Agilent 2200 TapeStation

User Manual

Agilent Technologies

Notices

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WARNING

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Contents

1
Introduction to the 2200 TapeStation System

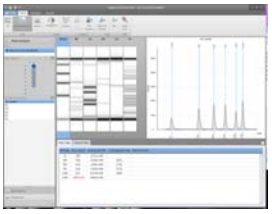
This chapter gives an introduction to the system

Overview of the System

The Agilent 2200 TapeStation system is a revolutionary tape-based platform for simpler, faster and more reliable electrophoresis. It is made up of three elements: a consumable tape (ScreenTape), an instrument (the 2200 TapeStation) and an analysis software. The system is very straightforward to use, simply place the sample tubes and ScreenTape in to the 2200 TapeStation and let it load, separate, image, analyse and present the results.

Place ScreenTape and some tips in the 2200 TapeStation.

Place your samples in the 2200 TapeStation and click **Start** on the controller software.



View your analysed results in around 1 min per sample.

This User Manual guides the operation of ScreenTape, the 2200 TapeStation and software for the analysis of DNA, RNA and protein samples. The contents of the ScreenTape System are detailed below.

Information pertaining to the 2200 TapeStation can be found in:

- 2200 TapeStation Technical Specification
- 2200 TapeStation Components

- Installing the 2200 TapeStation

Information pertaining to sample and ScreenTape requirements can be found in:

- ScreenTape Architecture
- Operating Procedure

ScreenTape Architecture

Barcode:	The unique barcode tracks lane usage within individual ScreenTape and allows traceability of results.
Buffer chamber:	The buffer chamber is located at the top of the channel and contains optimised buffers for the effective separation of nucleic acid fragments or proteins.
Electrodes:	The integrated electrodes apply a current across the ScreenTape and eliminate the need for any additional electrophoresis equipment.
Gel:	The gel contained within ScreenTape has been developed specifically to resolve nucleic acids or proteins.
ScreenTape product details:	The information is unique to each consumable item. This includes: ScreenTape type, product expiry date and a unique serial number.

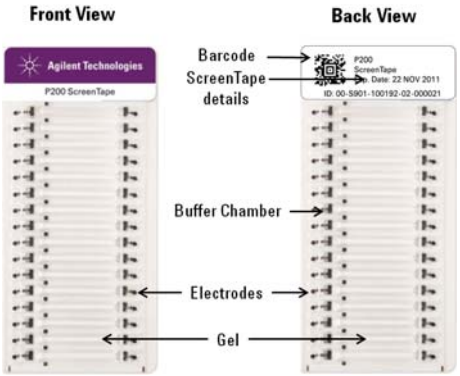


Figure 1 Example: P200 ScreenTape

Agilent 2200 TapeStation Components

Lid:	The 2200 TapeStation lid must be closed each time the instrument controller software is initialized, and whilst the instrument is in operation.
LED:	The LED will illuminate once the instrument is on. When the LED is flashing slowly, the instrument is in use and the lid should not be opened, rapid flashing indicates that the TapeStation requires some attention.
Sample Block:	There are 2 sample blocks provided that can either hold 0.2 mL sample tube strips or a 96 well plate.
Tip Holder:	The tip holder can accommodate up to 16 TapeStation loading tips at any one time.
ScreenTape:	The tape must be placed into the holder with the barcode towards the front of the instrument, facing towards the right.
USB Socket:	The USB connector is inserted into the USB socket to link the laptop to the 2200 TapeStation.
Power-cable socket:	The power cable must be connected to the 2200 TapeStation and the relevant mains electricity outlet.

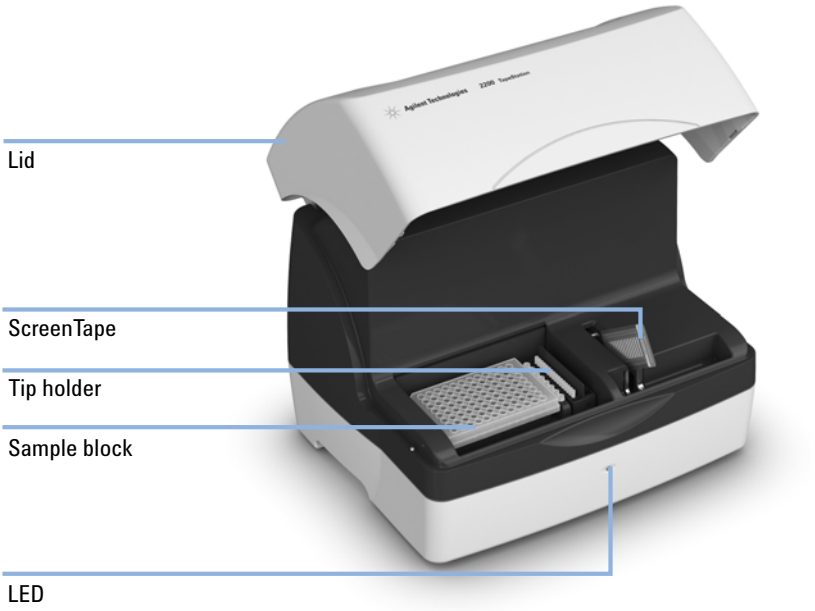


Figure 2 2200 TapeStation (front view)

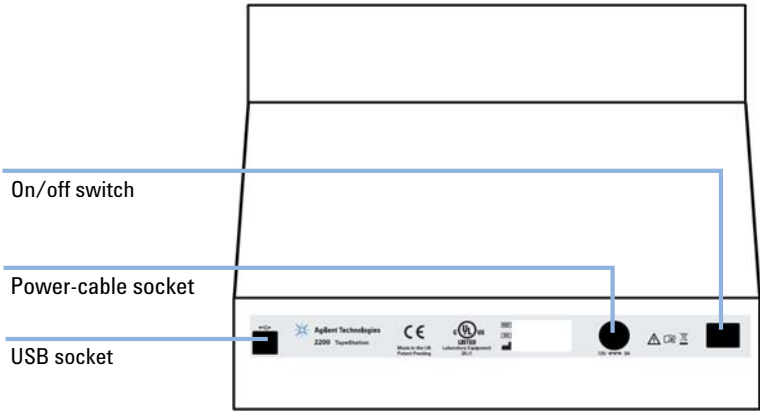


Figure 3 2200 TapeStation (back view)

2 Specifications

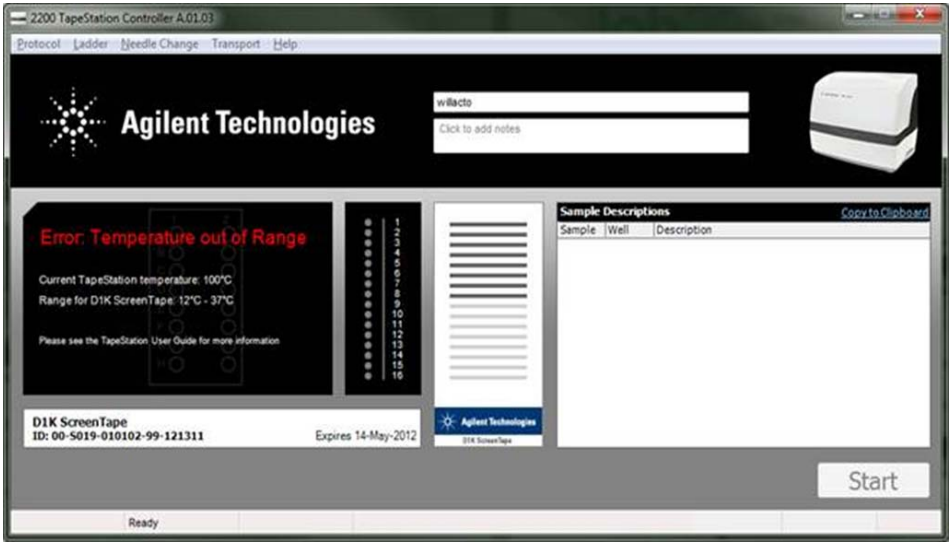
This chapter provides information on specifications.

