Fragment Analyzer
Технические характеристики

Eliminate Sample Quality Control Bottlenecks to Obtain Reliable Results Faster

The Agilent Fragment Analyzer systems employ several unique design features to alleviate common quality control chokepoints. These features include, increased instrument availability, flexible and dependable operations, and customizable runs helping you reach results faster.

Using automated parallel capillary electrophoresis, the Fragment Analyzer systems offer nucleic acid quality control for a range of applications, including NGS libraries and cfDNA QC. Simple sample preparation, automated operation, and intuitive analysis software contribute to efficient and accurate measurement.

There are three models, varying only in throughput, to fit the needs of any lab.

5200 Fragment Analyzer System

Medium throughput system for labs running 12-96 samples one to three times per day.
M5310AA

5300 Fragment Analyzer System

High-throughput system for labs running one to two 96-well plates up to three times per day.
M5311AA

5400 Fragment Analyzer System

Ultrahigh-throughput system for robotic automation running more than two 96-well plates per day.
M5312AA

Take Advantage of the Benefits of Automated Parallel Electrophoresis

A smooth workflow helps reduce user stress and increase efficiency. The Fragment Analyzer systems offer many workflow advantages to users of all types. Whether you run a dozen or hundreds of samples per day, you will experience an intuitive instrument designed with the user in mind.

Easy set up and programming allows you to use your time efficiently.

– Unattended operation provides additional time for concentrating on other tasks

– Two gel capacity enables seamless switching between applications

– Single dilution of a sample simplifies run preparation

– No daily array handling and room-temperature stable reagents minimize hands on time
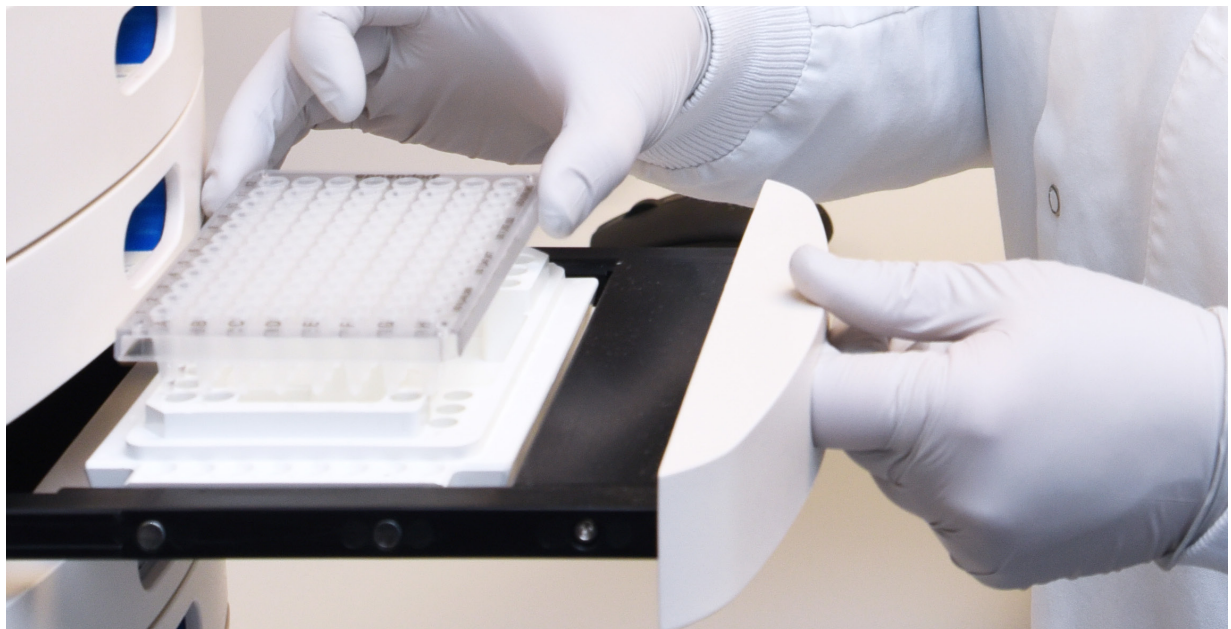
Easily adapt to changes in your workflow with flexible options.

– Maximize for speed or resolution of individual samples by choosing a shorter or longer array

– Minimize wait times with the capability to program additional sample trays during active runs

– Intuitive software allows changing the priority of runs in the queue

– Extend separation time during a run for more thorough sample analysis

Identify samples suitable for your applications with quality data.

– Quality metrics for RNA (RQN) and genomic DNA (GQN) remove subjective quality calls

– Reliable smear analysis delivers accurate molarity calculations

– See clear results with separation resolution as good as 3 bp

– DNA and RNA input concentration ranges cover two orders of magnitude to provide a wide dynamic range
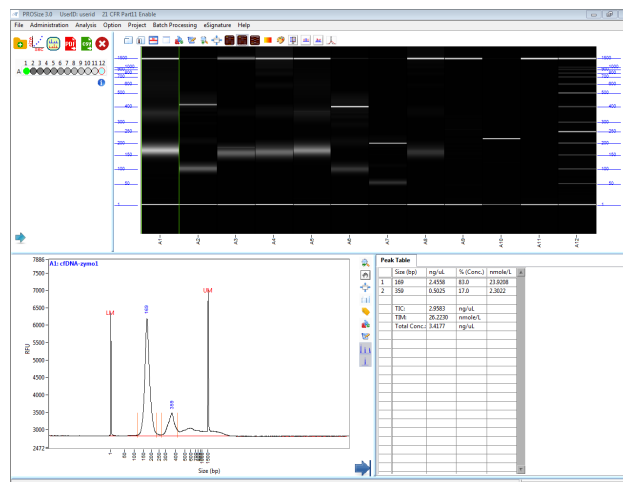
Features of the Fragment Analyzer Systems

The Fragment Analyzer systems were designed to improve the efficiency of quality control workflows while keeping researchers in mind. Key instrument features mean you can perform analysis unattended, helping you minimize time to results. These features also allow a smoother transition between the needs of multiple researchers improving your lab's efficiency.

Variable throughput

Choose the array that best fits your throughput needs, 12, 48, or 96 capillaries.

Flexibility

Load up to two additional trays and program your analysis during an active run.

