

Agilent 4200 TapeStation System

System Manual



Agilent Technologies

Notices

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Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

In this Guide...

This manual covers the Agilent 4200 TapeStation system.

1 Safety

This chapter provides information on safety symbols and safety messages.

2 Legal and Regulatory

This chapter provides additional information on legal and regulatory aspects.

3 Product Description

This chapter gives an introduction to the instrument and provides information on intended use and instrument specifications.

4 Installation

This chapter gives information about the installation of the system.

5 4200 TapeStation Software

This chapter gives an overview on the four packages of software that come preinstalled with your Agilent 4200 TapeStation system.

6 Operating Instructions

This chapter explains the operation of the 4200 TapeStation system.

7 Essential Measurement Practices

This chapter summarizes information on essential measurement practices for ScreenTape assays.

8 Instrument Diagnosis

This chapter contains information on instrument diagnosis, available tests, and reporting.

In this Guide...

9 Maintenance

This chapter describes the maintenance of the Agilent 4200 TapeStation system.

10 Troubleshooting

This chapter gives an overview about the troubleshooting features of the Agilent 4200 TapeStation system.

11 Appendix

This chapter contains parts information.

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1 Safety

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Safety Messages 10

This chapter provides information on safety symbols and safety messages.



Symbols

Table 1 Symbols








	<p>The apparatus is marked with this symbol when the user should refer to the instruction manual in order to protect risk of harm to the operator and to protect the apparatus against damage.</p>
	<p>Indicates dangerous voltages.</p>
	<p>Indicates a protected ground terminal.</p>
	<p>Confirms that a manufactured product complies with all applicable European Community directives. The European Declaration of Conformity is available at: http://regulations.corporate.agilent.com/DoC/search.htm</p>
	<p>Manufacturing date.</p>
	<p>Power symbol indicates On/Off. The apparatus is not completely disconnected from the mains supply when the power switch is in the Off position</p>
	<p>Pacemaker Magnets could affect the functioning of pacemakers and implanted heart defibrillators. A pacemaker could switch into test mode and cause illness. A heart defibrillator may stop working. If you wear these devices keep at least 55 mm distance to magnets. Warn others who wear these devices from getting too close to magnets.</p>
	<p>Magnetic field Magnets produce a far-reaching, strong magnetic field. They could damage TVs and laptops, computer hard drives, credit and ATM cards, data storage media, mechanical watches, hearing aids and speakers. Keep magnets at least 25 mm away from devices and objects that could be damaged by strong magnetic fields.</p>

Table 1 Symbols

	Indicates a pinching or crushing hazard
	Indicates a piercing or cutting hazard.

Safety Messages

WARNING

A WARNING

alerts you to situations that could cause physical injury or death.

- Do not proceed beyond a warning until you have fully understood and met the indicated conditions.
-

CAUTION

A CAUTION

alerts you to situations that could cause loss of data, or damage of equipment.

- Do not proceed beyond a caution until you have fully understood and met the indicated conditions.
-



2 Legal and Regulatory

Sound Emission 12

Waste Electrical and Electronic Equipment (WEEE) Directive
(2002-96-EC) 13

Directives and Compliance 14

This chapter provides additional information on legal and regulatory aspects.



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

Waste Electrical and Electronic Equipment (WEEE) Directive (2002-96-EC)

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 of in domestic household waste

To return unwanted products, contact your local Agilent office, or see <http://www.agilent.com> for more information.

Directives and Compliance

The Agilent 4200 TapeStation instrument complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly.

- EMC Directive 2004/108/EC
- Machinery Directive 2006/42/EC

ISM Classification:

ISM Group 1 Class A According to CISPR 11

NOTE

This is an ISM Class A product intended for use in industrial environment. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.



3 Product Description

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This chapter gives an introduction to the instrument and provides information on intended use and instrument specifications.



3 Product Description

Intended use of the 4200 TapeStation System

Intended use of the 4200 TapeStation System

The 4200 TapeStation system is intended to separate nucleic acids by means of electrophoresis. The system detects:

- Fluorescently stained double stranded DNA including genomic DNA
- Fluorescently stained total RNA (Eukaryotic and Prokaryotic)

The 4200 TapeStation system is designed to exclusively run Agilent ScreenTape kits and specified consumables. It can analyze 1 to 16 samples provided in tube strips or up to 96 samples using a well plate.

Research use only. Not for use in diagnostic procedures.

Overview of the System and ScreenTape Architecture

Overview of the System

The Agilent 4200 TapeStation system offers automated sample processing of ScreenTape applications for DNA and RNA at scalable and high throughput. The system includes the 4200 TapeStation instrument and a laptop.



For the Agilent 4200 TapeStation system, a portfolio of ScreenTape assays is available. The credit card-sized, disposable ScreenTape device carries multiple separation lanes for analyzing DNA and RNA samples. Each ScreenTape device has 16 lanes so that each sample is analyzed in an individual lane, completely eliminating contamination and carryover.

A suite of intuitive software provides instrument control for creation of experimental data and streamlines data analysis and reporting.

3 Product Description

Overview of the System and ScreenTape Architecture

The Agilent 4200 TapeStation software comes preinstalled with the Agilent 4200 TapeStation system and consists of four packages.



4200 TapeStation Controller software



Agilent TapeStation Data Analysis software



Agilent Lab Advisor with TapeStation AddOn



TapeStation Information Center

The 4200 TapeStation Controller software is simple and intuitive, streamlining instrument control as well as data analysis and reporting. You can display your results as an electropherogram, as a familiar gel image or in tabular format for effortless sample comparison. Depending on your application, the software automatically determines size, quantity, purity, RIN^e or ribosomal ratios, saving you time and reducing errors. Reports can easily be generated and saved in PDF format, or exported for editing in Microsoft Word or Excel.



Figure 1 ScreenTape devices for DNA and RNA assays

The Agilent Lab Advisor with TapeStation AddOn allows you to achieve highest productivity through advanced system diagnostics. It can be used for routine confirmation of the system functionality or for instrument troubleshooting. Using a dedicated TapeStation Test Tape device, you can run an instrument self-test through the Agilent Lab Advisor software and check the performance of electrical and optical components. Test reports can easily be generated and saved in PDF format.