Technical Specifications

2200 TapeStation	
Input voltage:	12 V DC
Power consumption:	40 W (VA)
Current:	3 A
Interface:	USB cable (PC comms.)
Instrument Housing:	UL94/VO rated flame retardant cast polyurethane
Dimensions:	400 x 310 x 310 mm
Weight:	12.5 kg
Power Supply	
Input voltage:	100 – 240 V AC
Input frequency:	50 – 60 Hz
Phase:	1
Current:	0.45 – 1.1 A
Environmental condition	
Optimal operating temperature	23 °C (73.4 °F).
Ambient operating temperature	12 – 37 °C (53.6 – 98.6 °F) for D1K 17 – 37 °C (62.6 – 98.6 °F) for HS D1K 15 – 30 °C (59.0 – 86.0 °F) for Genomic DNA 14 – 30 °C (57.2 – 86.0 °F) for RNA applications 10 – 33 °C (50.0 – 91.4 °F) for Protein applications

NOTE

If the instrument is out of the recommended temperature range for the ScreenTape inserted the following error message will appear in the controller software:



- If the quoted current temperature is above the specified range, please move the system out of direct sunlight and away from any windows. Check that any air conditioning is functioning.
- If the quoted current temperature is below the specified range please allow the instrument to equilibrate to the ambient temperature, and avoid using in a cooled area.

ScreenTape Specifications

Specification (High Sensitivity D1K ScreenTape Assay)

Analytical Specification	High Sensitivity D1K ScreenTape Assay
Sizing Range	35 – 1000 bp
Resolution[1]	35 – 300 bp: 15 %, 300 – 1000 bp: 10 %
Sensitivity[2]	5 pg/µL[3]
Sizing Precision	5 % CV
Sizing Accuracy[4]	±10 %
Quantitative Precision	15 % CV
Quantitative Accuracy	±20 %
Quantitative Range	75 – 1000 pg/µL
Carry Over	N/A
Physical Specification	
Analysis Time	16 samples < 20 min, 96 samples < 100 min
Samples per consumable	16
Sample Volume Required	2 µL
Shelf Life	4 months
Box/Kit size	112 samples/box

1 Resolution is defined as the separation of fragments at half peak height or better

2 Signal:noise ratio > 3 for single peak

3 2200 TapeStation Nucleic Acid System (G2965AA)

4 Determined using the D1K ladder as sample

Specification (D1K ScreenTape Assay)

Analytical Specification	D1K ScreenTape Assay
Sizing Range	35 – 1000 bp
Resolution[1]	35 – 300 bp: 15 %, 300 – 1000 bp: 10 %
Sensitivity[2]	0.05 ng/µL
Sizing Precision	5 % CV
Sizing Accuracy[3]	±10 %
Quantitative Precision	10 % CV
Quantitative Accuracy	±20 %
Quantitative Range	0.1 – 50 ng/µL
Carry Over	N/A
Physical Specification	
Analysis Time	16 samples < 20 min, 96 samples < 100 min
Samples per consumable	16
Sample Volume Required	1 µL
Shelf Life	4 months
Box/Kit size	112 samples/box

1 Resolution is defined as the separation of fragments at half peak height or better

2 Signal:noise ratio > 3 for single peak

3 Determined using the D1K ladder as sample

Specification (Genomic DNA ScreenTape Assay)

Analytical Specification	Genomic DNA ScreenTape
Sizing Range	200 bp to > 60000 bp
Sensitivity	0.5 ng/µL
Sizing Precision[1]	200 – 15000 bp 15 %CV
Sizing Accuracy[1]	200 – 15000 bp ±10 %
Quantitative Precision[2]	15 % CV
Quantitative Accuracy[2]	±20 %
Linear Concentration Range	10 – 100 ng/µL
Carry Over	N/A
Physical Specification	
Analysis Time	16 samples < 25 min, 96 samples < 150 min
Samples per consumable	16
Sample Volume Required	1 µL
Shelf Life	4 months
Box/Kit size	112 samples/box

1 Determined using the Genomic DNA ladder as sample

2 Average result from various genomic DNA sample types

Specification (High Sensitivity R6K ScreenTape Assay)

Analytical Specification	High Sensitivity R6K ScreenTape Assay
Quality Score	RIN[e]
Sensitivity	100 pg/µL
Quantitative Precision[1]	20 % CV
Qualitative Range	100 – 10000 pg/µL
Physical Specification	
Analysis Time	16 samples < 15 min, 96 samples ~ 100 min
Samples per consumable	16
Sample Volume Required	2 µL
Shelf Life	4 months
ScreenTape box size	112 samples/box

[1] Within a ScreenTape

Specification (R6K ScreenTape Assay)

Analytical Specification	R6K ScreenTape Assay
Quality Score	RIN[e]
Sensitivity	2 ng/µL
Quantitative Precision[1]	15 % CV
Qualitative Range	2 – 500 ng/µL
Physical Specification	
Analysis Time	16 samples < 20 min, 96 samples ~ 100 min
Samples per consumable	16
Sample Volume Required	1 µL
Shelf Life	4 months
ScreenTape box size	112 samples/box

[1] Within a ScreenTape

Specification (P200 ScreenTape Assay)

Analytical Specification	P200 ScreenTape Assay
Sizing range	10 – 200 kDa
Resolution[1]	15 %
Typical Sizing Accuracy	±10 % (CAII, Lysozyme, beta lactoglobulin)
Sizing Precision	3 % CV
Quantitative Range/precision	100 – 1000 ng/µL for IgG; 15 % CV
Qualitative Range	5 – 5000 ng/µL BSA, Lysozyme; 12.5 – 5000 ng/µL IgG
Sensitivity[2]	5 ng/µL Lysozyme; 12.5 ng/µL IgG
Physical Specification	
Sample volume needed	2 µL
Analysis Time	16 samples <15 min
Samples/consumable	16
Kit Size	112 Samples
Kit Stability	4 months

1 for ladder

2 signal :noise ratio > 3

3
Installing the System

This chapter gives information about how to install the system.

Unpacking the System

Unpacking the Agilent 2200 TapeStation

Prerequisites Do not attempt to unpack the 2200 TapeStation instrument until you have read the accompanying Site and Safety Manual.

CAUTION

Condensation within the instrument

Condensation will damage the system electronics.

➔ If your instrument was shipped in cold weather, leave it in its box and allow it to warm slowly to room temperature to avoid condensation.

CAUTION

"Defective on arrival" problems

If there are signs of damage, please do not attempt to install the instrument. Inspection by Agilent is required to evaluate if the instrument is in good working condition.

➔ Notify your local Agilent Representative and the Technical support channel.

➔ An Agilent service representative will inspect the instrument at your site and initiate appropriate actions.

WARNING

Personal injury

The TapeStation is heavy.

➔ Enlist the aid of a co-worker to share the lifting load to avoid personal injury.

1 Remove the TapeStation from the packaging and place on a clean, dry, flat surface.

2 Allow the TapeStation to acclimatise to the ambient temperature of the operating environment.

3 Remove the label covering the tape holder, as shown in the image below.

Figure 4 Remove before use

Delivery Checklist

Ensure all parts and materials have been delivered with your system. The delivery checklist is shown below.

Please report any missing or damaged parts to your local Agilent Technologies sales and service office.

Contents of the ScreenTape System

The Agilent 2200 TapeStation

Table 1 The Agilent 2200 TapeStation System (G2964AA, G2965AA)

Product	Volume	Properties
Agilent 2200 TapeStation	1 x	Instrument for loading, electrophoresing, imaging and analysing: • 2200 TapeStation System (G2964AA) or • 2200 TapeStation Nucleic Acid System (G2965AA)
TapeStation Software Setup Disc	1 x CD	The software is required to drive the 2200 TapeStation and visualise the ScreenTape analysis
Laptop	1 x Laptop	Instrument Control Laptop
USB Cables/Power supply units	1 x USB cable 2 x power cords	1 x USB cable to connect the laptop to the TapeStation 1 x Power supply unit for the laptop 1 x Power supply unit for the TapeStation
Sample Block	1 x 0.2 mL strip and 1 x 96 well plate	A removable sample block for the correct loading of samples within the TapeStation
Tip Holder	2 x	A removable cartridge for pipette tips placed in the TapeStation
TapeStation loading tips	1 x 384 tips	Pipette tips to use in the 2200 TapeStation
TapeStation - compatible 0.2 mL tube strips and lids	1x box of 120 tubes and caps	Tube strips for placing samples mixed with loading buffer into the 2200 TapeStation
96 well plates	pack of 10	
96 well plate foil seal	pack of 100	
Loading tip transfer tool (optional)	1 x	
Guides		Site Safety guide and Quick Guides (G2964AA - Protein, DNA and RNA; G2965AA - DNA and RNA)