Versatility

Set up two different gels at the same time for automated separation of completely different sample types.

Key Features of the Capillary Arrays

The capillary array is the basis of the Fragment Analyzer systems. Once filled with gel, voltage is applied to first inject, then move DNA and RNA samples through individual capillaries in a size-dependent manner. As the fragments pass the detection window, a sensitive Charged Coupled Device (CCD) detector captures the size and concentration levels of the fragments which are then displayed in ProSize data analysis software.

Suitable for RNA and DNA

Every capillary array can reliably separate DNA and RNA samples. This capability reduces system preparation time and allows users to switch between RNA and DNA samples with ease.

Prioritize separation resolution or separation time

Capillary arrays are available in different lengths. Shorter capillaries offer faster separation times but reduce separation resolution. Longer capillaries offer slower separation times and improved separation resolution, allowing you to choose what is important.
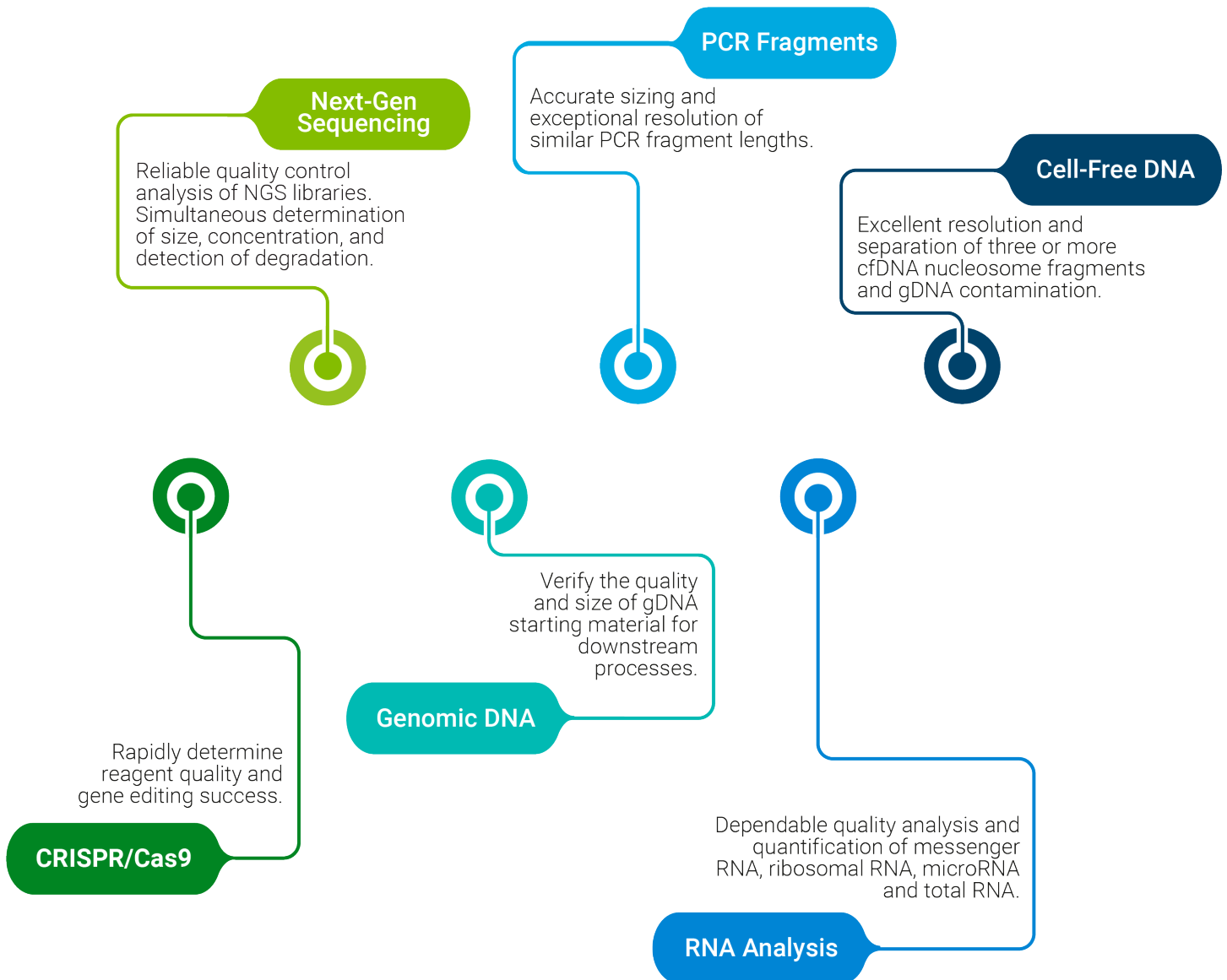
Low maintenance

Durable design and construction allow the capillary array to be stored on the instrument. Automated maintenance tasks including cleaning and conditioning, reducing the need for array handling.