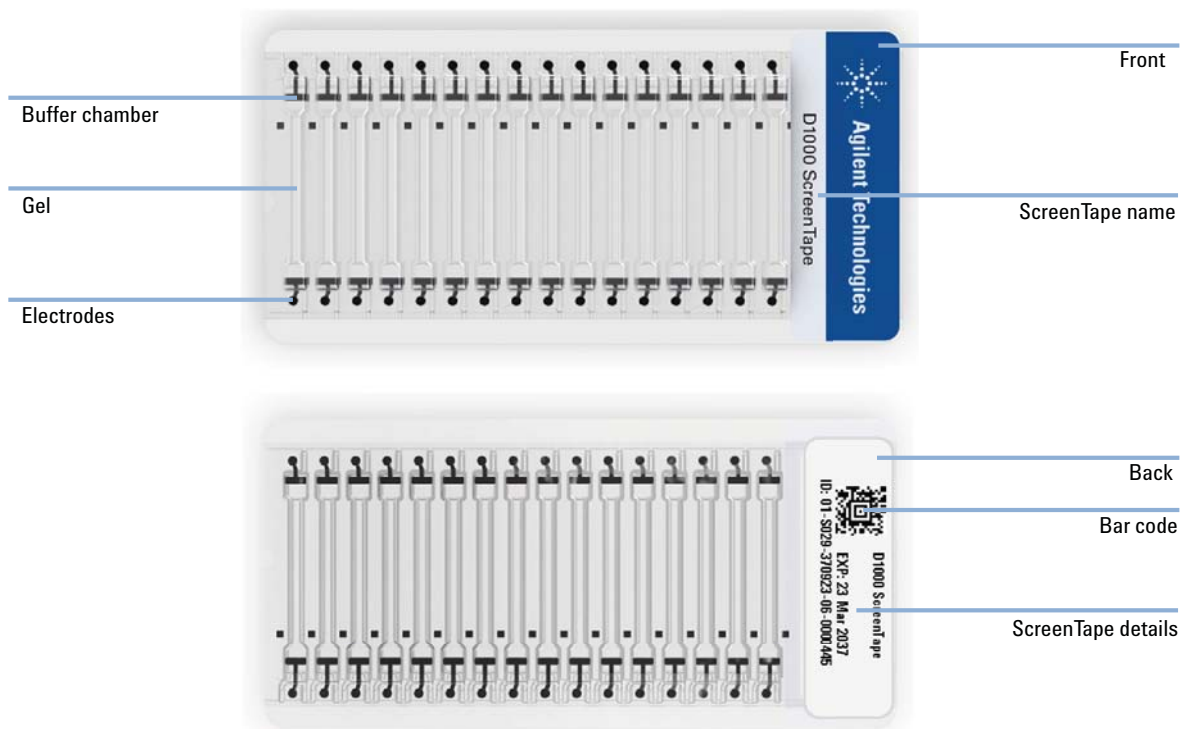
Figure 2 TapeStation Test Tape

3 Product Description

Overview of the System and ScreenTape Architecture

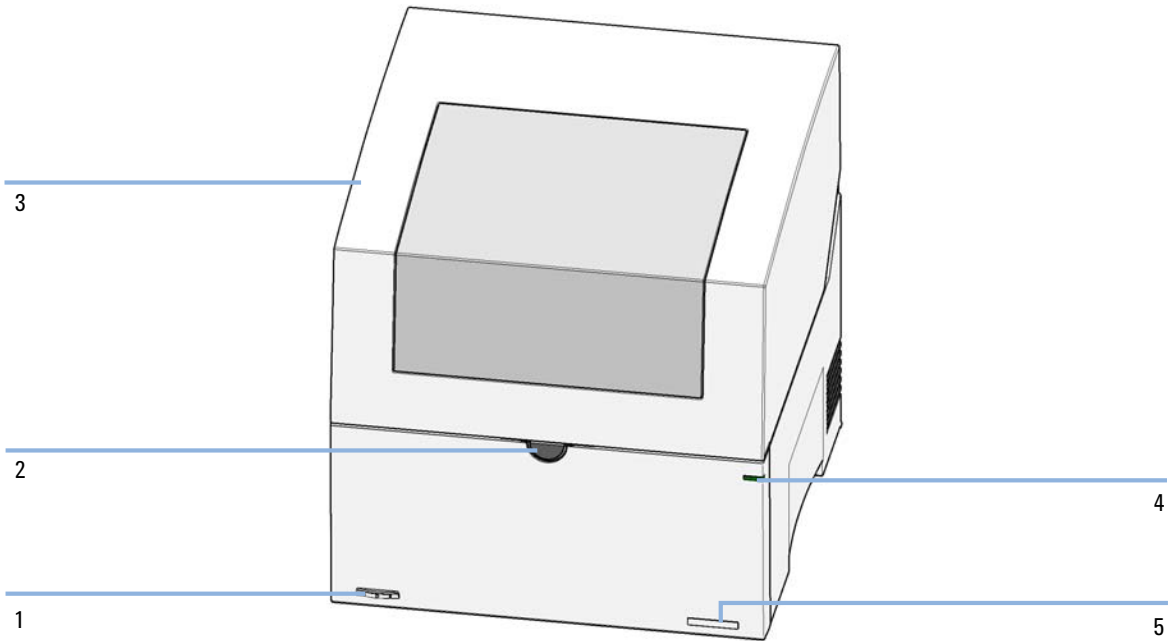
ScreenTape Architecture

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



Product Descriptions

1 Overview of the 4200 TapeStation instrument



1	Power button
2	Lid release button
3	Lid
4	Status LED
5	Serial number

3 Product Description

Product Descriptions

WARNING

Heart pacemakers

Magnets could affect the functioning of pacemakers and implanted heart defibrillators.

A pacemaker could switch into test mode and cause illness.

A heart defibrillator may stop working.

→ Bearers of heart pacemakers or implanted defibrillators must stay off at least 55 mm from the magnets.

CAUTION

Magnetic fields

Magnets produce a far-reaching, strong magnetic field.

You can damage for example televisions, laptops, computer harddisks, credit cards, magnetic cards may be damaged as well.

→ Keep magnets at least 25 mm away from devices and objects that could be damaged by strong magnetic fields.

2 Lid operation

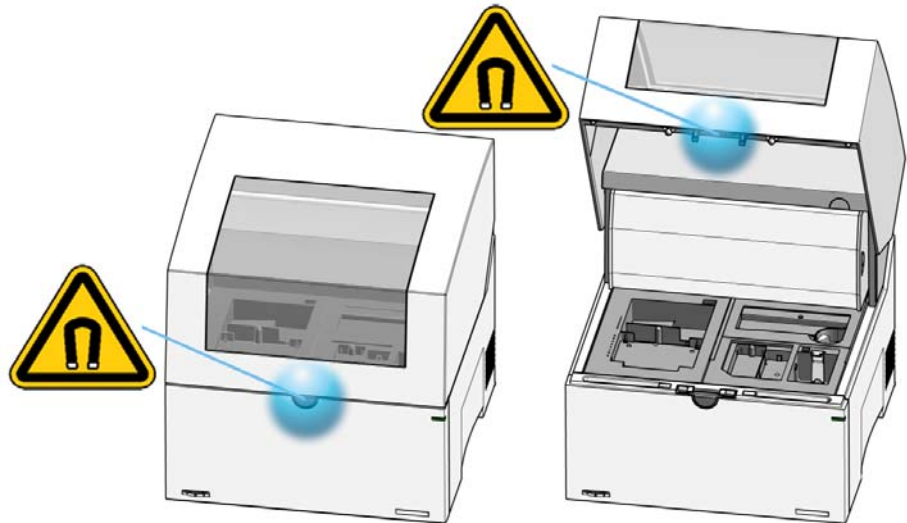


Figure 3 Position of magnet

The 4200 TapeStation instrument lid is opened by pressing the lid release button. Subsequently the lid swings open and allows access to the working area. Opening and closing of the lid is best assisted by two hands guiding the lid up or down. The lid should be closed each time the 4200 TapeStation instrument is initialized or when the 4200 TapeStation Controller software is started. Close the lid by moving it gently downwards until latching is complete.

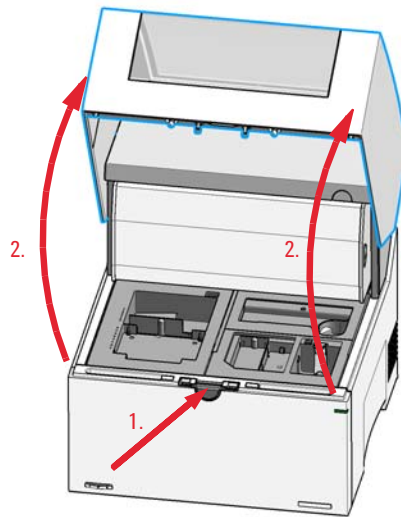
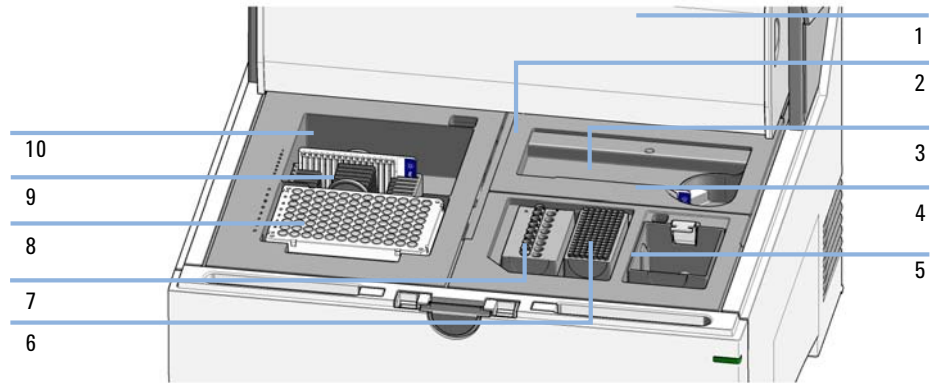


Figure 4 Lid operation

3 Product Description

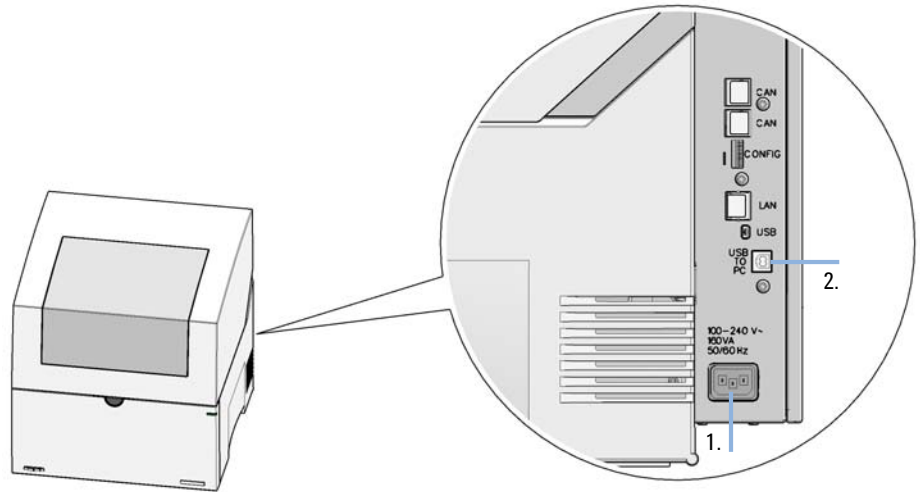
Product Descriptions

3 Overview of the instrument workspace



1	Gantry cover
2	Upper nest cover
3	Lower nest cover
4	ScreenTape nest
5	Tip waste
6	Tip rack
7	Sample tube strip holder
8	Sample well plate
9	ScreenTape rack
10	ScreenTape waste location

4 Electrical connections



1. Power line in, 2. USB-B to PC

Remaining connectors are blocked by plugs and reserved for factory use.

3 Product Description

Product Descriptions

5 Status indicators (LED)

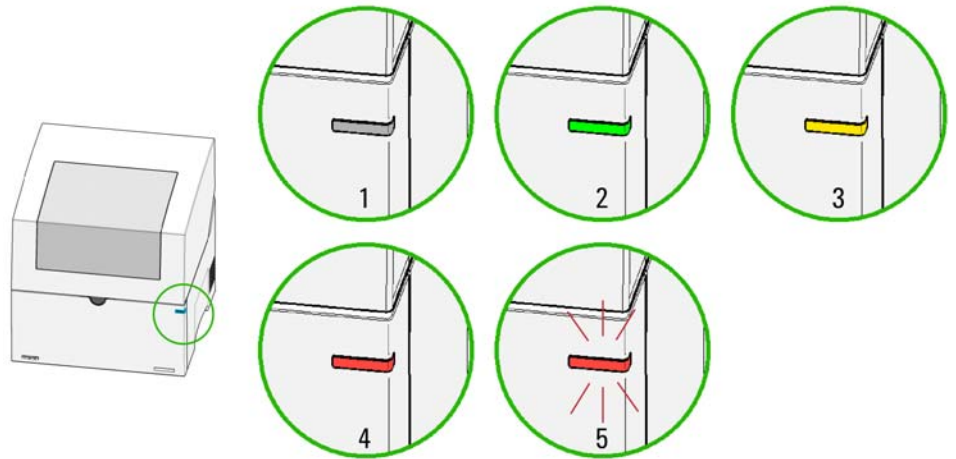


Figure 5 Status indicators

1	off	Idle
2	green	Run mode
3	yellow	Not-ready, waiting for a specific pre-run condition to be reached or completed
4	red	Error mode (restart required)
5	red blinking	Error mode (restart required)