ScreenTape Products

Kit Components (High Sensitivity D1K Assay)

Part Number	Name	Color	Amount
5067-5363	High Sensitivity D1K ScreenTape		7 ScreenTape
5067-5364	High Sensitivity D1K Reagents		2 vials
	• High Sensitivity D1K Ladder		75 µL
	• High Sensitivity D1K Sample Buffer		300 µL

Kit Components (D1K Assay)

Part Number	Name	Color	Amount
5067-5361	D1K ScreenTape		7 ScreenTape
5067-5362	D1K Reagents		2 vials
	• D1K Ladder		75 µL
	• D1K Sample Buffer		400 µL

Kit Components (Genomic DNA Assay)

Part Number	Name	Color	Amount
5067-5365	Genomic DNA ScreenTape		7 ScreenTape
5067-5366	Genomic DNA Reagents		2 vials
	• Genomic DNA Ladder		75 µL
	• Genomic DNA Sample Buffer		1350 µL

Kit Components (High Sensitivity R6K Assay)

Part Number	Name	Color	Amount
5067-5369	High Sensitivity R6K ScreenTape		7 ScreenTape
5067-5370	High Sensitivity R6K Reagents		1 vial
	• High Sensitivity R6K Sample Buffer		300 µL

Kit Components (R6K Assay)

Part Number	Name	Color	Amount
5067-5367	R6K ScreenTape		7 ScreenTape
5067-5368	R6K Reagents		1 vial
	• R6K Sample Buffer		500 µL

Kit Components (P200 Assay)

Part Number	Name	Color	Amount
5067-5371	P200 ScreenTape		7 ScreenTape
5067-5372	P200 Reagents		
	• P200 5X Labeling Dye		70 µL
	• P200 Labeling Buffer		350 µL
	• P200 Reducing Sample Buffer		550 µL
	• P200 pH Buffer	clear	1000 µL
	• P200 Non-Reducing Sample Buffer		550 µL
	• P200 Markers (pre-stained)		270 µL
	• P200 Ladder		40 µL

Installing the System

Software Installation

The software for your Agilent 2200 TapeStation system is preinstalled on the system laptop.

NOTE

For updates, or if you have to change the laptop, you may download the latest version of the software from the update server http://www.agilent.com/genomics/tapestation.

For details on installation of the software refer to the readme.txt file on the installation CD *Agilent 2200 TapeStation Software TAPESTATION INSTRUMENT CONTROL AND DATA ANALYSIS*.

Agilent 2200 TapeStation Set Up

Hardware required Laptop

Software required Agilent 2200 TapeStation Software (already installed)

WARNING

Personal injury, explosion or fire

- ➔ Do not operate the instrument in an atmosphere containing explosive gases or near flammable volatile liquids.
- ➔ Only approved mains cord set supplied with the instrument must be used with this instrument and if an extension lead is required, the lead must be earthed.
- ➔ If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

NOTE

For general safety information, please refer to the *2200 TapeStation System - Site and Safety Manual*.

WARNING

Use of unsupplied cables or power adaptors

Using cables or power adaptors not supplied by Agilent Technologies can lead to damage of the electronic components or personal injury.

- ➔ Never use cables or power adaptors other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

1. Connect the supplied USB cable between the port on the back of the instrument and your laptop.
2. Power the instrument with the supplied power lead and adaptor.
3. Turn the instrument on using the power switch located at the back of the TapeStation.

   When powered and idle, the instrument will have a blue LED visible on the front of the case.

4 Windows may display a **Found New Hardware** wizard once the software has loaded. In this instance, always perform the following steps:

   a Select **No, not this time** to prevent connecting to Windows Update and searching for software.

   b In the next window select **Install the Software automatically**.

   c If a window appears, indicating the software did not pass the windows logo testing, click **Continue Anyway**.

A window appears, indicating that the hardware has been successfully installed. The TapeStation system will function.

NOTE

As there is more than one driver that can be detected and installed, you may need to follow these steps more than once.

You may need to follow these steps if you change the USB port on the laptop for the TapeStation connector cable.

4
Using the 2200 TapeStation System

This chapter explains the intended use of the 2200 TapeStation System.

Intended Use of the 2200 TapeStation System

The 2200 TapeStation system (Agilent 2200 TapeStation Software) carries out electrophoretic separation of Nucleic Acids and proteins. The system detects:

- Fluorescently stained double stranded DNA including genomic DNA
- Fluorescently stained total RNA
- Fluorescently labelled proteins

Performance Limitations of Use

The 2200 TapeStation System (Agilent 2200 TapeStation Software) can analyse a maximum of 16 samples at any one time, more samples can be run using a 96 well plate and multiple ScreenTape.

The user is responsible for establishing performance characteristics necessary for upstream and downstream applications. Appropriate controls must be included in any upstream application requiring analysis on the 2200 TapeStation System (Agilent 2200 TapeStation Software).

Additional Components Required by the User

Additional Consumables required for the 2200 TapeStation instrument

- Loading tips (5067-5152 or 5067-5153)
- Optical Tube 8x Strip (401428) and and Optical Cap 8x Strip (401425) or 96-well Sample Plates (5067-5150) and 96-well Plate Foil Seal (5067-5154).

Additional Material Required (Not Supplied)

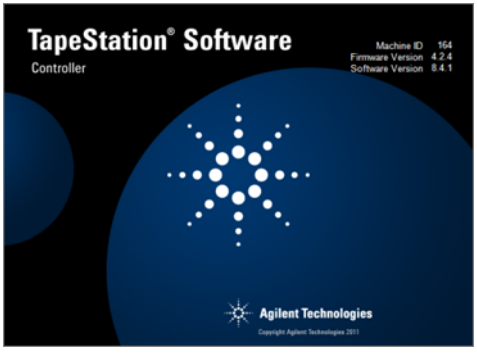
- Volumetric pipette
- Vortex mixer
- Centrifuge
- Heating block or PCR machine

Operating Procedure

1 Double click the 2200 TapeStation controller icon on the desktop and follow the instructions on the screen.

NOTE Always ensure you are using the most up-to-date Controller software. Please check for the latest version.

You will now see the startup splash.



2 Insert the tube strip sample block into the TapeStation.

OR

Insert the plate sample block into the TapeStation.

3 Place loading tips into the loading tip holder as shown and insert into the TapeStation.

NOTE If any used tips are left in the tip-buckets, a pop up window will ask for the discarded tips to be removed. The 2200 TapeStation will not run until all the tip buckets are empty.

NOTE A Loading tip transfer tool (G2964-60000) is available.

NOTE Ensure that all 16 loading tips are inserted into the tip holder.

The laptop utilised for performing any previous use(s) of the ScreenTape must be utilised for all further re-use.

CAUTION Damage to the 2200 TapeStation and impact on performance

➔ Use correct tips.

4 Remove ScreenTape from the foil packet.

5 Hold the tape with the ScreenTape label facing you and gently flick the top of the tape.

If there are any small bubbles present then this will move them to the top of the chamber.

NOTE The presence of small bubbles within the buffer chamber of the ScreenTape is normal. These bubbles often occur at the gel/buffer interface and need to be displaced prior to running.

Failure to remove bubbles from the gel/buffer interface is detrimental to the performance of the ScreenTape.

6 Insert the ScreenTape into the TapeStation, with the label towards the front of the instrument and the barcode facing right.

NOTE Protect the individual gel lanes within the ScreenTape from excessive force. Do not bend or flex ScreenTape and store in the provided packaging at the recommended temperature, when not in use.

NOTE TapeStation instrument will not recognize the screen tape if inserted incorrectly.

NOTE The TapeStation will automatically recognise the sample plate type and ScreenTape and load the required parameters.

7 Prepare samples according to type as detailed in "How to prepare your samples" on page 47 or the appropriate Quick Guide.

8 Place samples into the sample block inside the TapeStation.

CAUTION

Damage to the 2200 TapeStation and impact on performance

➔ Ensure the lids have been removed from the sample tubes.