Light Source

Capillaries

Sample or Buffer Tray

CCD

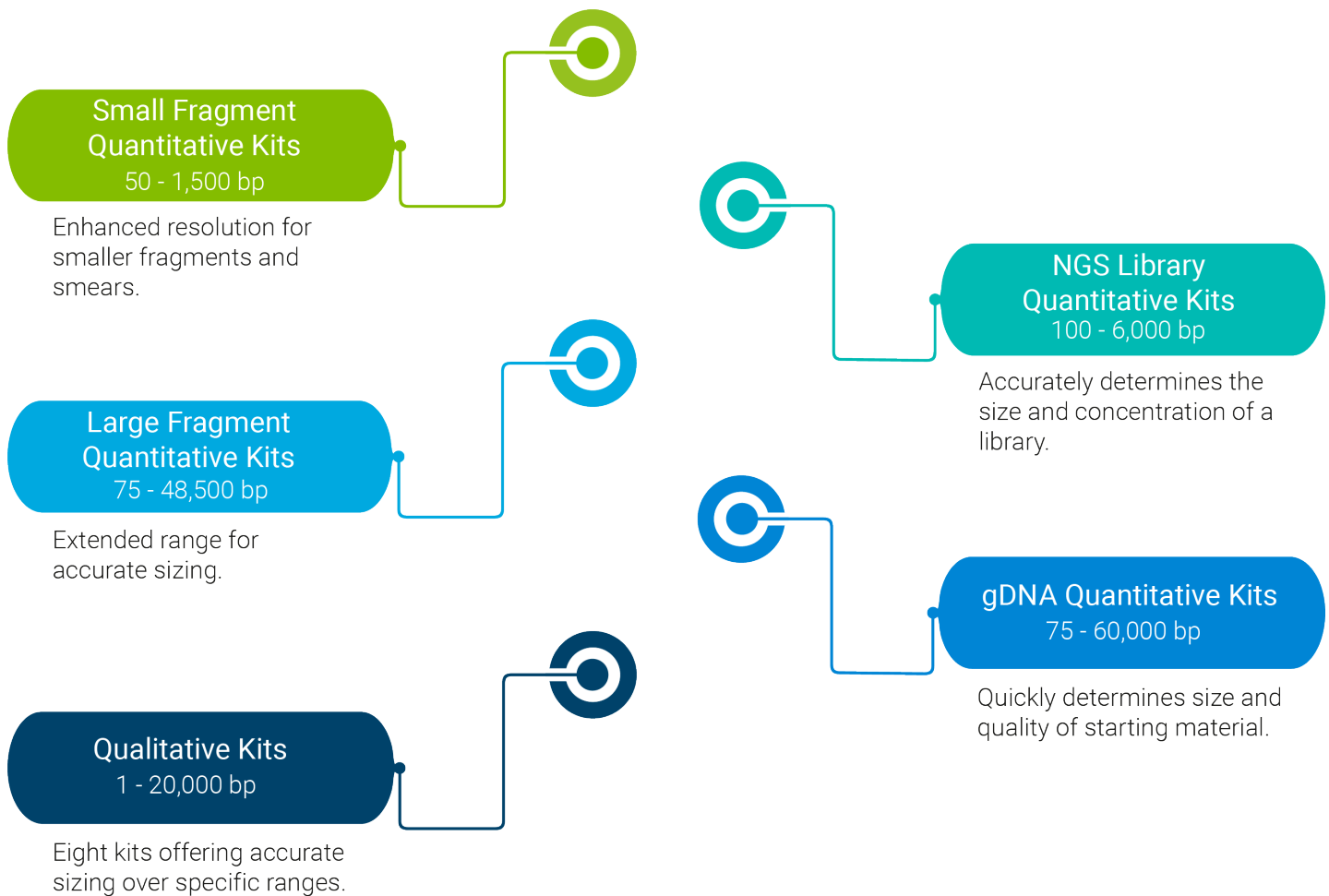High Voltage Power Supply

Outlet

Reservoir
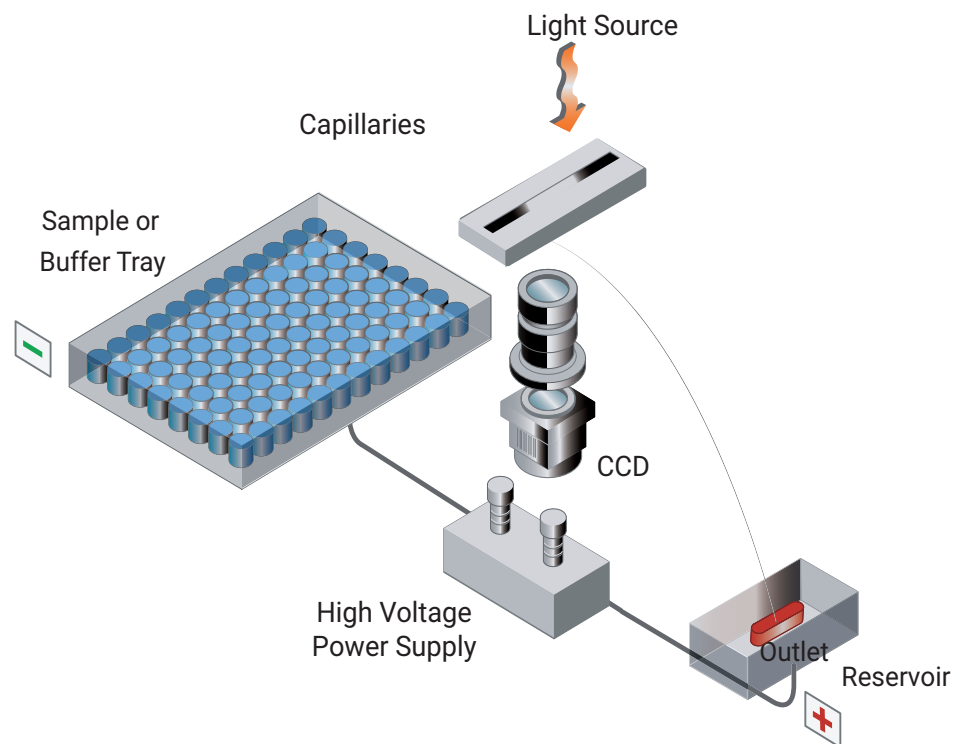
Perform Reliable Quality Control for Any Application

Applications including NGS, PCR, cfDNA, and many others need accurate nucleic acid assessment for optimal performance. Whether you are verifying the quality of your sample as a first step, determining the size of your fragments during your workflow, or confirming your results, you need efficient and reliable quality control methods for all your applications. With a broad range of kits, a Fragment Analyzer system allows you to assess diverse applications in one instrument.

PCR Fragments

Accurate sizing and exceptional resolution of similar PCR fragment lengths.

Next-Gen Sequencing

Reliable quality control analysis of NGS libraries. Simultaneous determination of size, concentration, and detection of degradation.

Cell-Free DNA

Excellent resolution and separation of three or more cfDNA nucleosome fragments and gDNA contamination.

Verify the quality and size of gDNA starting material for downstream processes.

Genomic DNA

Dependable quality analysis and quantification of messenger RNA, ribosomal RNA, microRNA and total RNA.

Rapidly determine reagent quality and gene editing success.

CRISPR/Cas9

RNA Analysis

# Sizing Range and Input Concentration of DNA Kits

With both qualitative and quantitative DNA kits, the Fragment Analyzer systems can assess various DNA sample subtypes. The qualitative DNA kits are ideal for fragment analysis, offering accurate sizing of small and large fragments as well as relative quantification. Use of the quantitative kits enables the separation and assessment of samples as diverse as small DNA fragments and high-molecular weight genomic DNA.