6 Status indicators (Lid)

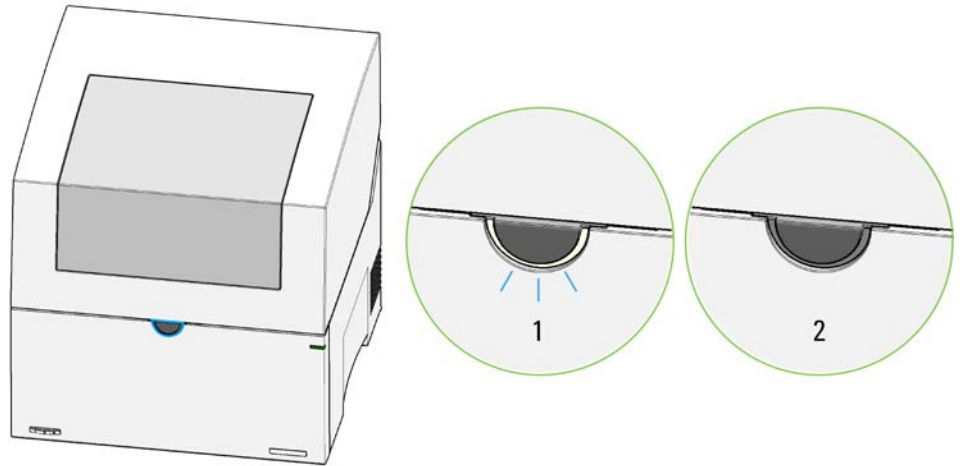


Figure 6 Lid release button status light

1. On; 2. Off.

Normal status is off. Blinking indicates an input request from the Agilent 4200 Controller software to confirm a run stop request.

Physical Specification

Table 2 Physical Specifications

Type	Specification
Weight	25.5 kg (56.3 lbs)
Dimensions (w×d×h)	435 x 510 x 445 mm (17.1 x 20.0 x 17.5 inches)
Line voltage	100 – 240 VAC ± 10 %
Line frequency	50 or 60 Hz ± 5 %
Power consumption	50 VA / 50 W
Interface	USB2 (Instrument: USB-B; PC: USB-A)
Ambient operating temperature	10 – 40 °C (50 – 104 °F)
Operating humidity	15 – 80 %, non-condensing
Storage temperature	-40 to 70 °C (-40 to 158 °F)
Operating altitude	Up to 3000 m (9842 ft)
Safety standards	IEC, CSA, UL, KC, Installation category II, Pollution degree 2 For indoor use only. See “Directives and Compliance” on page 14
Sound pressure	<70 dB (A)



4 Installation

Bench Space Required	30
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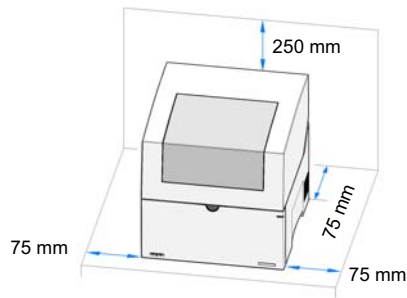
This chapter gives information about the installation of the system.



Bench Space Required

Identify the laboratory bench space based on the specifications table (see “Physical Specification” on page 28).

Pay special attention to the total height and total weight requirements for all system components you have ordered. Also pay special attention to the total weight of the modules you have ordered to ensure your laboratory bench can support this weight. The work bench should be stable and vibration free.



Allow approximately 75 mm (3 inches) of clear space around the instrument for air circulation and electrical connections.

Performance can be affected by sources of heat and cold, for example direct sunlight, heating/cooling from air conditioning outlets, drafts and/or vibrations.

A computer system is supplied with your instrument. Account for respective electrical outlets. Two plug sockets must be available near the allocated bench space for the instrument itself and a laptop.

NOTE

Additional space of approximately 25 cm is required on top of the listed height in order to open the 4200 TapeStation lid. Please avoid locations with low overhanging shelves.

Unpacking

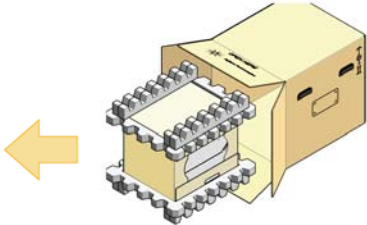
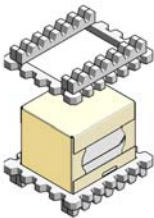
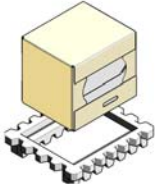
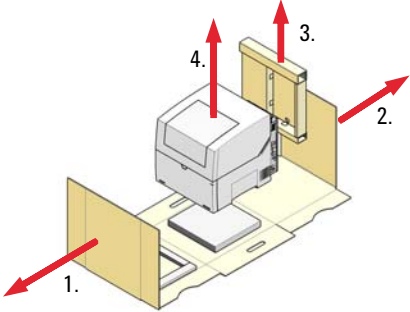
For unpacking the instrument follow the instructions listed below.

Do not remove the instrument from its original shipping box immediately. Upon delivery, store in a temperature stable, dry environment suitable for operation, see “Physical Specification” on page 28. If actual shipment conditions are unknown or were outside operating conditions, wait for at least 5 h before unpacking to allow the instrument to adjust to the ambient temperature and humidity of the operating environment.

WARNING

Be careful when lifting the instrument.

→ Because the instrument is heavy, lifting it will require the assistance of a second person to prevent injury.

<p>1 Pull the instrument out of the outer cardboard box.</p> 	<p>2 Remove the top foam of the inner cardboard box.</p> 
<p>3 Lift the instrument to remove the bottom foam packaging.</p> 	<p>4 Open the inner cardboard box and move the instrument to its bench.</p> 

Initial Setup of the System

This procedure explains the initial setup of the system after unpacking.

NOTE

The fixation foam holds covers in place and is only required during shipments. Keep the foam in a safe place for further use.

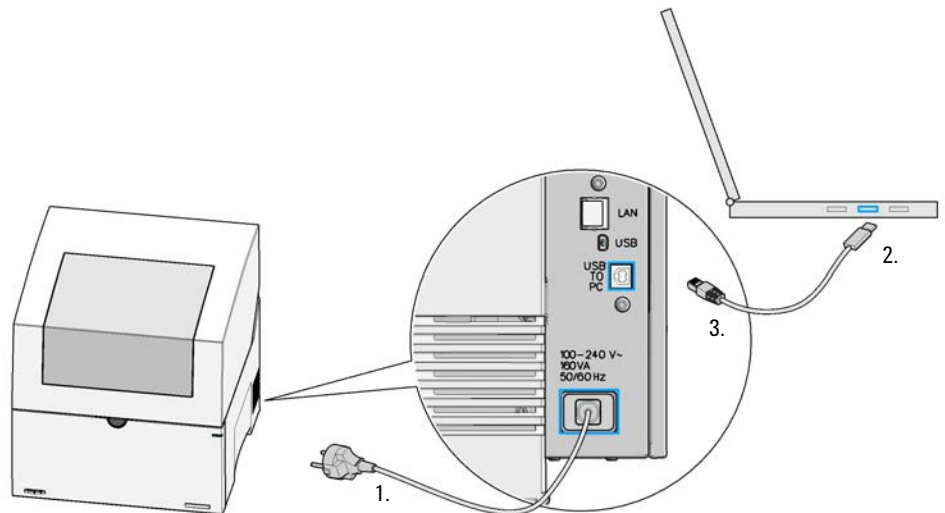
NOTE

The transportation lock holds robotic parts in a safe position during shipment. If needed, the transportation lock can only be engaged by the 4200 TapeStation Controller software again.

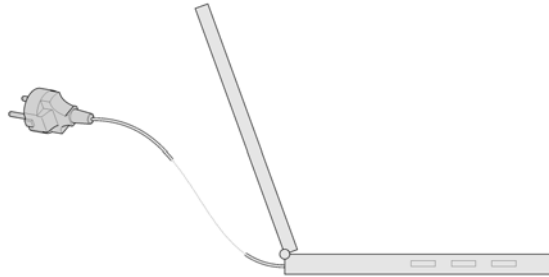
NOTE

An instrument with engaged transportation lock cannot perform analysis. The 4200 TapeStation Controller software will prompt you for powercycling releasing the transportation lock in case of an analysis start.

- 1 Connect the instrument in the following order: 1. Power plug to power socket, 2. USB-A to laptop, 3. USB-B to TapeStation instrument.



- 2 Connect laptop to power according to its accompanying documentation.



- 3 Open the lid by pressing the lid release button.



4 Installation

Initial Setup of the System

WARNING

Heart pacemakers

Magnets could affect the functioning of pacemakers and implanted heart defibrillators.

A pacemaker could switch into test mode and cause illness.

A heart defibrillator may stop working.

→ Bearers of heart pacemakers or implanted defibrillators must stay off at least 55 mm from the magnets.

CAUTION

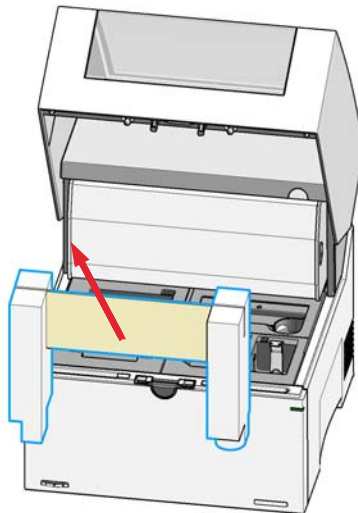
Magnetic fields

Magnets produce a far-reaching, strong magnetic field.

You can damage for example televisions, laptops, computer harddisks, credit cards, magnetic cards may be damaged as well.

→ Keep magnets at least 25 mm away from devices and objects that could be damaged by strong magnetic fields.