9 Select the tubes or wells you wish to run by clicking and dragging the mouse over the sample locations.

- Selected wells will change colour from white.
- Selected lanes on the controller ScreenTape image will change colour.
- Lanes which have been run previously will appear grey.

NOTE

For best sizing precision and accuracy, the user should run the appropriate ladder with the samples.

For RNA applications, or if 16 samples need to be analysed in parallel, the user may insert a saved ladder in the 2200 TapeStation analysis software.

RNA reagent kits do not contain a ladder.

No software saved ladder is available for genomic DNA applications.

NOTE

ScreenTape can be used up to 2 weeks after first use if it has been stored upright between 2 – 8 °C.

Simply select the samples in the same manner as whole ScreenTape. The first sample selected will automatically appear in the first available lane.

NOTE

Partially used ScreenTape (those that contain lanes run on previous occasions) should be returned to the box and stored vertically between 2 – 8 °C for a maximum of 2 weeks.

D1K, Genomic DNA and R6K Reagents

Store between 2 – 8 °C.

P200 Reagents

Store from -30 to -20 °C.

10 The sample selection can be deleted by right clicking on the sample plate image.

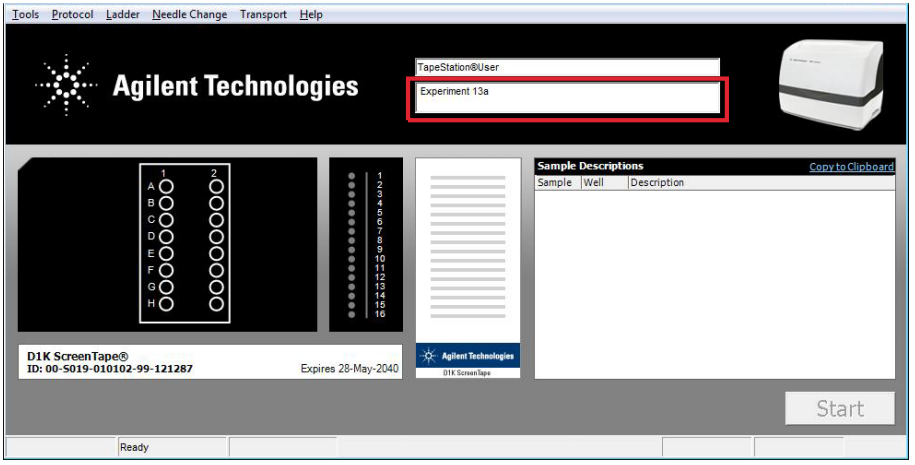
A menu will appear with the following options:

- **Clear All Selections** - this will clear ladder well and all sample wells selected
- **Clear Last Selection** - this will only clear the last samples to be highlighted

NOTE Pressing **Escape** on the keyboard will also cancel the current selections.

Add Experiment Notes

1 If required, notes can be manually entered into the software before the instrument is started.



Describe Samples

1 Sample descriptions can be manually entered into the software before the instrument is started and whilst the TapeStation is operating, before analysis software is launched.

OR

If samples are barcoded, place the cursor in the desired track description and scan the sample barcode with a hand-held barcode scanner.

OR

Sample data can be copied and pasted from for example an Excel table.

NOTE The entered Sample descriptions data can be copied to clipboard by using the Copy to Clipboard link in the top right hand corner of the **Sample Description** table.

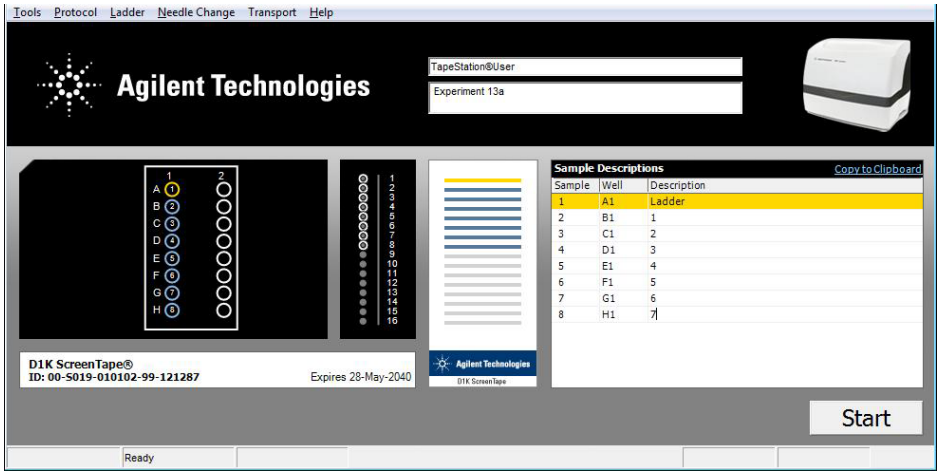


Figure 5 Controller image (8 way strip selection)

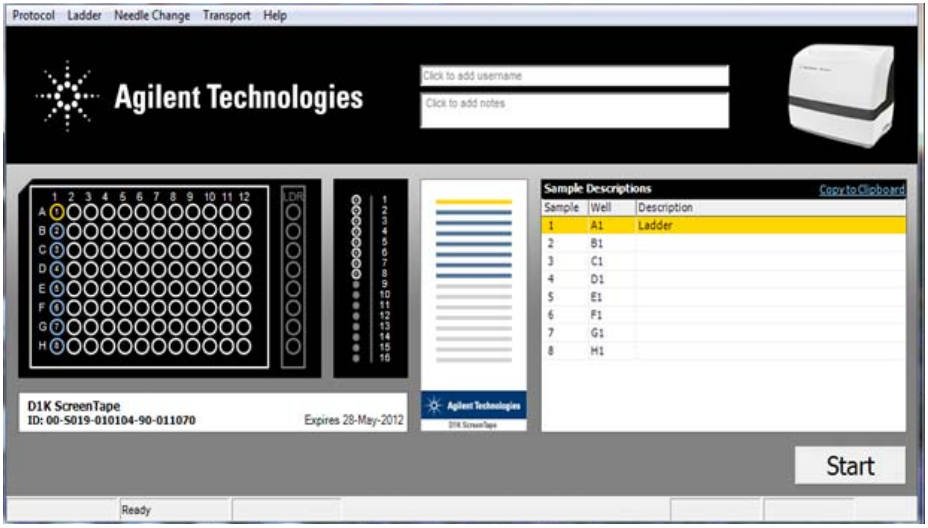


Figure 6 Controller image (96 well plate selection)

NOTE In the 96 well plate sample selection screen the panel labeled LDR is no longer available for selection.

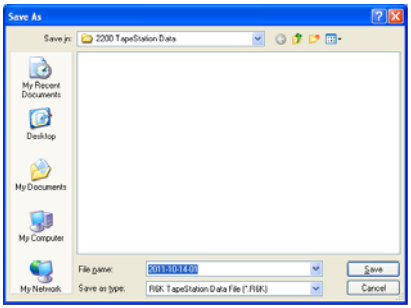
NOTE All information entered in the control software will appear in the analysed results.

Start the TapeStation Run

1 Click the start button.

This will produce a **Save As** window.

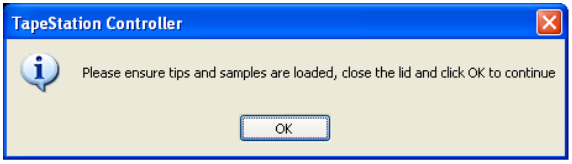
As a default the file name starts with the date, in reverse order, and a run counter. When run continuously, the save function auto increments the counter part of the file name.



2 Type in the name that you wish the analysis to be saved as. Do not include a full stop (.) in file names.

Final Check

ScreenTapeController:



1 Lift the lid of the TapeStation.

2 Ensure that there are fresh tips in the tip holder and that all the samples have been correctly loaded with lids removed and correspond to the sample selection on the screen.

3 Close the lid.

NOTE Lifting the lid of the TapeStation after this time will abort the experimental run.

Running System

WARNING **Exposure to potentially dangerous mechanical parts**

➔ Do not open the lid whilst the light is flashing.

Abort the TapeStation Run

1 If, for any reason, you wish to abort an experiment, click the abort button on the pop-up controller. The instrument will ask:

   a If you want to reset the instrument to begin another experiment – this will return the controller software and TapeStation to the beginning of the next experiment.

   b If you want to close down the controller – this will close the controller software and keep the TapeStation temporarily locked in its current state.