Small Fragment Quantitative Kits
50 - 1,500 bp

Enhanced resolution for smaller fragments and smears.

NGS Library Quantitative Kits
100 - 6,000 bp

Accurately determines the size and concentration of a library.

Large Fragment Quantitative Kits
75 - 48,500 bp

Extended range for accurate sizing.

gDNA Quantitative Kits
75 - 60,000 bp

Quickly determines size and quality of starting material.

Qualitative Kits
1 - 20,000 bp

Eight kits offering accurate sizing over specific ranges.

# Assess a Broad Range of Nucleic Acid Types with the Fragment Analyzer Systems

The broad range of kits available for the Fragment Analyzer systems allow you to qualify and quantify DNA and RNA samples such as plasmids, genomic DNA, total RNA, small RNA, CRISPR edits, large DNA fragments, and much more. The quantitative kits provide measurements of both sample size (bp or nt) and concentration. Similarly, the qualitative DNA kits offer accurate sizing and provide relative quantification.
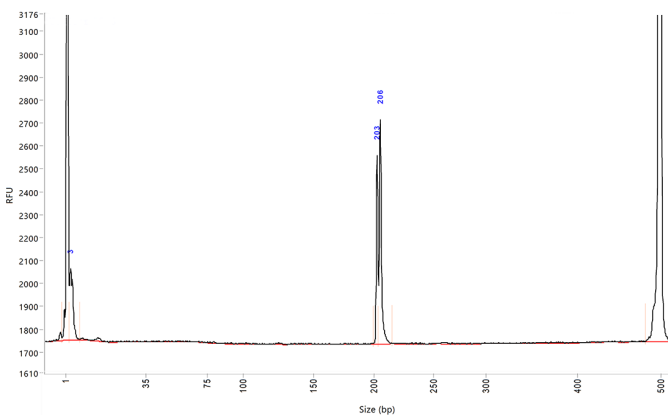

Figure 1. Mixed PCR fragments (201 bp and 204 bp) analyzed on the dsDNA 905 Reagent kit (1-500 bp) using the long 55 cm array on the 5200 Fragment Analyzer system. The two fragments are clearly defined demonstrating the high resolution capabilities on these Fragment Analyzer systems.
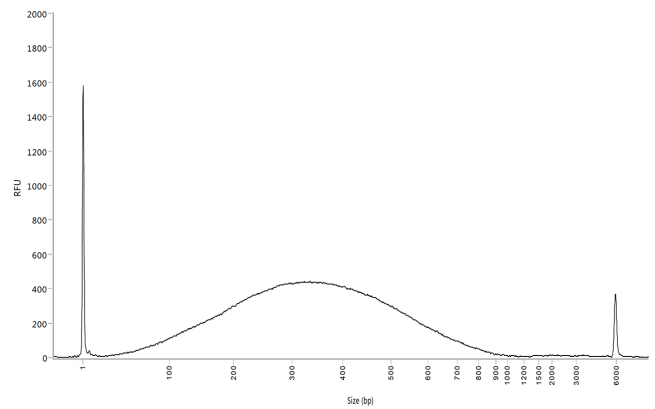
Figure 2. Short-read NGS library separated using the HS NGS Fragment kit (p/n DNF-474) on the 5200 Fragment Analyzer system. NGS library contaminants, including primer and adapter dimers, are quickly identified as peaks near the lower marker on library electropherograms.
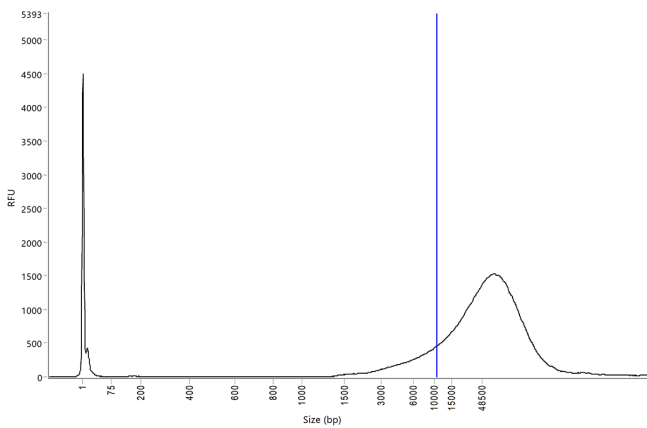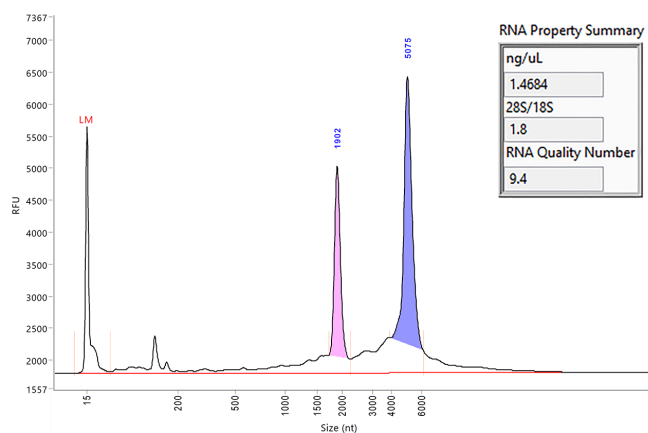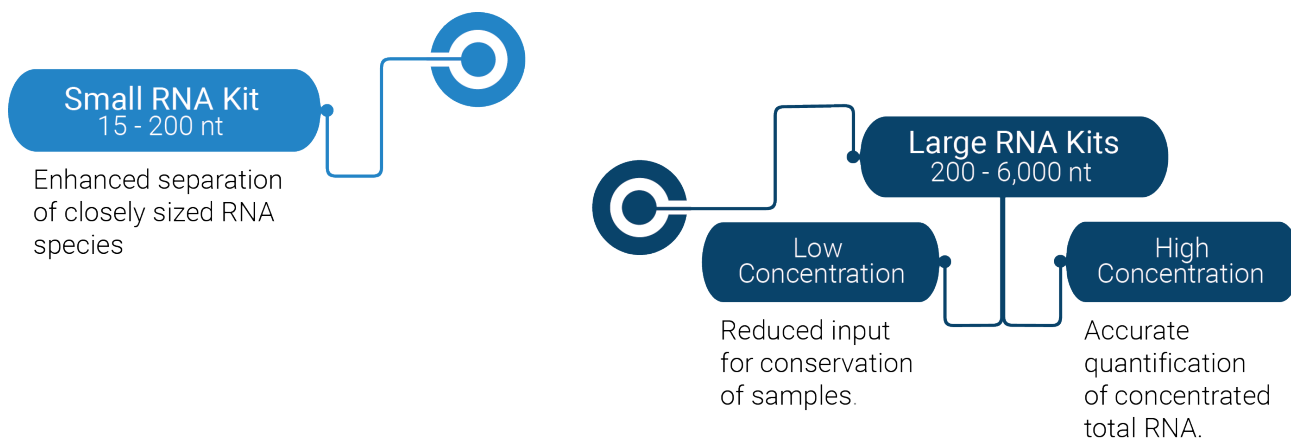

