without user intervention.

The Power Behind the Femto Pulse System

Pulsed-field electrophoresis is a powerful separation method and a proven way to separate large DNA fragments. By using a pulsed-field power supply and a redesigned detection system, DNA smears as large as 165,000 bp can be separated in about 1.5 hours.

Pulsed-field power for fast, large fragment separations

Separations are achieved by:

- Alternating the voltage polarity from negative to positive
- Regulating the oscillation frequency
- Controlling the timing or ramping of the oscillation frequency
- Governing the oscillation wave form

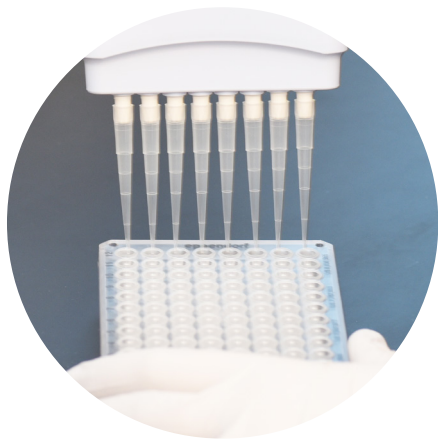
Enhanced detection levels:

- The power density has been increased on the detection window for heightened illumination and excitation
- New software was developed to measure and record the nucleic acids as they pass the detector
- Specialized gel chemistries were created to ensure the lowest possible background noise



Simple Preparation, Intuitive Operation

The Femto Pulse system excels where legacy agarose PFGE fails. The simple sample preparation, ease-of-use, and fast separation times improve your efficiency on all fronts. You will experience decreased sample requirements and faster separations of high molecular weight DNA samples.



Step 1: Prepare instrument

Load gel and conditioning solution, change inlet buffer, and empty waste draw/bottle.



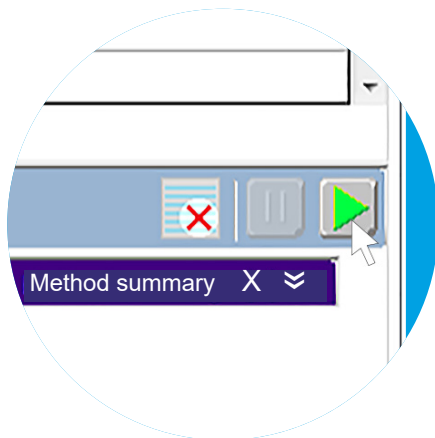
Step 2: Load sample

Load your runs with just a single dilution and 2 μL of sample per well.



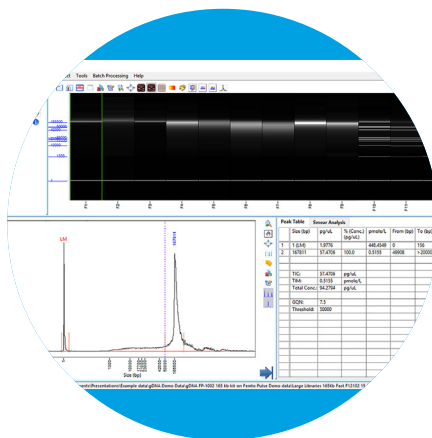
Step 3: Choose method

Select your method from the dropdown menu and enter any notes for the run.



Step 4: Start runs

Queue up to 288 samples and walk away.