NOTE Aborting the experiment will irretrievably discard any progress made and samples loaded.

Complete TapeStation Run

When finished, a pop up will ask for removal of the tip cartridge and tape.

1 Remove tip cartridge and tape.

2 Click **OK**.

Empty Tip Buckets

1 Empty tip buckets.

NOTE

Used loading tips must be removed from the tip buckets before the next experimental run. The TapeStation will not start if tips are detected in the buckets.

Used ScreenTape, sample strips and tips should be disposed of in accordance to local regulations.

How to Use the Agilent TapeStation Software

NOTE

For further information please refer to the software help.

This can be accessed by selecting the question mark (?) button in the top right hand corner of the 2200 TapeStation Analysis Software.

Shutdown and Restarting Procedure

Shutdown Procedure

NOTE The controller software, TapeStation instrument and laptop should be shut down when not in use (preferably at the end of every working day).

Ensure that the TapeStation System is shut down in the following order:

1. Exit the TapeStation Controller Software.
2. Turn off the TapeStation instrument.
3. Power down the laptop.

Restarting Procedure

Ensure that the ScreenTape System is restarted in the following order:

1. Power up the laptop.
2. Turn on the TapeStation.
3. Start the TapeStation Controller Software.

How to prepare your samples

WARNING

Toxic agents

The handling of solvents, samples and reagents can hold health and safety risks.

- ➔ When using/handling the ScreenTape and working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing).
- ➔ Always follow good laboratory practices and adhere to the guidelines established in your laboratory.
- ➔ Refer to product material safety datasheets for further information.
- ➔ The volume of substances should be reduced to the minimum required for the analysis.

CAUTION

Damage to the 2200 TapeStation instrument

- ➔ Use only the recommended consumables and reagents with the 2200 TapeStation system.

NOTE

- When pipetting sample buffer, ensure that excess buffer droplets are removed from the tip before transfer to the sample tubes. Care must be taken due to viscosity of Sample Buffers.
- When pipetting small volumes ensure that no sample remains within the tip.
- When adding sample buffer to sample, please ensure that they are mixed correctly.

  To achieve this, gently mix several times with additional pipetting, then cap the tubes, mix the samples using a vortex mixer for 5 s and briefly centrifuge to collect the contents at the base of the tubes. Improper mixing can lead to quantification errors.
- For best results ensure that all reagents are allowed to equilibrate to room temperature for 30 minutes prior to use.

NOTE For successful loading, the sample solution must be placed at the bottom of the tube or well without any air-bubbles. The 2200 TapeStation will load a sample from a minimum of 3 µL onto ScreenTape.

Ladder Options

NOTE In **Ladder** mode in the controller software, a ladder should be loaded into the first available lane.

Alternatively the user can choose to run a software ladder. This is done by choosing **No ladder** in the 2200 TapeStation Controller software ladder menu, then running the instrument as normal. A software saved ladder can then be inserted in the 2200 TapeStation Analysis software.

Ladders not run in the first available position, or in **No ladder** mode can later be assigned as ladder using the 2200 TapeStation Analysis Software.

Good Measurement Practices for Analysing DNA on the Agilent 2200 TapeStation

Quantification

Protocol

Ensure that sample and sample buffer volumes are from the correct protocol.

Ensure that the reagents are used with the corresponding ScreenTape type.

Ensure correct pipetting technique. When pipetting sample buffer, ensure that excess buffer droplets are removed from the tip before transfer to the sample tubes.

Correct Mixing

Sample and sample buffer must be vortex mixed on maximum speed for 5 seconds followed by centrifugation to remove any bubbles.

Insufficient mixing can cause discrepancies in quantification.

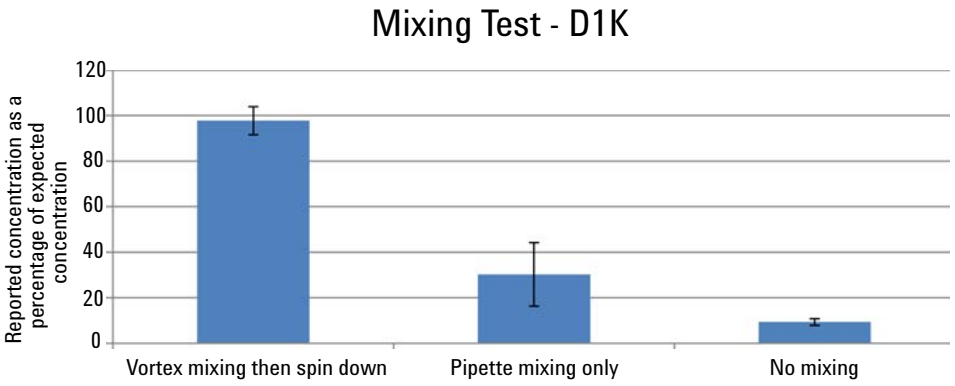


Figure 7 Effect of sample mixing on quantification results

Peak Integration

Ensure that the upper marker is properly integrated. This is used for quantification.

Sample peaks should also be adjusted as required (see Figure 8 on page 50).

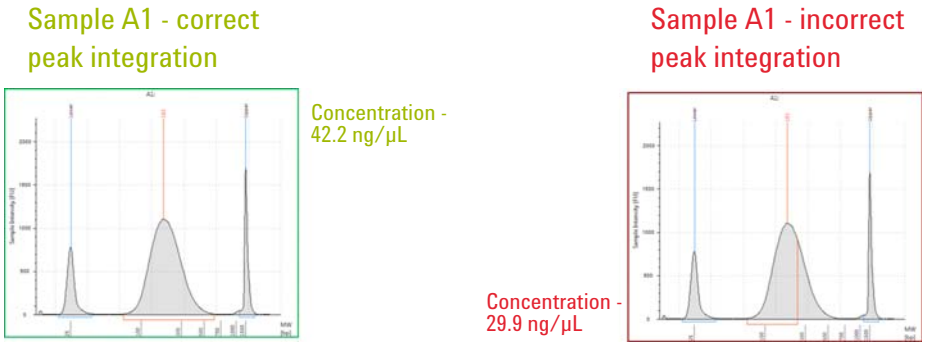


Figure 8 Peak integration (examples for correct and incorrect integration)

Quantitative Range

For accurate quantification, ensure that the sample is within the range of the chosen ScreenTape.

- The quantitative range for D1K ScreenTape is

  100 pg/µL - 50 ng/µL
- The quantitative range for HSD1K ScreenTape is

  75 – 1000 pg/µL

NOTE In extreme cases, overloading the ScreenTape will result in a loss of the bottom marker.

Other Issues

Residual AMPure beads from SureSelect protocol can give signal which runs with the upper marker (see figure below).

Any signal under the upper marker affects quantification.

Removal of the beads removes the signal under the upper marker.

NOTE This can be achieved using a magnetic plate as detailed in the Sure Select protocol. If you see this signal please increase the duration of this step.

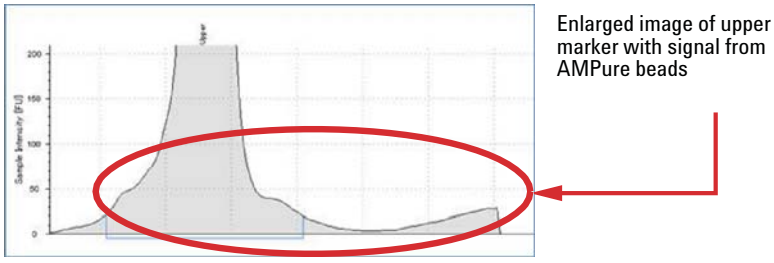


Figure 9 Upper marker with signal from AMPure beads

NOTE Over amplification can also cause signal to run concurrently with the upper marker.

Sizing

Analysis software mode

Within the 2200 TapeStation analysis software sizing can be found in both electropherogram and region mode.

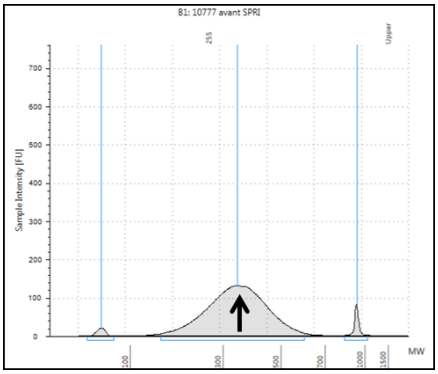
The sizing methods used in electropherogram and region mode will provide different sizing information.