4 Move the fixation foam carefully upwards.

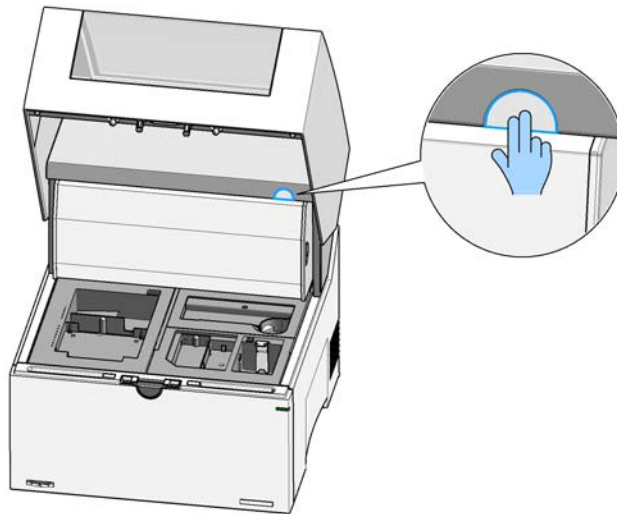


WARNING

A piercing needle is located behind the gantry cover.

- Do not reach under the cover.
- Do not remove the cover.

5 Release the transportation lock.



Pressing the release button of the transportation lock frees parts of the robotics from internal clamping. This mechanical unlocking activity enables the robotics to move and the instrument to operate. See details on transportation lock (“[Transportation Lock](#)” on page 98).

NOTE

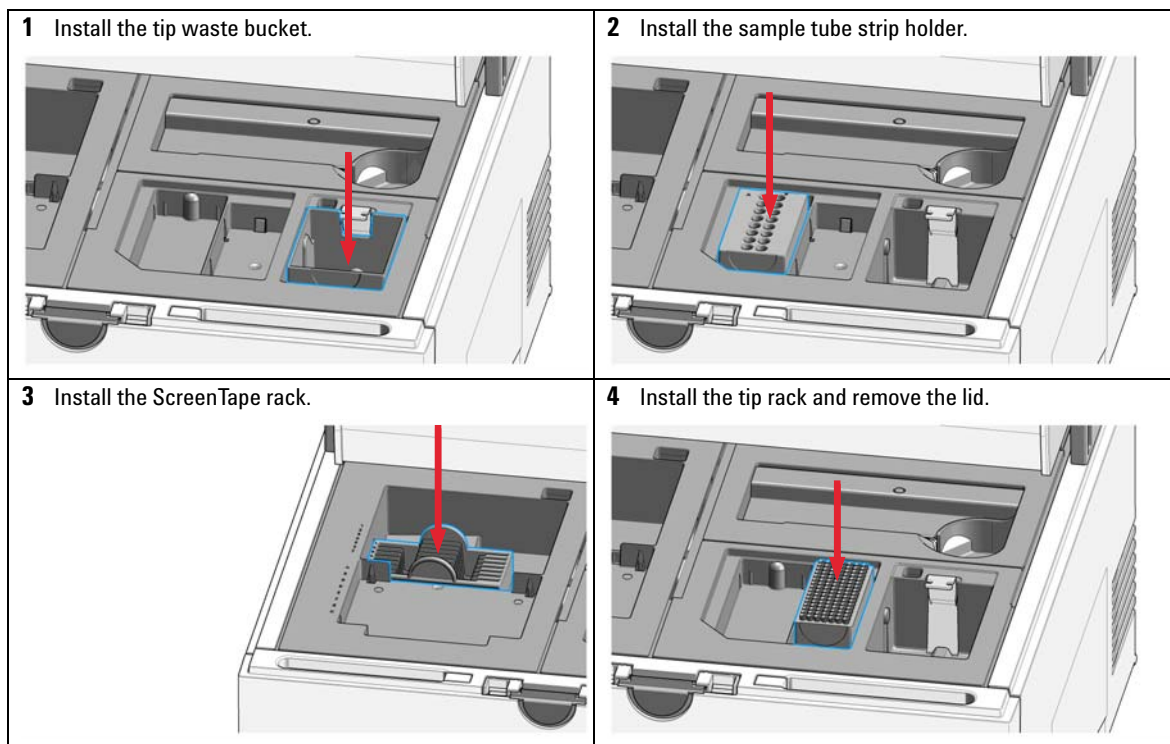
The release of the transportation lock should always be done prior to powering on the instrument. The turn-on process requires the robotics to be unlocked for proper initialization.

4 Installation

Prepare the Working Area

Prepare the Working Area

The steps below outline how to prepare the instrument working area with material provided as accessories. A shipment list of this material can be found in “[Accessories Shipment List](#)” on page 106.



NOTE

The sample tube holder and ScreenTape rack have recesses for orientation and only fit in one way. The tip rack is symmetrical and can be placed either way.



5 4200 TapeStation Software

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This chapter gives an overview on the four packages of software that come preinstalled with your Agilent 4200 TapeStation system.



Agilent 4200 TapeStation Controller Software



The Agilent 4200 TapeStation Controller software is designed to control the instrument during the analysis. It allows the automatic connection through USB and controls the robotics and vision system. It runs the desired assay based on the inserted ScreenTape device barcode. Data files are saved by this software and automatically opened in the Agilent TapeStation Analysis software for further processing. The 4200 TapeStation Controller software allows you to select sample location and information, to configure the file save settings and preselect assay parameters. This software reports the instrument status and allows the review of diagnostic counter.

The standard workflow for the 4200 TapesStation Controller software is shown in “[Operating Instructions](#)” on page 47. For context specific help within the software press **F1** on your keyboard.

Agilent 4200 TapeStation Controller Software User Interface

The Agilent 4200 TapeStation Controller software user interface consists of following items.

NOTE

All screenshots of graphical user interfaces in this documentation are based on software version A.02.01.

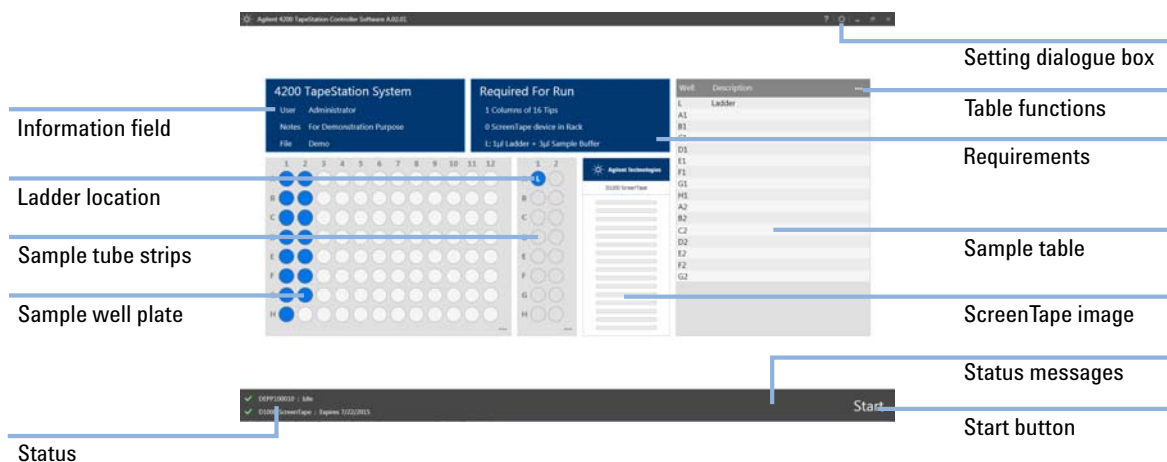


Figure 7 4200 TapeStation Controller Software User Interface

- The central ScreenTape image displays the assay selected based on the ScreenTape barcode. For partially used ScreenTapes, lanes used in earlier runs are dark gray whereas unused lanes are light gray.
- The information field reports the name of the user logged on to the system. It allows you to enter study-related notes and change the file name prefix. For general file save settings, see the setting dialogue (see “Agilent 4200 TapeStation Controller Software Settings” on page 41)
- Sample Well Plate and Sample Tube Strips Sample locations can only be selected once a ScreenTape device is inserted. Samples can then be selected by clicking and dragging across either the tube strip or well plate locations in either the tube strip or well plate. When samples are selected, the sample table populates the corresponding lines to allow you to enter sample descriptions.
- Well plate and tube strip functions allow you to select or clear all position and to decide if a run ladder or an electronic ladder is used. Table functions allow you to import or export sample descriptions or to clear the table.

The ladder is always loaded from location A1 on the strip tube position. Some assays allow the use of an electronic ladder, although running a ladder with the samples is recommended. The electronic ladder can be selected by right clicking on the ladder location (L).

Once the samples are selected the user interface is updated to show the exact consumables required for the number of samples selected, including the number of ScreenTape devices, the number of tips, and the volume of ladder.

NOTE

Typically, one lane of ladder will be run for every ScreenTape device used. Higher volumes of ladder are required for runs with multiple ScreenTape devices.

The required tips are given in full columns of 16 tips. The ScreenTape devices required in the ScreenTape rack are in addition to the ScreenTape device inserted in the nest. A brief description of the ladder volume required is given. Please refer to the assay-specific Quick Guide for more details, see [Table 3](#) on page 64.

The current status of the instrument and ScreenTape device are listed at the bottom of the screen. Status messages show important information relating to the instrument, the ScreenTape device or the planned run. Any status which prevents the run initiating will be described, for example if the instrument lid is still open, or the ScreenTape device is fully used or expired. In the status message area upcoming maintenance and errors are also displayed here.

NOTE

The 4200 TapeStation instrument cannot be controlled by the 4200 TapeStation Controller software and the Agilent Lab Advisor software simultaneously. You need to terminate the existing connection prior to starting to connect with the other software.