Figure 3. Genomic DNA separated using the Genomic DNA 50 kb kit (p/n DNF-467) on the 5200 Fragment Analyzer system. This sample has a Genomic Quality Number of 7.9 with a user-defined threshold of 10,000 bp (blue line).
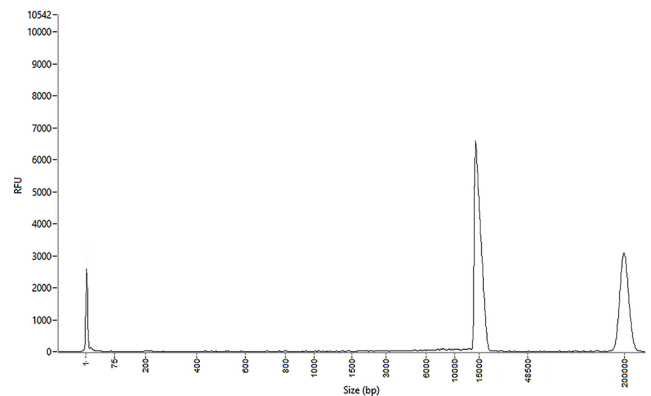

Figure 4. 15,000 bp DNA fragment separated using the HS Large Fragment 50 kb kit (p/n DNF-464) on the 5200 Fragment Analyzer system. Large DNA fragments of all origins can be separated on these systems.

Sizing Range and Input Concentration of RNA Kits

The RNA kits available for the Fragment Analyzer systems cover a broad range of sample types. Kits are available to assess samples from microRNA to total RNA. Concentration ranges for every kit cover two orders of magnitude, minimizing the amount of dilutions you must do for sample preparation.

Small RNA Kit
15 - 200 nt

Enhanced separation of closely sized RNA species

Large RNA Kits
200 - 6,000 nt

Low Concentration

Reduced input for conservation of samples.

High Concentration

Accurate quantification of concentrated total RNA.

Figure 1. Total RNA sample separated using the HS RNA kit (p/n DNF-472) on the 5200 Fragment Analyzer system. The RNA Property Summary offers further insight into individual samples, reporting the RQN, concentration, and rRNA ratios.
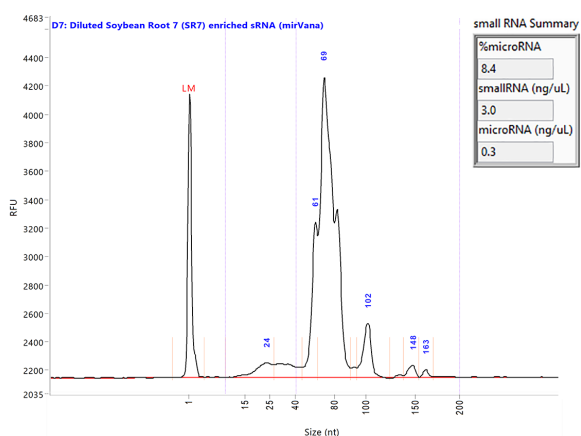

Figure 2. Small RNA sample separated using the Small RNA kit (p/n DNF-470) on the 5200 Fragment Analyzer system. Small RNA and microRNA concentrations and the percent mircoRNA are reported in the RNA Property Summary.

Key Aspects of ProSize Data Analysis Software

ProSize data analysis software is a robust, validated software package that simplifies the identification and analysis of nucleic acid fragments and smears. Designed with researchers in mind, ProSize software automatically calculates fragment size and quantification displaying the data in multiple formats. Reduce subjective assessment for certain DNA and RNA samples with custom quality metrics. ProSize data analysis software allows you to easily share data with coworkers with options to export run files in PDF and CSV formats.