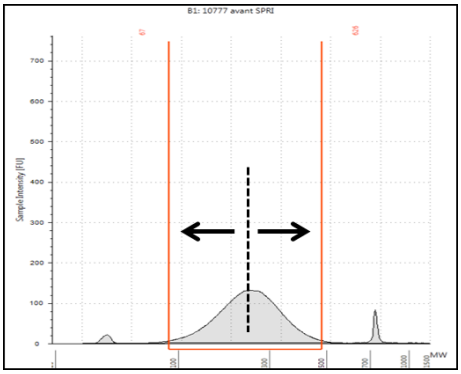
Electropherogram View

- Calculates data for a peak
- The size reported is that of the highest point in the peak

Region View

- Calculates data for a smear or region
- Size given is that of the centre of the region's mass





Lower and upper marker

Always ensure that the upper and lower markers have been identified correctly.

The markers are used as internal references to determine the molecular weight size of the sample.

NOTE Incorrect identification will lead to miscalculations in reported sizing values.

Molarity

Molarity is determined from both *size and quantity*.

NOTE Errors in sizing and quantification will result in erroneous molarity calculations.

Always ensure that the good measurement practices for sizing and quantification have been followed to ensure accurate molarity values.

DNA Sample Preparation

Information on Working with Samples

NOTE

- When pipetting sample buffer, ensure that excess buffer droplets are removed from the tip before transfer to the sample tubes. Care must be taken due to viscosity of Sample Buffers.
- When pipetting small volumes ensure that no sample remains within the tip.
- When adding sample buffer to sample, please ensure that they are mixed correctly.

  To achieve this, mix several times with additional pipetting, then cap the tubes, mix the samples using a vortex mixer on maximum speed for 5 s and briefly centrifuge to collect the contents at the base of the tubes. Improper mixing can lead to quantification errors.
- For best results ensure that all reagents are allowed to equilibrate to room temperature for 30 minutes prior to use.

NOTE

When using 96 well plates, the use of a 96 well plate vortex adaptor is advised to ensure correct sample mixing. Improper mixing can lead to quantification errors.

As with samples in PCR strips, briefly centrifuge after vortexing to collect the contents at the base of the tubes before placing into the TapeStation.

NOTE

For successful loading, the sample solution must be placed at the bottom of the tube or well without any air-bubbles. The 2200 TapeStation will load a sample from a minimum of 3 µL onto ScreenTape.

NOTE

For best sizing precision and accuracy, the user should run the appropriate ladder with the samples.

If 16 samples need to be analysed in parallel, the user may choose to insert a saved ladder in the 2200 TapeStation analysis software.

Sample Preparation (High Sensitivity D1K Assay)

Parts required	p/n	Description
	5067-5364	High Sensitivity D1K Reagents (Ladder and Sample Buffer)

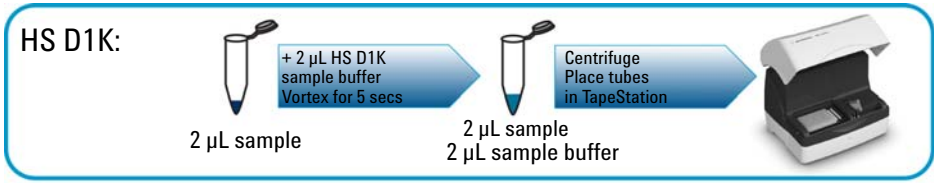
1 Prepare Ladder

   a Aliquot a minimum of 3 µL High Sensitivity D1K Ladder (●) into the first tube/well.

2 Mix 2 µL High Sensitivity D1K Sample Buffer (●) with 2 µL DNA sample by vortex for 5 s.

3 Spin down to position the sample at the bottom of the tube.

4 Load sample plate, tips, ScreenTape and Samples into the TapeStation as detailed in operating procedure section.



Sample Preparation (D1K Assay)

Parts required	p/n	Description
	5067-5362	D1K Reagents (Ladder and Sample Buffer)

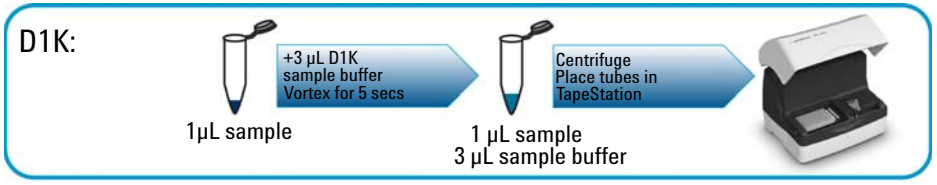
1 Prepare Ladder

   a Aliquot a minimum of 3 µL D1K Ladder (●) into the first tube/well.

2 Mix 3 µL D1K Sample Buffer (●) with 1 µL DNA sample by vortex for 5 s.

3 Spin down to position the sample at the bottom of the tube.

4 Load sample plate, tips, ScreenTape and Samples into the TapeStation as detailed in operating procedure section.



Sample Preparation (Genomic DNA Assay)

Parts required	p/n	Description
	5067-5366	Genomic DNA Reagents

1 Equilibrate all reagents to room temperature for 30 min.

2 Prepare Ladder

   a Aliquot a minimum of 3 µL Genomic DNA Ladder (●) into the first tube/well.

NOTE Use a fresh ladder for each run. If using 96-well plates, always run the ladder in first selected position. No software saved ladder is available for the Genomic DNA assay.

NOTE Do not shake or over vortex ladder vial. This could result in degradation of the gDNA ladder.

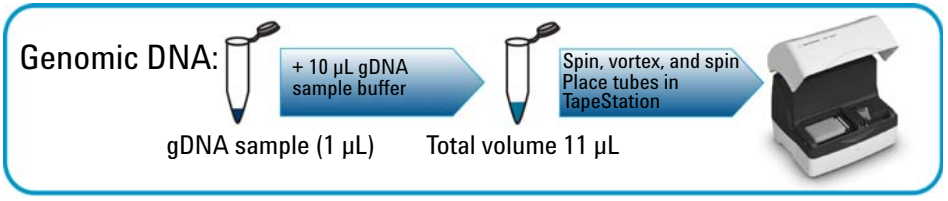
3 Prepare Sample

   a Mix 1 µL DNA sample with 10 µL Genomic DNA Sample Buffer (●).

   b Spin down, then vortex for 5 s.

   c Spin down to position the sample at the bottom of the tube.

4 Load sample plate, tips, ScreenTape and Samples into the TapeStation as detailed in operating procedure section.



RNA Sample Preparation

Information on Working with RNA

CAUTION

Sample degradation

➔ Ensure all working areas, reagents and plastic ware are RNase free.

➔ Handle RNA samples with care.

➔ Wear gloves at all times.

➔ Thaw RNA samples on ice.

➔ Store RNA samples on ice throughout the ScreenTape analysis procedure.

CAUTION

Solidification of DMSO

R6K Sample Buffer contains DMSO, which may solidify when cold, for example if taken directly from the fridge or stored on ice.

➔ Ensure R6K Sample Buffer is equlibrated to room temperature and mixed thoroughly prior to use.

➔ Maintain Sample Buffer vials at room temperature throughout sample preparation.

➔ Sample Buffer mixed with sample should always be kept on ice during sample preparation and after sample denaturation.

➔ The Sample Buffers should be returned to 2 – 8 °C storage, once the analysis procedure has been completed.

NOTE

- It is important to place the samples on ice directly after the denaturation step as this aids complete and stable denaturation of the RNA.
- To ensure optimal performance of the ScreenTape R6K platform samples should be analysed, using the 2200 TapeStation, within 3 h of the denaturation step when left on the 2200 TapeStation system. Beyond 3 h, denatured samples should be stored on ice, or in a suitable freezable sample block.

NOTE

- Do not vortex mix samples vigorously as this may degrade them.
- When pipetting Sample Buffer, ensure that excess buffer droplets are removed from the tip before transfer to the sample tubes.