Agilent 4200 TapeStation Controller Software Settings

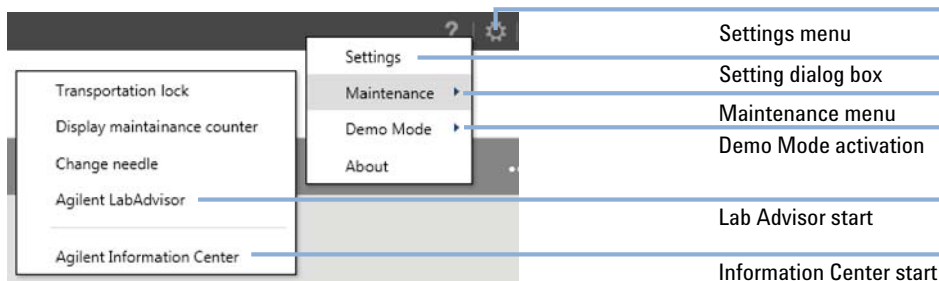


Figure 8 4200 TapeStation Controller software settings menu

Clicking on the icon for 4200 TapeStation Controller software settings menu allows you to

- Access the settings dialog box.
- Maintenance menu: Activate the transportation lock (see [“Engaging the Transportation Lock”](#) on page 99).
- Read diagnostic values from the instrument, see [“Needle Pierce Counter”](#) on page 90.
- Perform a needle exchange, see [“Exchange the Needle”](#) on page 92.
- Run in instrument demo mode with virtual ScreenTape assays.
- Start the Agilent Lab Advisor software with TapeStation AddOn.
- Start the TapeStation Information Center.
- See information about the software.

The **Settings** dialog box consists of following items.

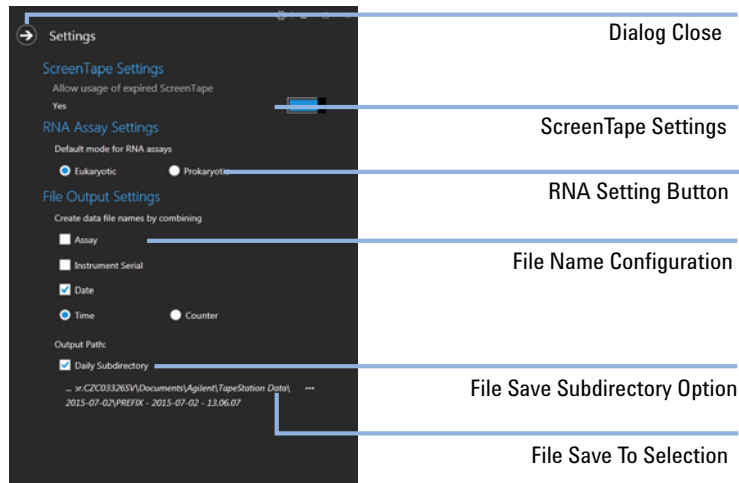


Figure 9 4200 TapeStation Controller software settings dialog box

NOTE

This exception for expired ScreenTape devices is not recommended. Usage of expired ScreenTape devices will be recorded in the data file.

Clicking on the **ScreenTape Settings** allows you to:

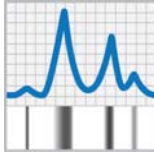
- Use expired ScreenTape devices beyond the general expiry date that is printed on the ScreenTape device, or
- Use ScreenTapes beyond the period of two weeks, which is the time allowed for using up a partially used ScreenTape device

The **RNA Assay Settings** button preselects the analysis mode for RNA assays (default setting Eukaryotic). The selected value can also be changed after the run, in the Agilent TapeStation Analysis software.

The **File Name Configuration** allows you to customize of the data file name. Assay name, instrument serial number and date can be selected. The file will have either time or a number from a continuous counter for identification.

You can create daily subdirectories within the location chosen as output path. The **File Save To Selection** allows you to change to a different location on your hard disk drive.

Agilent TapeStation Analysis Software



The Agilent TapeStation Analysis software is a simple and intuitive software for data analysis and reporting. You can display your results as an electropherogram, as familiar gel image or in tabular format for effortless sample comparison. Depending on your application, the software automatically determines size, quantity, purity, RIN^e or ribosomal ratios. Reports can easily be generated and saved in PDF format, or exported for editing in Microsoft Word. For context-specific help within the software press **F1** on your keyboard.

5 4200 TapeStation Software Agilent TapeStation Analysis Software

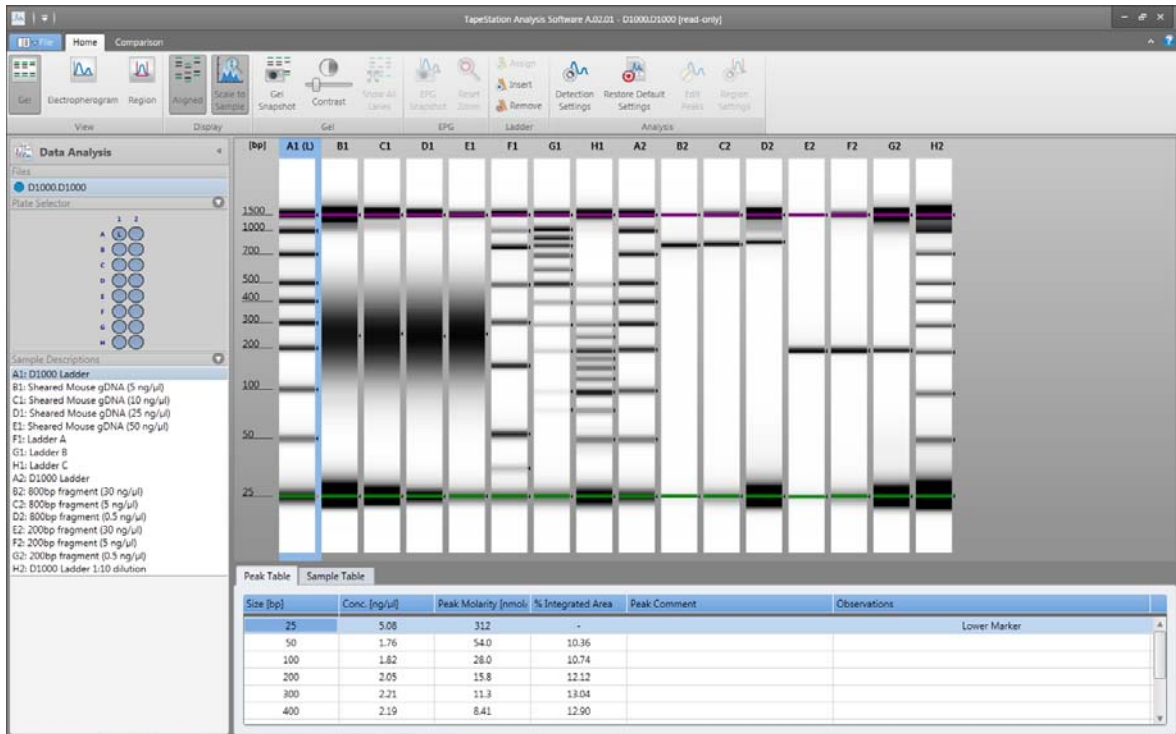


Figure 10 Agilent TapeStation Analysis software graphical interface

Agilent Lab Advisor with TapeStation AddOn



Agilent Lab Advisor software with TapeStation AddOn offers you advanced instrument diagnosis for routine confirmation of the system functionality and troubleshooting purposes. Using a dedicated TapeStation Test Tape device (see [“TapeStation Test Tape”](#) on page 84), you can check the performance of electrical and optical components using a System Test Suite (see [“System Test Suite”](#) on page 86) or a more extended Troubleshooting Test Suite (see [“Troubleshooting Test Suite”](#) on page 87). Test results can be stored, reviewed and used for the generation of PDF reports on the tests (see [“Reviewing Test Suite Results”](#) on page 88). If needed, result files from these test suites can be collected in exported log files.

NOTE

The Lab Advisor is a multi-instrument diagnosis and troubleshooting tool. Some functions of the Lab Advisor may be inactive and can not be used in conjunction with the 4200 TapeStations system.

NOTE

The 4200 TapeStation instrument can either be connected to the Agilent Lab Advisor software or the 4200 TapeStation Controller software at a time. You need to terminate the existing connection prior to starting a connection with the other software.

Agilent TapeStation Information Center



The Agilent TapeStation Information Center is a repository for all 4200 TapeStation user information. The TapeStation Information Center offers documentation on operating instructions of the 4200 TapeStation instrument as machine in English and instructions translated into multiple European and international languages.

The TapeStation Information Center has four TapeStation system-related chapters:

- The 4200 TapeStation instrument operation, explained using animated workflows (multiple languages).
- The 4200 TapeStation software, with reference help.
- The ScreenTape assays, with PDF Quick Guides and essential measurement practices recommendations.
- Diagnosis of the 4200 TapeStation instrument, with animated workflows on Lab Advisor operation.

The TapeStation Information Center gives you access to the PDF Quick Guides for all assays, and also access to the System Manual. The TapeStation Information Center also includes a copy of the context-sensitive help on the 4200 TapeStation software.



6 Operating Instructions

Sample Preparation	48
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Analysis end	61
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This chapter explains the operation of the 4200 TapeStation system.



Sample Preparation

Prepare the samples according to the assay-specific Quick Guide. Printed Quick Guides are part of system shipment (“[Accessories Shipment List](#)” on page 106). Quick Guides in electronic format are part of the Agilent Information Center which is installed on the laptop of your 4200 TapeStation system.

Preparing the Instrument

Preparing the 4200 TapeStation Instrument for an analysis is outlined below.