Digital gel image

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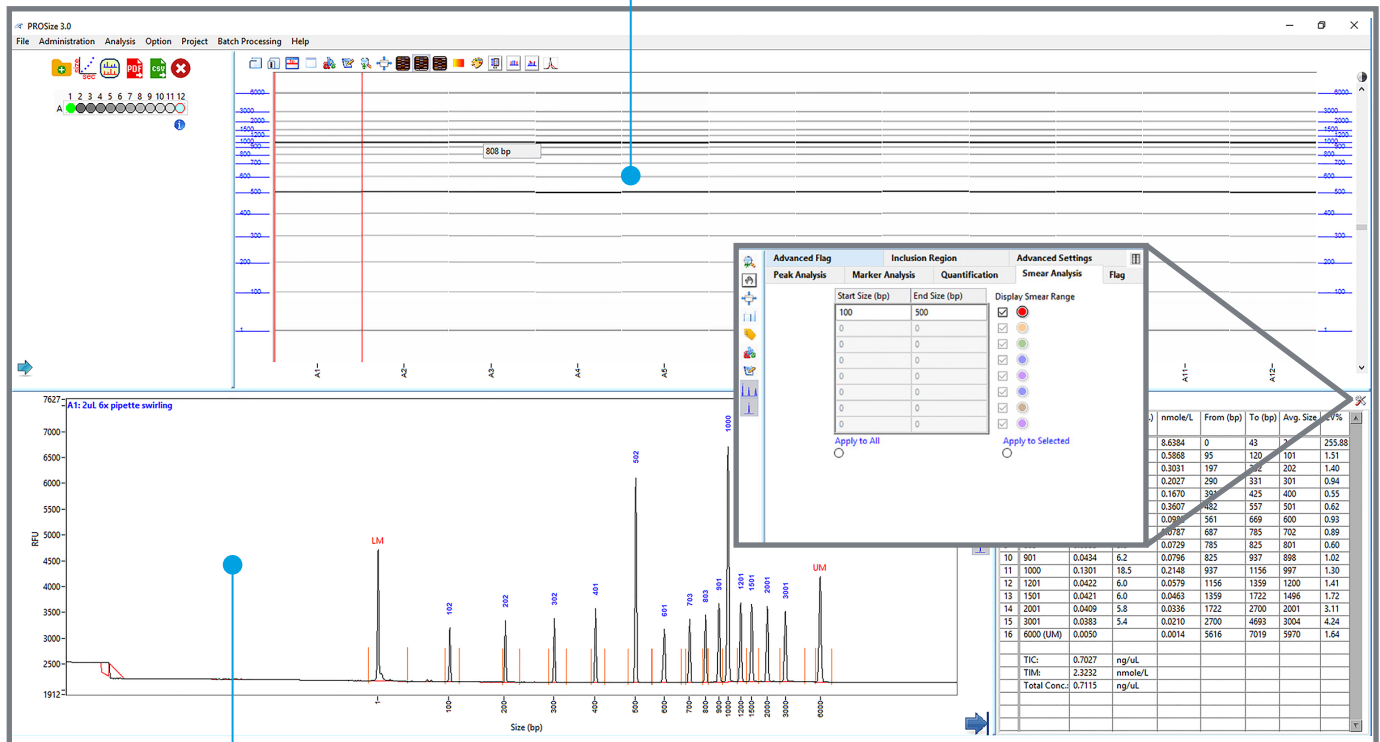

Electropherogram

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

Individual Parameter

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

Quality Metric Scoring with ProSize

The RNA Quality Number (RQN), Genomic Quality Number (GQN), and DNA Quality Number (DQN), were designed for use in ProSize data analysis software to allow for easy analysis of total RNA, gDNA, and sheared DNA quality, respectively. RQN calculates a quality score taking into account the entire electropherogram from the small RNA region to the ratio of the ribosomal peaks. This allows ProSize to assign an RQN based on a scale of 1 to 10, where 1 represents completely degraded RNA and 10 represents intact RNA. ProSize calculates a GQN or DQN value based on the fraction of total DNA sample concentration that lies above a user defined threshold value. The threshold value or size (bp), can be varied depending on the requirements of the specific application. RQN, GQN, and DQN allow for independent objective quality analysis that users can rely on for assessing all sample types.
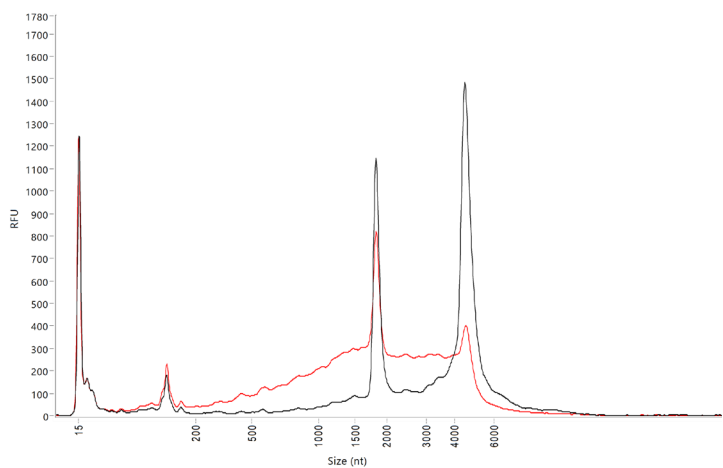

Figure 1. Universal mouse reference total RNA separated on the Agilent Fragment Analyzer system with the HS RNA kit (p/n DNF-472). Sample at 0 (black) and 8 (red) minutes at 70°C. RQN = 9.6 & 6.2, respectively.
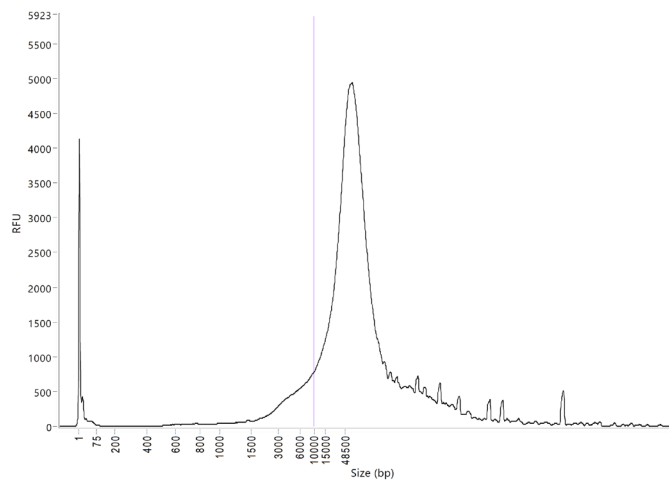
Figure 2. Genomic DNA analyzed on the Agilent Fragment Analyzer system with the Genomic DNA 50 kb kit (p/n DNF-467). $GQN_{10\,kb}$ = 8.8.