Step 5: Analyze results

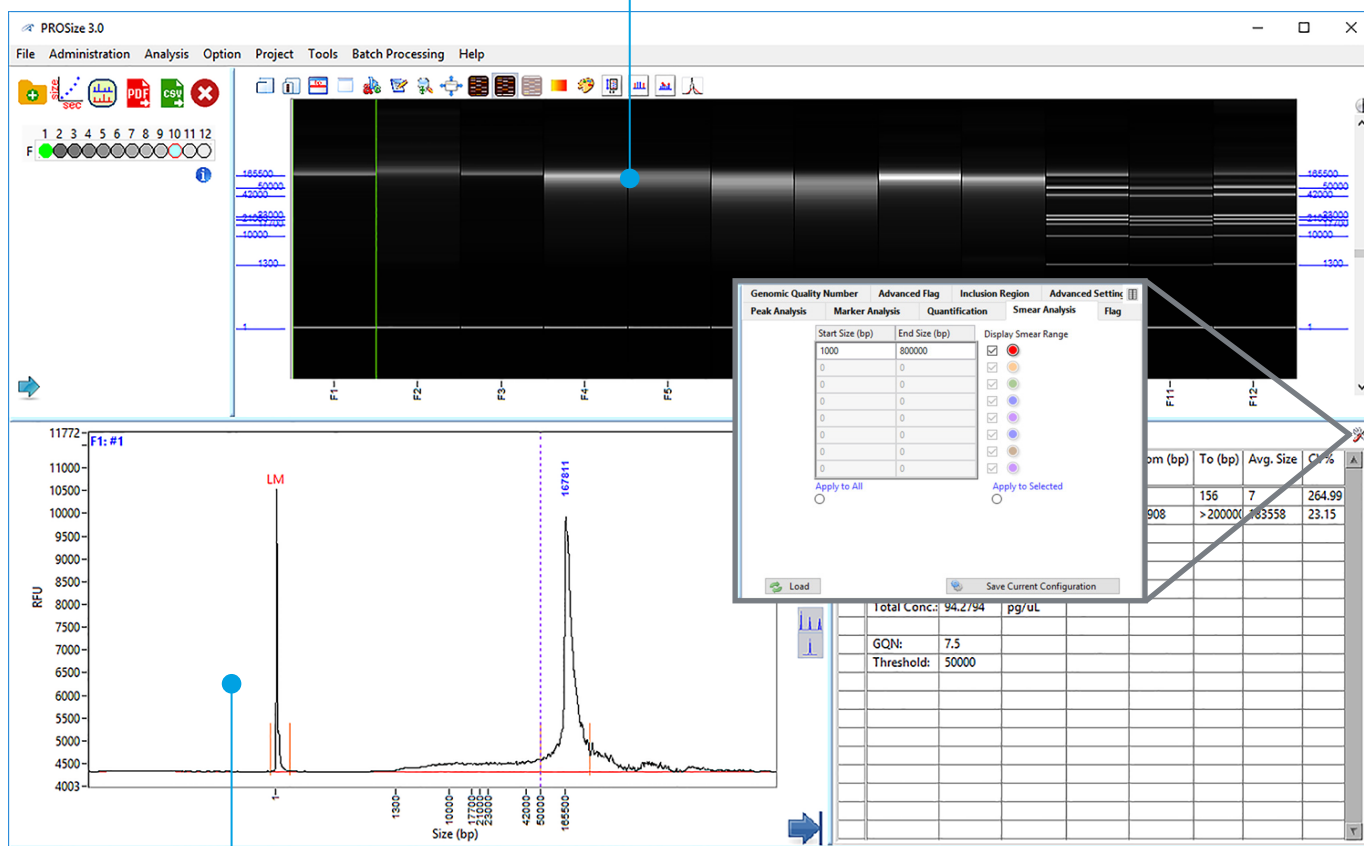
Process separation data with ProSize data analysis software.

All-In-One Analysis with Powerful Software

Femtogram level sensitivity and the capacity for high molecular weight DNA separations need to be supported with intuitive software that can capture the data and analyze the results. ProSize data analysis software is a robust, validated software package that simplifies the identification and analysis of nucleic acid fragments and offers you three ways to visualize separation data: a digital gel image, electropherogram, and a data table. Designed with researchers in mind, ProSize software automatically calculates fragment size and quantification, and reduces subjective assessment for certain DNA and RNA samples with custom quality metrics.

Digital gel image

Data represented as an interactive digital gel image with tools for basic adjustments.



Electropherogram

Data represented as an interactive electropherogram with tools for basic adjustments.

Individual parameter

Set specific parameters to customize sample analysis, aid in evaluating challenging samples, and expedite quality control decisions.

Agilent Femto Pulse Consumables

Analysis kits and capillary array



The Femto Pulse system uses a pulsed field power supply along with quantitative and qualitative kits to automate the separation of genomic DNA as large as 165,000 bp, DNA smears, DNA fragments and RNA.

The reagent kit portfolio covers a broad range of sample types such as HMW genomic DNA, long-read NGS libraries, cfDNA, single cell genomic DNA, total RNA, FFPE nucleic acid isolates, and bacterial artificial chromosomes (BAC) clones.

Quantitative Kits

With markers and calibrated ladders, these kits enable the accurate sizing and quantification of DNA and RNA samples.

DNA Kits

Kit name	Sizing range	Input concentration range	Part number	Kit sizes
gDNA 165 kb Analysis kit	1,300 bp - 165 kb	Fragments: 0.3 - 30 pg/μL Smears: 5 - 500 pg/μL	FP-1002-0275	275 samples
Ultra Sensitivity NGS kit	100 - 6,000 bp	Fragments: 0.1 - 5 pg/μL Smears: 25 - 250 pg/μL	FP-1101-0275	275 samples

RNA Kit

Kit name	Sizing range	Input concentration range	Part number	Kit sizes
Ultra Sensitivity RNA kit	200 - 6,000 nt	Total RNA: 15 - 250 pg/μL mRNA: 25 - 500 pg/μL	FP-1201-0275	275 samples

Qualitative Kits

With markers and ladders, these kits enable the accurate sizing of large DNA fragments.