1 Turn On

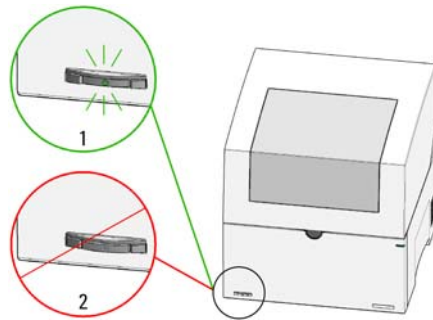
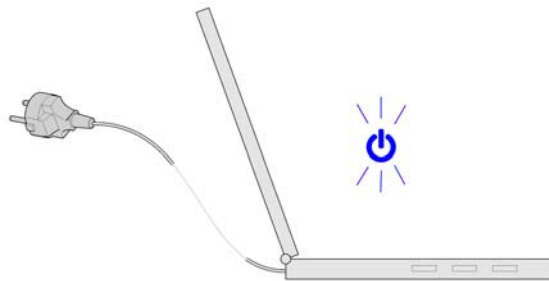


Figure 11 Power switch. 1: On; 2: Off

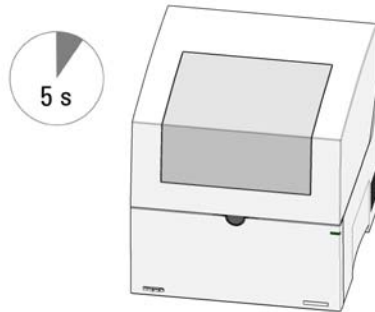
2 Power on the laptop.



6 Operating Instructions

Preparing the Instrument

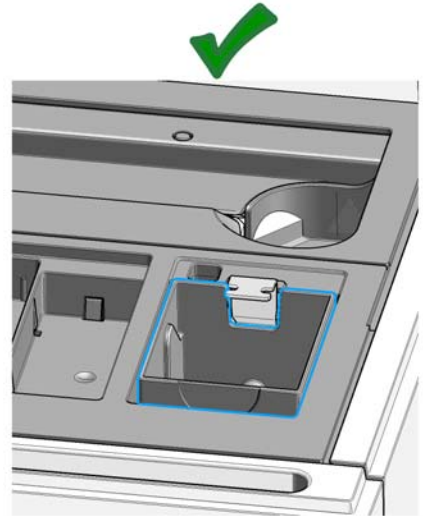
- 3 Allow the instrument to initialize.



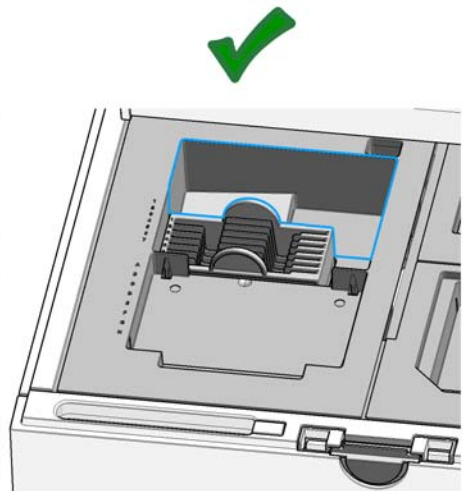
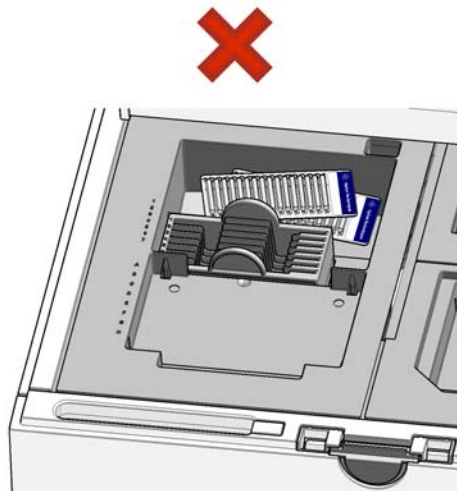
- 4 Start the Agilent 4200 Controller Software.
- 5 Open the lid by pressing the lid release button.



6 Empty the tip waste.



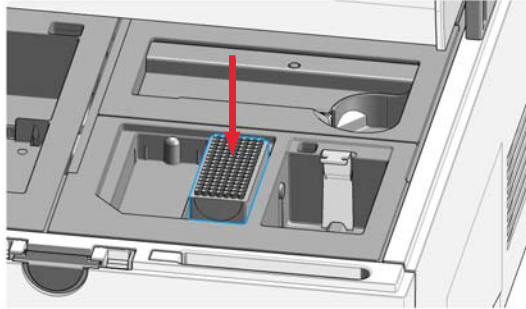
7 Discard the used up ScreenTape devices present in the waste location.



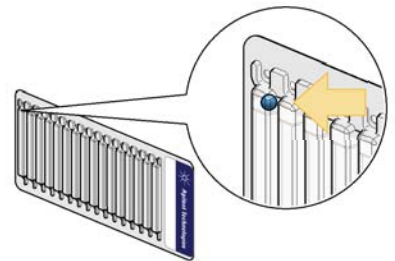
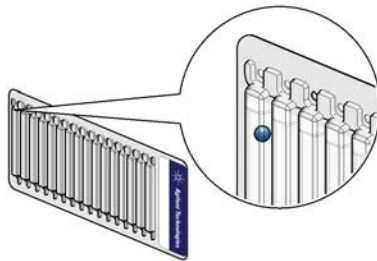
6 Operating Instructions

Preparing the Instrument

- 8 Install the tip rack and remove the lid.



- 9 Flick the ScreenTape device. Trapped air bubbles will move up in the buffer chamber. For details, see “ScreenTape Devices” on page 69



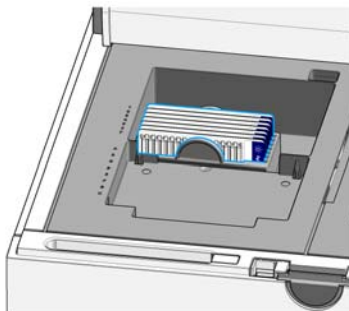
NOTE

The presence of small bubbles within the buffer chamber of the ScreenTape devices 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 assay.

6 Operating Instructions

Preparing the Instrument

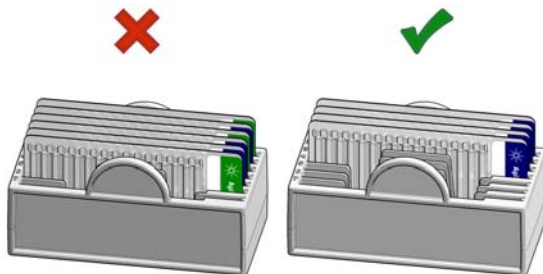
12 Insert flicked ScreenTape devices into the rack.



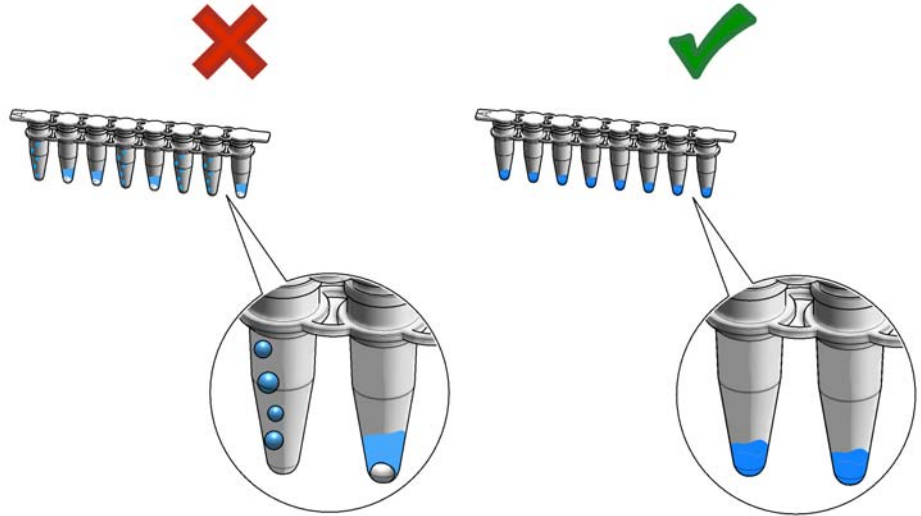
NOTE

Any partially used ScreenTape devices must be used first, and should be placed into the ScreenTape nest. Fill ScreenTape rack only with fresh and unused ScreenTape devices. Flick all ScreenTape devices to remove bubbles prior to loading them into the rack.

13 Only use ScreenTape devices of identical assays.



14 Centrifuge samples to remove spills and air bubbles. For details, see “Centrifugation Recommendations” on page 72.

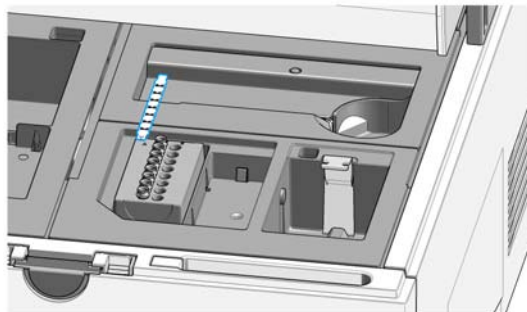


CAUTION

Blockage of the robotic system

→ Remove the lid from the sample tube strips to prevent blockage of the robotics system during pipetting steps.

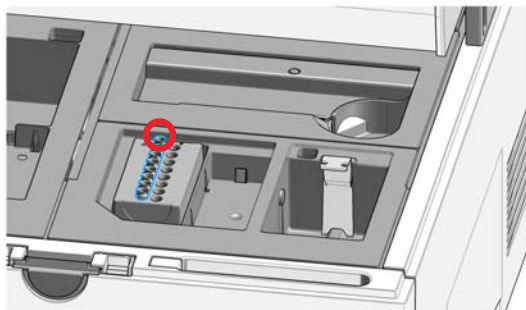
15 Insert sample tube strips. Remove the tube lids carefully ensuring not to create bubbles in the samples.