  Care must be taken due to the viscosity of Sample Buffers.
- When pipetting small volumes ensure that no sample remains within the tip.
- Please ensure samples and Sample Buffer are mixed correctly. To achieve this, gently mix several times with additional pipetting, then cap the tubes, gently vortex mix for 5 s, followed by briefly centrifuging on maximum speed to collect the contents at the base of the tubes. This is essential for accurate quantification of samples.
- For best results ensure that all reagents are allowed to equilibrate to room temperature prior to use.

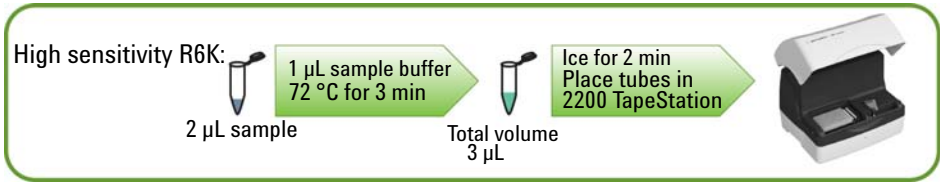
NOTE

RNA applications are only available to run without a ladder. If required, a software ladder can be added in the Agilent 2200 TapeStation analysis software.

Sample Preparation (High Sensitivity R6K Assay)

Parts required	#	p/n	Description
	1	5067-5370	High Sensitivity R6K Reagents

1. Mix 1 µL High Sensitivity R6K Sample Buffer (●) with 2 µL RNA sample.
2. Sample denaturation
   - Heat the samples to 72 °C for 3 min.
   - Place samples on ice for 2 min.
   - Briefly centrifuge the samples to collect the contents in the base of the tubes.
3. Load sample plate, tips, ScreenTape and Samples into the TapeStation as detailed in operating procedure section.



Sample Preparation (R6K Assay)

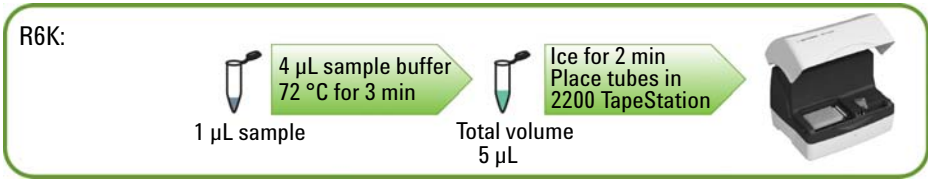
Parts required	p/n	Description
	5067-5368	R6K Reagents

1 Mix 4 µL R6K Sample Buffer (●) with 1 µL RNA sample.

2 Sample denaturation

- Heat the samples to 72 °C for 3 min.
- Place samples on ice for 2 min.
- Briefly centrifuge the samples to collect the contents in the base of the tubes.

3 Load sample plate, tips, ScreenTape and Samples into the TapeStation as detailed in operating procedure section.



Protein Sample Preparation

Information on Working with Samples

NOTE

- When pipetting sample buffer, ensure that excess buffer droplets are removed from the tip before transfer to the sample tubes. Care must be taken due to viscosity of Sample Buffers.
- When pipetting small volumes ensure that no sample remains within the tip.
- When adding sample buffer to sample, please ensure that they are mixed correctly.

  To achieve this, mix several times with additional pipetting, then cap the tubes, mix the samples using a vortex mixer on maximum speed for 5 s and briefly centrifuge to collect the contents at the base of the tubes. Improper mixing can lead to quantification errors.
- For best results ensure that all reagents are allowed to equilibrate to room temperature for 30 minutes prior to use.

NOTE

When using 96 well plates, the use of a 96 well plate vortex adaptor is advised to ensure correct sample mixing. Improper mixing can lead to quantification errors.

As with samples in PCR strips, briefly centrifuge after vortexing to collect the contents at the base of the tubes before placing into the TapeStation.

NOTE

For successful loading, the sample solution must be placed at the bottom of the tube or well without any air-bubbles. The 2200 TapeStation will load a sample from a minimum of 3 µL onto ScreenTape.

NOTE

For best sizing precision and accuracy, the user should run the appropriate ladder with the samples.

If 16 samples need to be analysed in parallel, the user may choose to insert a saved ladder in the 2200 TapeStation analysis software.

Sample Preparation (P200 Assay)

Parts required	p/n	Description
	5067-5372	P200 Reagents

1 Prepare the P200 stain solution.

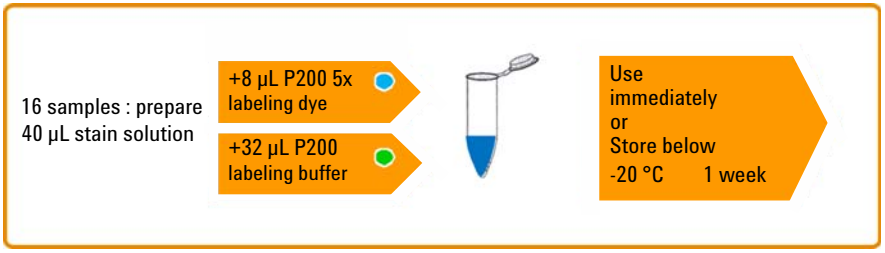
a Dilute P200 5X Labeling Dye (●) at a ratio of 1 :5 with P200 Labeling Buffer (●)

NOTE

The prepared stain solution is best used on the day of formulation, however it can be stored for up to one week below -20 °C.

For normal applications, 2 µL of formulated stain solution is required for 2 µL of sample. For 16 samples 8 µL of 5X Stain would be diluted with 32 µL of Stain Buffer. The resultant stain solution should be thoroughly mixed before use.

For certain applications, particularly with high protein concentrations, higher concentrations of stain can be used in combination with altered ratios of stain to sample.



2 Stain protein sample or ladder.

NOTE

The P200 ladder (●) should be processed through the P200 sample preparation procedure in the same manner as your samples.

In **Ladder** mode, selected in the ladder options in the controller software, P200 ladder is automatically selected as the first sample in the TapeStation controller.

The user can also select to run no ladder, and then to insert a software saved ladder in the 2200 TapeStation Analysis software.

a Place 2 µL of P200 stain solution (prepared above)into a PCR tube strip or 96 well plate.

b Pipette 2 µL of the protein sample or ladder into the tube, mix and attach the lids or foil cover to prevent evaporation.

c Heat for 7 min at 75 °C.

d After heating, remove condensation from the lids (or foil cover) of the tubes by centrifugation.

NOTE P200 pH buffer (clear) is supplied to allow the user to dilute samples to alleviate issues with staining efficiency caused by low pH. The use of P200 pH Buffer resolves these issues in most circumstances. For further information on buffer compatibility, contact your Agilent Technologies representative.

3 Denaturate sample.

a Choose which sample buffer is required: P200 Reducing Sample Buffer (○) or P200 Non-reducing Sample Buffer (●).

NOTE It is recommended that P200 Reducing Sample Buffer is used for the denaturation of P200 Ladder.

b Add 4 µL of the relevant P200 sample buffer to the stained sample and replace the lids or foil cover.

c Mix and heat at 75 °C for 5 min.

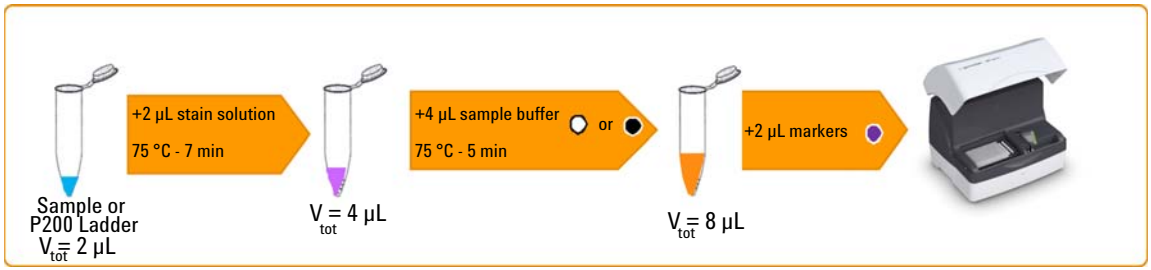
d Remove condensation from the lids (or foil cover) of the tubes by centrifugation.

4 Add 2 µL of P200 Marker (●) to each sample and to the P200 ladder.

5 Mix the solution well, and centrifuge to ensure that the sample is at the bottom of the tube, ready for analysis on the TapeStation.