Kit name	Sizing range	Input concentration range	Part number	Kit sizes
55 kb BAC kit	75 bp - 48,500 kb	Fragment up to 48 kb: 3 - 25 pg/μL Fragment <2 kb: 1 - 12.5 pg/μL	FP-1003-0275	275 samples
165 kb BAC kit	75 bp - 165 kb	Fragment <48 kb: 1.6 - 25 pg/μL Fragment >48 kb: 3 - 50 pg/μL Multiple frags: 12.5 - 100 pg/μL	FP-1004-0275	275 samples

Capillary Array

The Femto Pulse system has one capillary array designed for superior separation resolution of challenging samples.

Array name	Part number
Femto Pulse 12-Capillary Array	A1600-1250-2240

Agilent ProSize Data Analysis Software For the Agilent Fragment Analyzer, Femto Pulse and ZAG DNA Analyzer Parallel Electrophoresis Systems



Powerful and intuitive nucleic acid data analysis

The Agilent ProSize data analysis software is designed to analyze raw data acquired from the Fragment Analyzer, Femto Pulse and ZAG DNA Analyzer parallel capillary electrophoresis systems offered by Agilent. These instruments deliver automated fragment separation solutions for a variety of applications including nucleic acid raw materials, second and third generation next-generation sequencing (NGS) library preparation, *in vitro* transcribed (IVT) RNA, microRNA, fragment analysis, and Bacterial Artificial Chromosome (BAC).

Software Benefits:

- Data can be processed and saved for further analysis
- Users can share raw data and processed files for collaborations
- Results are presented in easy to interpret reports

Features:

- Software is compatible with the Fragment Analyzer, Femto Pulse and the ZAG DNA Analyzer systems
- Analyze the size and concentration of individual sample fragments and smears for both small and large ranges
- Directly compare sample size, peak height, and separation profile(s) by easily overlaying samples from the same or different runs
- Obtain objective sample quality metrics for genomic DNA (gDNA) with the customizable thresholds of the genomic quality number (GQN) providing greater flexibility for gDNA assessment, total RNA with the RNA quality number (RQN), and FFPE RNA with the DV₂₀₀
- Automatically score samples for the presence or absence of specific DNA fragment size(s) with the multifunctional flagging feature
- Export data and images in a variety of formats such as CSV file or PDF, with the option to select all the data or only a subset of data
- Ability to set unit labels in either ng/μL and nmole/L or pg/μL and pmole/L
- Laboratory Information Management System (LIMS)-enabled
- Administrative user and login privileges enable enhanced security features
- Event Error Logs are generated automatically when enhanced security features are enabled

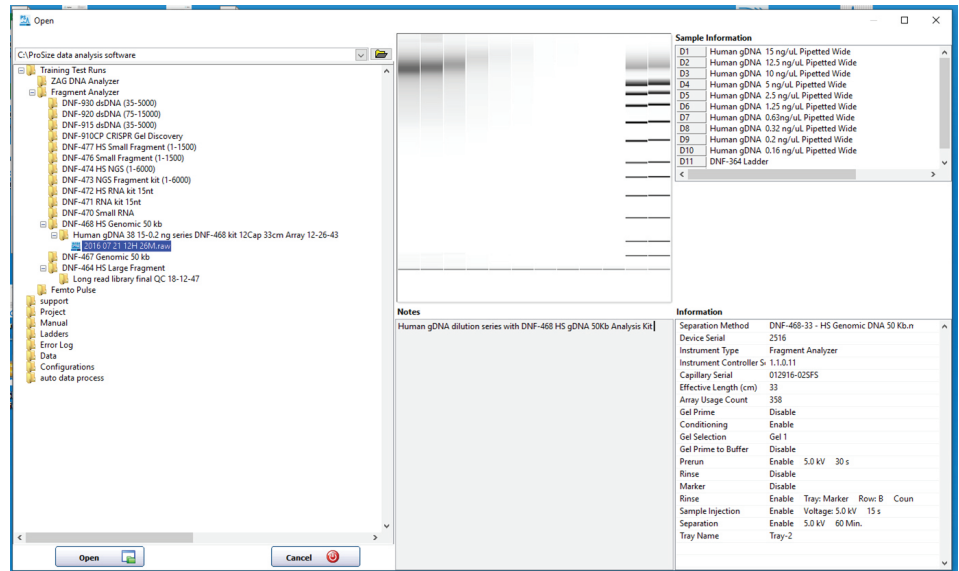
PC Specifications:

Display Resolution.....	1280 x 1024 pixels - Recommended or 1280 x 800 pixels - Minimum resolution
Hard Disk Space Requirements.....	500 GB
Memory.....	4 GB
Operating System.....	Windows 10, 64 bit. English (US) language settings
Ports.....	Two USB ports
Processor.....	Intel i5 or above
Software Type.....	ProSize data analysis software
Data Export Format.....	CSV and PDF
Operation system regions setting.....	English (US) in default configurations