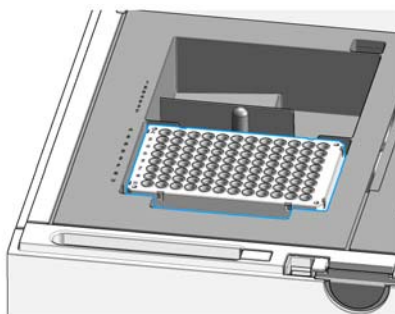
6 Operating Instructions

Preparing the Instrument

- 16** Ladder is exclusively provided from location A1 on the sample tube strip holder. For further details on handling the ladder within assays see the assay-specific Quick Guides or the section “[Ladder Considerations](#)” on page 75.



- 17** Alternatively samples can be run from a sealed 96-well plate by inserting a sealed 96-well plate in correct orientation (The letters A to H are embossed for reference on the left hand side of the recess for the well plate). Vortex and centrifuge well plates before insertion.



NOTE

Use plate foil seals to protect samples from evaporation during analysis.

Use only Agilent approved plate foil seals and plates to avoid damaging the instrument.

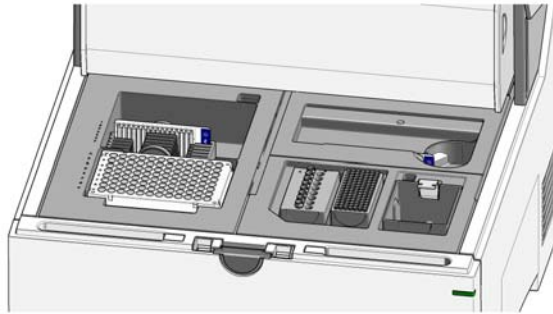
CAUTION

Failures and errors during the run

Any spare material left in the instrument will cause failures and errors during the run. The instrument might get damaged by this.

→ Ensure the working area is cleared before starting the run.

18 Keep the working area clean and tidy.



NOTE

Keep in mind the robotics movements during an analysis. Let material snap in place where appropriate. Do not leave lids, pipettes or packaging material in the working area.

WARNING

Heart pacemakers

Magnets could affect the functioning of pacemakers and implanted heart defibrillators.

A pacemaker could switch into test mode and cause illness.

A heart defibrillator may stop working.

→ Bearers of heart pacemakers or implanted defibrillators must stay off at least 55 mm from the magnets.

CAUTION

Magnetic fields

Magnets produce a far-reaching, strong magnetic field.

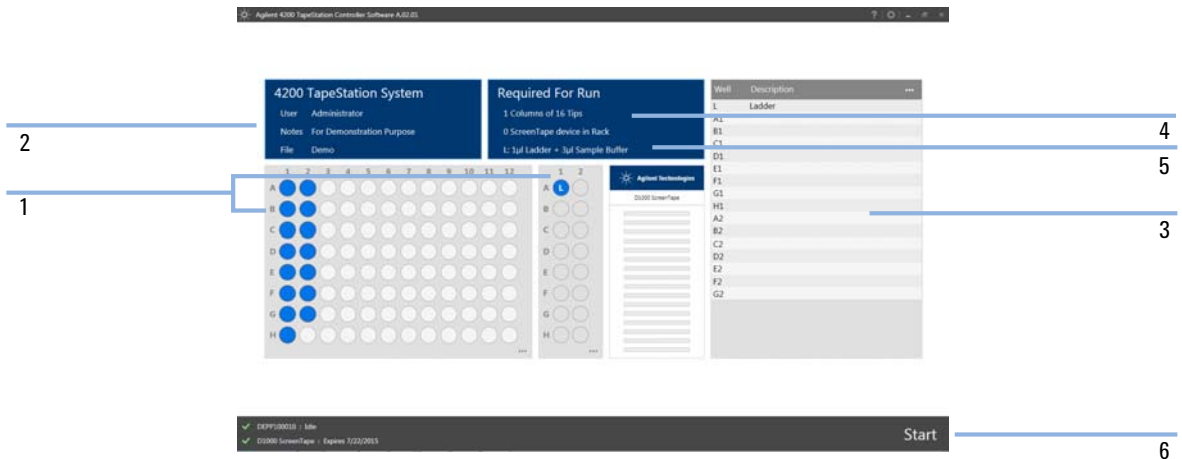
You can damage for example televisions, laptops, computer harddisks, credit cards, magnetic cards may be damaged as well.

→ Keep magnets at least 25 mm away from devices and objects that could be damaged by strong magnetic fields.

19 Close the lid.

Starting the Analysis

The following steps describe the essential steps for starting a 4200 TapeStation analysis. Please refer to section “[Agilent TapeStation Analysis Software](#)” on page 43 for further details. Press **F1** for context-sensitive help on Agilent 4200 Controller software questions or consult the Agilent Information Center.



Numbers in Figure refer to steps below.

- 1 Select samples for the analysis either on the well plate or on the tube strip holder.

The ladder must always be loaded in location A1 on the tube strip holder.

NOTE

Running samples from the well plate and from sample tube strips at the same time is not supported. Please combine all samples either to the well plate or to the tube strips.

- 2 Modify user name, notes and filename prefix as required.
- 3 Enter sample descriptions.

- 4 Make sure sufficient tips and ScreenTape devices are present as directed to in the **Required for Run** section.

The graphical user interface shows the required number of columns of tips and ScreenTape devices for the selected number of samples. The requested number of ScreenTape devices in the rack is based on calculation with full ScreenTape devices in the rack and the number of available lanes on the ScreenTape device in the nest. For reasons of simplification, required tips are expressed in columns (16 tips) and therefore possibly rounded up.

NOTE

- Well plates: samples from well plates can be run on different ScreenTape devices.
- Tube strips: samples from tube strips must be run on one and the same ScreenTape device.

Make sure you have as many unused lanes on a partially used ScreenTape device as samples in the tube strips. If you want to use multiple ScreenTape devices in one analysis, transfer samples from tube strips to well plates.

- 5 Make sure sufficient ladder is present in (L).

The volume of ladder and sample buffer to be mixed is displayed. These volumes differ from assay to assay. They also differ for analysis with one ScreenTape device or multiple ScreenTape devices. For further details, see the assay-specific Quick Guide of the respective ScreenTape assay or the section **“Ladder Considerations”** on page 75.

- 6 Start the run.

After starting the analysis, a dialogue box will request that you confirm tip and ScreenTape waste are empty, and that tube strip lids have been removed.

During the initialization phase of an analysis, the presence of components such as tube strip lids, tips, and ScreenTape devices are checked.

NOTE

Instrument initialization and sample analysis take place after starting an analysis. If desired, an analysis may be paused or aborted from the graphical user interface.

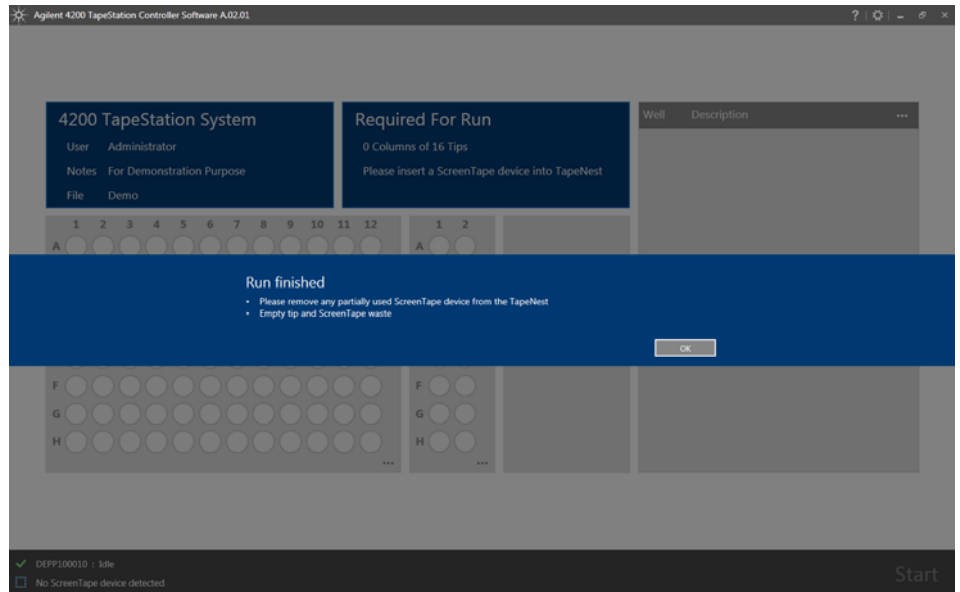
NOTE

Pressing the lid release button in order to open the lid while an analysis takes place does not open the lid immediately. The area around the button starts blinking. The 4200 TapeStation Controller software prompts you for confirmation.

Analysis end

Once the entire analysis is complete the instrument is reset and the lid unlocked. After acquisition of data from 16 lanes or when all samples are run, the Agilent TapeStation Data Analysis software starts automatically. The 4200 TapeStation Controller software is kept active; therefore its graphical interface may remain in the background. Please notice any remaining dialogue.

1 Analysis end.



2 Data acquired is displayed in the Agilent TapeStation Data Analysis software.

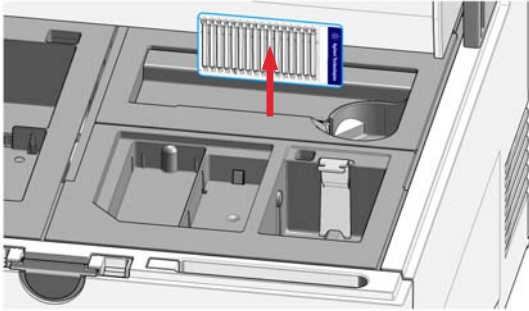
NOTE

For multi ScreenTape device runs, the 4200 Data Analysis software will launch in read only mode after data from the first ScreenTape device is available. Data from each additional ScreenTape device will be added to this read only file, until the last ScreenTape device has been run, and the file will be finalized.