NOTE P200 Marker is formulated with a high percentage of glycerol. Due to the high density of this reagent, the user must ensure that the samples are adequately mixed prior to analysis on the TapeStation. Failure to do so may result in unsatisfactory analysis results.

6 Load sample plate, tips, ScreenTape and Samples into the TapeStation as detailed in operating procedure section.



5 Maintenance

This chapter describes the maintenance of the TapeStation system.

General Information

Annual Preventative Maintenance (PM) is essential for the TapeStation as it has many moving parts.

This PM should be arranged with your local Agilent representative and consists of

- Fan Filter replacement
- Needle replacement
- Electrophoresis probe replacement
- Internal instrument inspection for wear, foreign objects and general clean inside and out

In addition to the above, the engineer will check that the instrument is functional by running a full ScreenTape.

For customers with exceptionally high usage the needle replacement procedure as detailed in the section below can also be performed between annual PM services.

Changing the Needle

It is important to know which TapeStation system you have before changing the needle(s), in order to purchase the correct needle cartridge.

Table 2 Overview TapeStation Configuration - Needle Cartridge

Product Number	TapeStation Configuration	Pump	Needle Cartridge Ordering Code
ST007	TapeStation for ScreenPlex	Single	G2960-60062
ST008	TapeStation for DNA		
ST009	TapeStation for Nucleic acids		
ST017	TapeStation for ScreenPlex	Twin	G2960-60063
ST019	TapeStation for Nucleic acids		
ST010	TapeStation for Protein / Combined TapeStation		
G2960A	2200 TapeStation System	Twin	G2960-60063
G2961A	2200 TapeStation Nucleic Acid System		
G2964AA	2200 TapeStation System		
G2965AA	2200 TapeStation Nucleic Acid System		
G2966AA	2200 TapeStation ScreenPlex System		

Needle change intervals:

- After 3840 (7680 lanes in a Dual loading system) pierces, the controller software will inform the user that a needle change is pending. The word **Needle** will appear in the bottom of the controller software inside a yellow box.
- After 4160 pierces (8320 lanes in a Dual loading system), a needle change is recommended. The box around the word **Needle** will change from yellow to red.
- After 4480 pierces (8960 lanes in a Dual loading system), the needle has completed its lifetime and must be changed before the TapeStation will start.

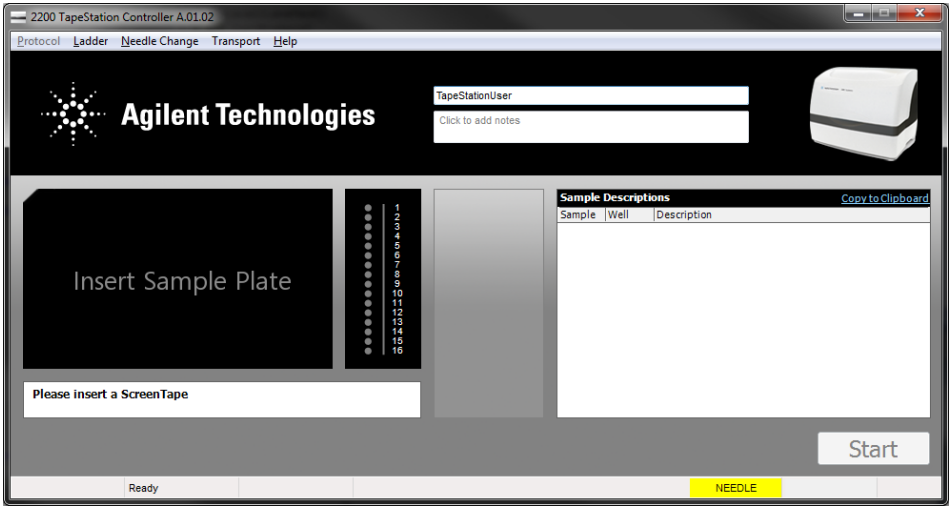


Figure 10 Controller software indicating a **Needle** change is recommended

Parts required	#	p/n	Description
	1	G2960-60062	Needle cartridge (for use in single pump systems) For use with product numbers ST007, ST008 and ST009
OR	1	G2960-60063	Needle cartridge (for use in dual pump systems) For use with product numbers ST017, ST019, ST010, G2960A, G2961A, G2964AA, G2965AA and G2966AA

NOTE New needles cartridges can be ordered at any time from Agilent Technologies by contacting your local sales agent.

For details on correct needle cartridge for your TapeStation model, refer to Table 2 on page 69.

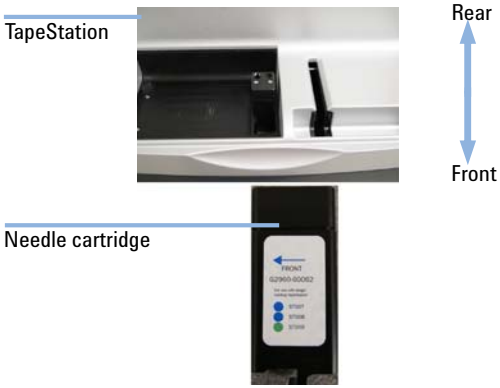
Change the needle cartridge

1 Remove the sample plate and tip holder.

2 Remove the foil tab from the top of the needle cartridge.

NOTE Care must be taken to keep the needle cartridge level after removing the foil tab

3 Insert the needle cartridge into the tip holder space, using the label for orientation. The cartridge should be placed so that the label faces to the right, and the printed arrow points to the front of the TapeStation.



4 Close the lid.

5 Go to **Needle Change** on the Controller software toolbar and select **Run**.

6 Appendix

This chapter provides addition information.

Limited Use Label License

Some products within this system contain SYBR® Green I or SYBR® Gold nucleic acid stain which are provided under an agreement between Molecular Probes, Inc. (a wholly owned subsidiary of Invitrogen Corporation) and Agilent Technologies UK Limited, and the manufacture, use, sale or import of this product is subject to one or more of U.S. Patents and corresponding international equivalents, owned by Molecular Probes, Inc.

The purchase of this product conveys to the buyer the non-transferable right to use the purchased amount of the product and components of the product in research conducted by the buyer in conjunction with Agilent Technologies UK Limited's automated gel electrophoresis system, where such research does not include testing, analysis or screening services for any third party in return for compensation on a per test basis. The buyer cannot sell or otherwise transfer (a) this product (b) its components or (c) materials made using this product or its components to a third party or otherwise use this product or its components or materials made using this product or its components for Commercial Purposes. Commercial Purposes means any activity by a party for consideration and may include, but is not limited to: (1) use of the product or its components in manufacturing; (2) use of the product or its components to provide a service, information, or data; (3) use of the product or its components for therapeutic, diagnostic or prophylactic purposes; or (4) resale of the product or its components, whether or not such product or its components are resold for use in research.

For information on purchasing a license to this product for purposes other than research, contact Molecular Probes, Inc., Business Development, 29851 Willow Creek Road, Eugene, OR 97402, USA. Tel: (541) 465-8300, Fax: (541) 335-0354.

Sound Emission

Manufacturer's Declaration

This statement is provided to comply with the requirements of the German Sound Emission Directive of 18 January 1991.

This product has a sound pressure emission (at the operator position) < 70 dB.

- Sound Pressure Lp < 70 dB (A)
- At Operator Position
- Normal Operation
- According to ISO 7779:1988/EN 27779/1991 (Type Test)

The Waste Electrical and Electronic Equipment Directive

Abstract

The Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC), adopted by EU Commission on 13 February 2003, is introducing producer responsibility on all electric and electronic appliances starting with 13 August 2005.

NOTE This product complies with the WEEE Directive (2002/96/EC) marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category:

With reference to the equipment types in the WEEE Directive Annex I, this product is classed as a Monitoring and Control Instrumentation product.

NOTE Do not dispose off in domestic household waste

To return unwanted products, contact your local Agilent office, or see www.agilent.com for more information.

Technical Service

For more information, please contact

Agilent Technologies UK Limited

e: www.agilent.com/genomics/contact

Index

www.agilent.com

In This Book

The manual describes the following:

- Introduction to the system
- Site requirements and specifications
- Installation
- Using the system
- Maintenance
- Product notices

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