How to Use the Fragment Analyzer Systems

Performing QC on a Fragment Analyzer system is easy, prepare the instrument, load your samples, select method, start your run, and walk away until you are ready to analyze the results. The systems are low maintenance and allow you to automate maintenance tasks, such as capillary conditioning, to run before or after separations. This ability to analyze samples unattended means your QC is on your schedule.
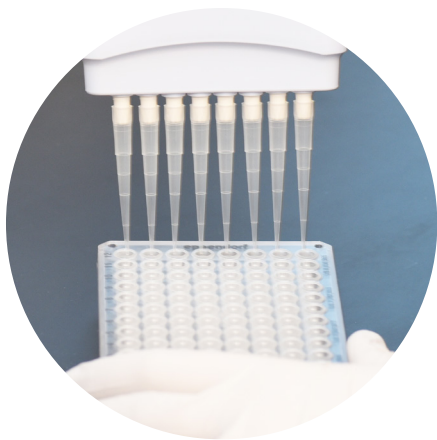
Step 1: Prepare Instrument

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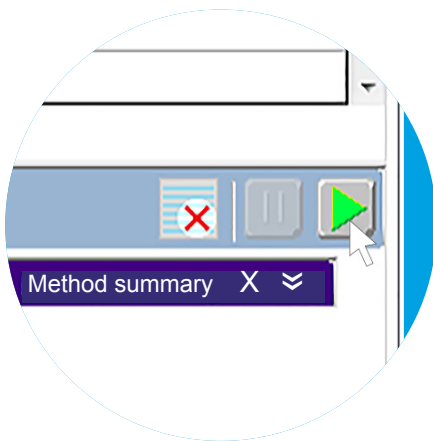

Step 2: Load Sample

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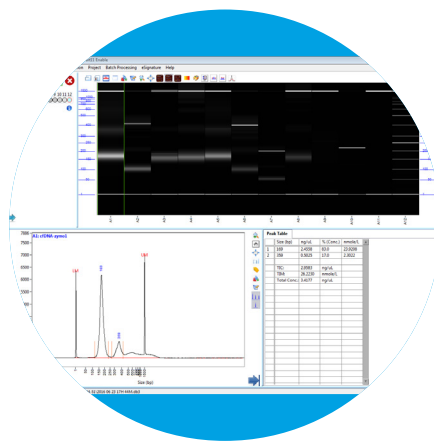

Step 3: Choose Method

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.

Agilent Fragment Analyzer Consumables

Analysis kits and capillary arrays

The unique design features of the Fragment Analyzer instruments combines ease of use automated electrophoresis with the flexibility to switch between DNA and RNA analysis kits without maintenance between runs. The reagent kit portfolio covers a broad range of applications and offers efficient solutions for separating and analyzing nucleic acids.

Quantitative Kits

The kits below use internal standards for accurate quantification and are ideal for various applications such as next-generation sequencing (NGS) quality control, cfDNA, and genomic DNA.

DNA/NGS Fragment Analysis

Kit name	Sizing range	Input concentration range	Part number	Kit sizes
NGS Fragment kit (1-6000 bp)	100 - 6,000 bp	5 - 100 ng/µL	DNF-473-0500 DNF-473-1000	500 samples 1,000 samples
HS NGS Fragment kit (1-6000 bp)	100 - 6,000 bp	50 - 5,000 pg/µL	DNF-474-0500 DNF-474-1000	500 samples 1,000 samples
Small Fragment kit	50 - 1,500 bp	5 - 100 ng/µL	DNF-476-0500	500 samples
HS Small Fragment kit	50 - 1,500 bp	100 - 5,000 pg/µL	DNF-477-0500	500 samples

Genomic DNA Analysis

Kit name	Sizing range	Input concentration range	Part number	Kit sizes
Genomic DNA 50 kb kit	75 - 60,000 bp	25 - 250 ng/µL	DNF-467-0500	500 samples
HS Genomic DNA 50 kb kit	75 - 60,000 bp	0.3 - 12 ng/µL	DNF-468-0500	500 samples

Large Fragment Analysis

Kit name	Sizing range	Input concentration range	Part number	Kit sizes
HS Large Fragment 50 kb kit	75 - 48,500 bp	50 - 5,000 pg/µL	DNF-464-0500	500 samples
Large Fragment kit	50 - 20,000 bp	5 - 100 ng/µL	DNF-492-0500 DNF-492-1000	500 samples 1000 samples

RNA Analysis

Kit name	Sizing range	Input concentration range	Part number	Kit sizes
Small RNA kit	15 - 200 nt	50 - 2,000 pg/µL	DNF-470-0275	275 samples
RNA kit (15 nt)	200 - 6,000 nt	25 - 500 ng/µL	DNF-471-0500 DNF-471-1000	500 samples 1,000 samples
HS RNA kit (15 nt)	200 - 6,000 nt	Total RNA: 50 - 5,000 pg/µL mRNA: 500 - 5,000 pg/µL	DNF-472-0500 DNF-472-1000	500 samples 1,000 samples

Qualitative Kits

The kits below are for sizing and qualitative analysis, using a double injection of sizing markers and sample. Appropriate for genotyping or analysis of SSR's/microsatellites, and PCR fragments.

Kit name	Sizing range	Input concentration range	Part number	Kit sizes
dsDNA 905 Reagent kit (1-500 bp)	35 - 500 bp	0.5 - 50 ng/µL	DNF-905-K0500 DNF-905-K1000	500 samples 1,000 samples
dsDNA 910 Reagent kit (35-1500 bp)	35 - 1,500 bp	0.5 - 50 ng/µL	DNF-910-K0500 DNF-910-K1000	500 samples 1,000 samples
dsDNA 915 Reagent kit (35-5000 bp)	35 - 5,000 bp	0.5 - 50 ng/µL	DNF-915-K0500 DNF-915-K1000	500 samples 1,000 samples
dsDNA 920 Reagent kit (75-15000 bp)	75 - 15,000 bp	0.5 - 50 ng/µL	DNF-920-K0500	500 samples
dsDNA 930 Reagent kit (75-20000 bp)	75 - 20,000 bp	0.5 - 50 ng/µL	DNF-930-K0500 DNF-930-K1000	500 samples 1,000 samples
dsDNA 935 Reagent kit (1-1500 bp)	100 - 1,500 bp	0.5 - 50 ng/µL	DNF-935-K0500 DNF-935-K1000	500 samples 1,000 samples
Plasmid DNA kit	2,000 - 10,000 bp	0.1 - 1.0 ng/µL	DNF-940-K0500	500 samples

CRISPR Mutation Kit

The CRISPR Discovery Gel kit was designed for the automated screening of CRISPR-induced mutation events within a target fragment.

Kit name	Sizing range	Input concentration range	Part number	Kit sizes
CRISPR Discovery Gel kit	100 - 6,000 bp	0.005 - 2 ng/µL	DNF-910-K1000CP	1,000 samples

Capillary Arrays

Agilent developed various capillary arrays for the Fragment Analyzer systems to provide superior separation resolution and nucleic acid quantification.