ProSize data analysis software:

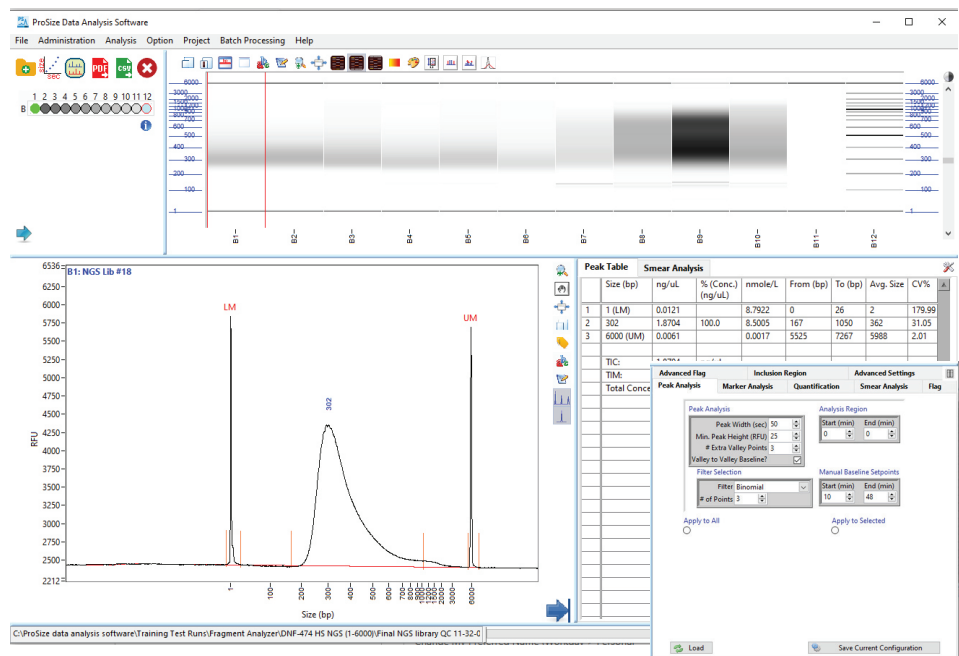
1. Start the analysis

ProSize data analysis software allows users to select the file for analysis and navigate through the results with data preview, sample information, separation method and experimental notes available on the main screen.



2. Analyze and compare

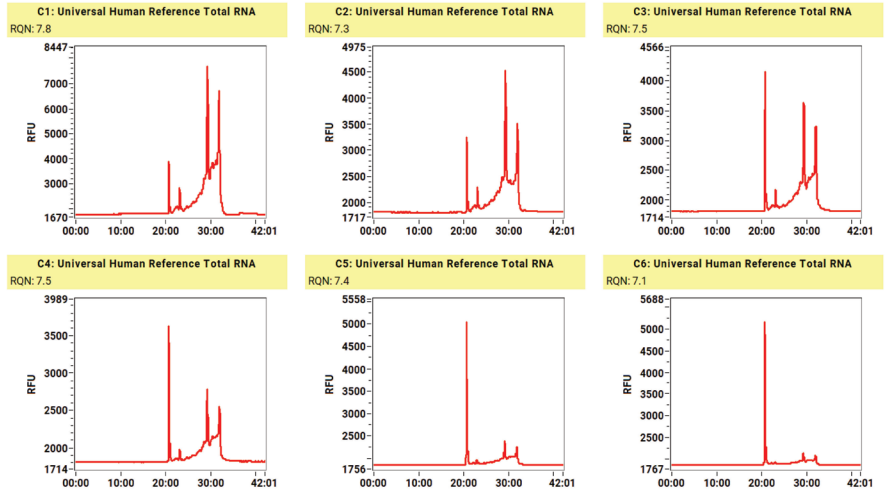
Data can be analyzed in the gel or electropherogram view. Concentration and sizing information is displayed in the peak and sample table. In the Advanced Settings tab, the user can select the desired Analysis Mode for specific sample types such as Total RNA from prokaryotes, eucaryotes or plants. Samples can also be overlaid for quick profile comparison. The software offers intuitive user interface which allows a pleasant sample analysis experience.



3. Generate PDF report

Sample reports are easily generated. Users can take advantage of the Flag Analysis feature and customizable reports for clear overview of results based on their requirements.

Filename and data path: C:\ProSize data analysis software\Training Test Runs\Fragment Analyzer\DNF-472 HS RNA kit 15nt\sample dilution series 20-07-57\2018 01 17 20H 07M.raw



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