Array name	Part number
FA 12-Capillary Array Ultrashort	A2300-1250-2247
FA 12-Capillary Array Short	A2300-1250-3355
FA 12-Capillary Array Long	A2300-1250-5580
FA 48-Capillary Array Short	A2300-4850-3355
FA/ZAG 96-Capillary Array Short	A2300-9650-3355
FA/ZAG 96-Capillary Array Long	A2300-9650-5580

Agilent
Trusted Answers

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 DV_{200}

– 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.
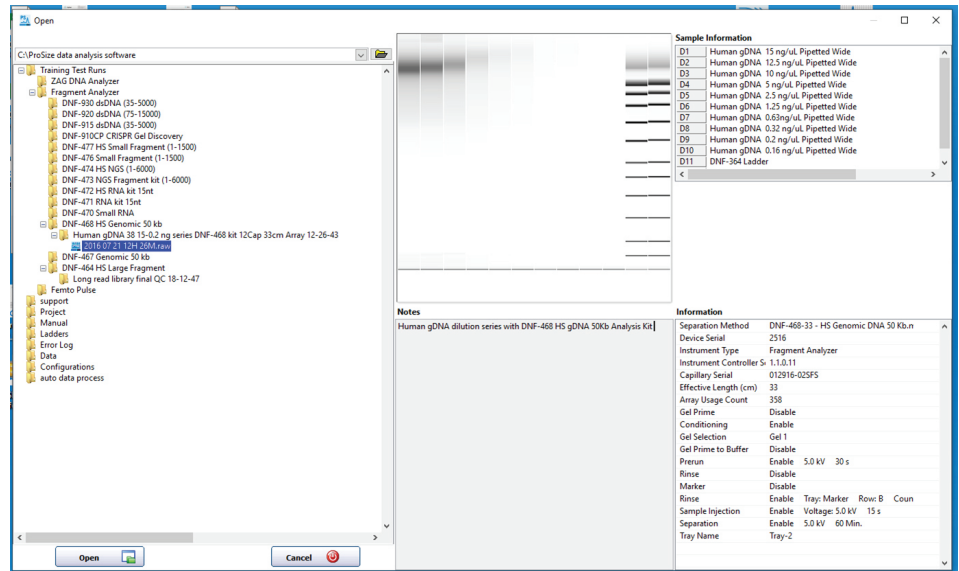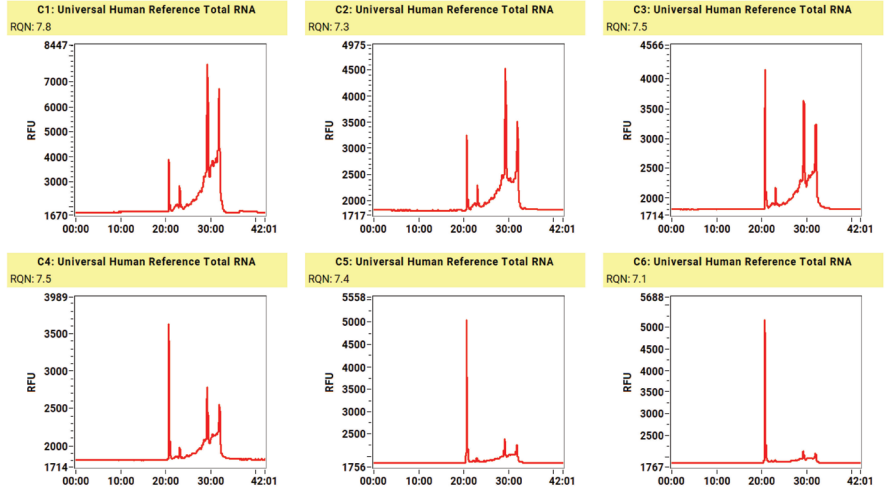

2. **Analyze and compare**
Data can be analyzed in the gel or electropherogram view. Concentration and sizing information is displayed in the peak and sample table. In the Advanced Settings tab, the user can select the desired Analysis Mode for specific sample types such as Total RNA from procaryotes, 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.
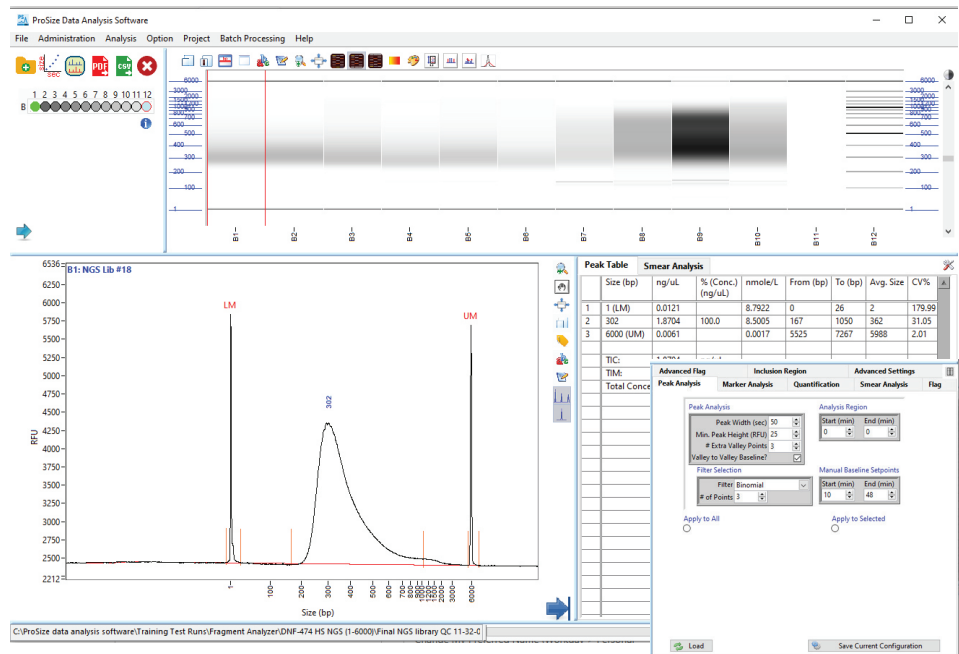
3. **Generate PDF report**

   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