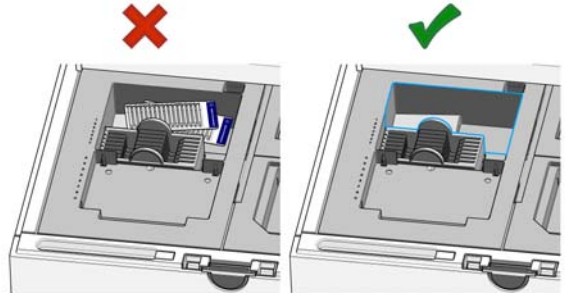
Follow up

After the analysis end follow the post run steps listed below.

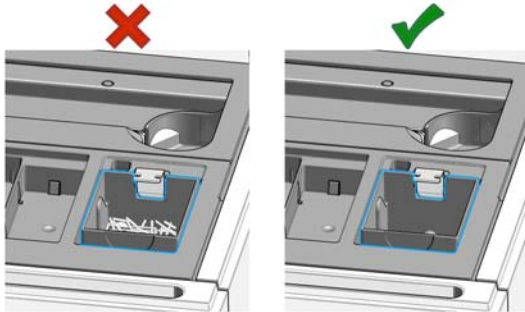
- 1** Gather partially used ScreenTape device from the nest and store it according to the Quick Guide instructions.



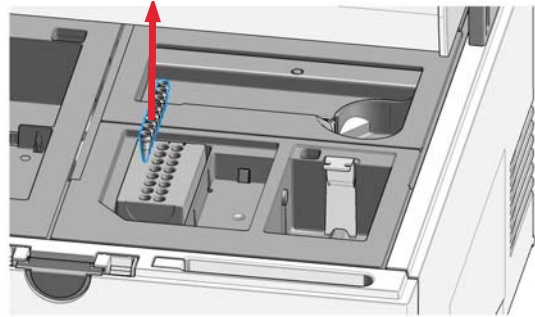
- 2** Discard the used up ScreenTape devices present in the waste location.



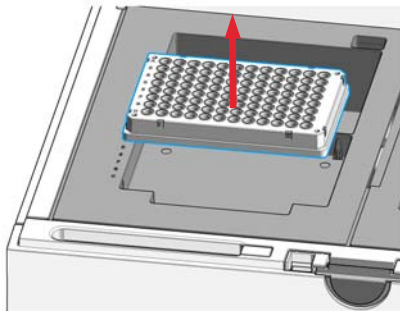
- 3** Empty the tip waste.



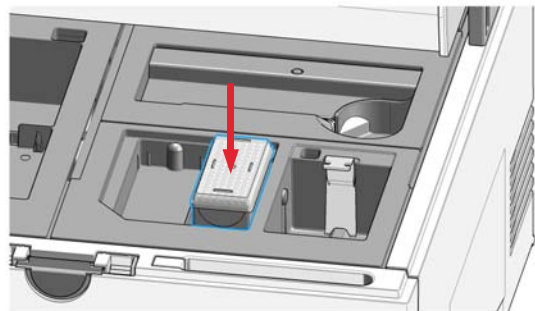
- 4** Remove the sample tube strip.



- 5** Remove the well plate.



- 6** Replace the tip rack cap until next use.





7 Essential Measurement Practices

ScreenTape Assays Portfolio	64
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This chapter summarizes information on essential measurement practices for ScreenTape assays.



ScreenTape Assays Portfolio

NOTE

Please carefully follow the important essential measurement practices in the assay-specific Quick Guides.

Please refer to the Quick Guides for analytical and physical specifications such as sizing range, resolution, sensitivity, maximum sample buffer strength, quantitative range, analysis time, and more. The Quick Guides provide assay specific information on storage conditions, kit components, additional material required and assay operating procedure.

Table 3 ScreenTape Assays portfolio

ScreenTape Assay	Quick Guide Number
Agilent D1000 ScreenTape Assay	G2991-90030
Agilent High Sensitivity D1000 ScreenTape Assay	G2991-90130
Agilent RNA ScreenTape Assay	G2991-90020
Agilent High Sensitivity RNA ScreenTape Assay	G2991-90120
Agilent Genomic DNA ScreenTape Assay	G2991-90040
Agilent D5000 ScreenTape Assay	G2991-90050
Agilent High Sensitivity D5000 ScreenTape Assay	G2991-90150

NOTE

The assay-specific Quick Guides contain important information on the ladder, see also “[Ladder Considerations](#)” on page 75. Please read this section carefully.

Tools and Handling

- Always follow the GLP-rules established in the laboratory.
- Always wear gloves to prevent contamination.
- When pipetting sample, use pipette tips that are of adequate size. Pipette tips that are too large will lead to poor quantitation accuracy.
- Change pipette tips between steps to avoid cross-contamination.

Mixing Recommendations

Use a vortexer which is designed for mixing 8-way tube strips, or 96-well plates respectively. The IKA MS3 vortexer is recommended for all ScreenTape assays. 4200 TapeStation systems are supplied with an optional IKA MS3 vortexer which includes a 96-well plate adaptor suitable for both 96-well PCR plates and 8-way strips.

- Close tube strips with tube strip caps and seal 96-well plates with plate foil seal.
- Set the IKA MS3 vortexer to 2000 rpm.
- Vortex for 1 min by pressing the start button.



Figure 12 IKA MS3 vortexer

If no IKA MS3 vortexer is available, please ensure thorough manual vortex mixing – 10 s on maximum speed.

Reagents and Reagent Mixes

- Handle and store all reagents according to the instructions given in the appropriate Quick Guide.
- Keep all reagents at the directed temperature when not in use. Reagents left at room temperature for a long period of time may decompose, leading to poor results.
- Allow all reagents to equilibrate to room temperature for 30 min. Mix and spin down prior to use.
- 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 adding sample buffer to samples, please ensure that they are mixed correctly. See “[Mixing Recommendations](#)” on page 66 and appropriate Quick Guide ([Table 3](#) on page 64).
- When pipetting small volumes ensure that no sample remains within the tip. Special care must be taken with high sensitivity assays which use small volumes of sample and sample buffer.

Sample Preparation

- Refer to the assay-specific Quick Guide for the recommended sizing and concentration ranges. Using samples outside the stated ranges can affect performance.
- For salt tolerance guidelines, please refer to the assay-specific Quick Guide. Please ensure that sample buffers are below the maximum recommendation.
- Allow all samples to equilibrate to room temperature for 30 min. Mix and spin down prior to use.
- Always pipette reagents against the side of the sample tube.
- Ensure that no residual material is left on the outside of the tip.
- When adding sample buffer to sample, please ensure that they are mixed correctly by following the Quick Guide instructions ([Table 3](#) on page 64). Improper mixing can lead to quantification errors, see [“Mixing Recommendations”](#) on page 66.
- Once mixed, briefly centrifuge to collect the contents at the base of tubes.
- Used sample tube strips and tips should be disposed of in accordance to local safety regulations.

NOTE

For successful loading, the sample solution must be placed at the bottom of the tube or well without any air-bubbles. The 4200 TapeStation system will load a sample from a minimum of 3 μ L onto ScreenTape device.

CAUTION

Lids on sample tubes

Failure to remove sample tube lids can cause damage to the 4200 TapeStation instrument and impact the performance.

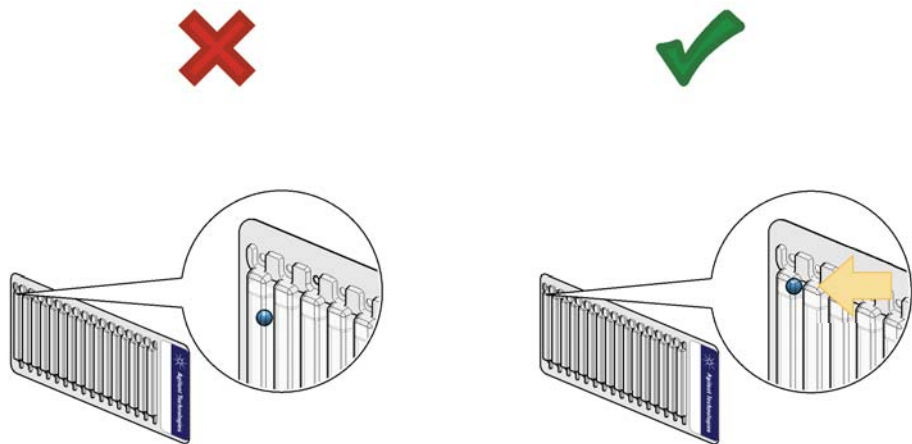
→ Ensure lids have been removed from the sample tube strips before starting the run.

NOTE

For successful sample analysis, 96-well plates must be covered by Plate Foil Seal (96 -well Plate Foil Seal, Pack of 100 foils (5067-5154)) to prevent evaporation. The 4200 TapeStation system is capable of piercing through the foil, providing only Agilent approved foils are used.

ScreenTape Devices

- Details and specifications for each assay are available in the 4200 TapeStation System Manual, the assay-specific Quick Guide, and online <http://www.agilent.com/genomics/tapestation>.
- Protect the gel lanes of the ScreenTape device from excessive force - do not bend or flex the ScreenTape device.
- Store the ScreenTape devices in the provided packaging between 2 – 8 °C.
- ScreenTape devices can be used straight from the fridge with no equilibration time.
- Handle ScreenTape devices carefully to avoid fingerprints or fibers, which can affect imaging.
- Ensure that the ScreenTape device is flicked gently before inserting it into the instrument; if there are any small bubbles present, flicking the ScreenTape device will move them to the top of the chamber.



Air bubbles present at the top of the buffer chamber are acceptable.

7 Essential Measurement Practices

ScreenTape Devices

NOTE

The presence of small bubbles within the buffer chamber of the ScreenTape devices 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 assay.

NOTE

ScreenTape devices have an expiration date. If a ScreenTape device beyond the expiration date is used, a message will show up in the 4200 TapesStation Controller interface. Starting a sample analysis with an expired ScreenTape device is disallowed by software. Assay performance specifications do not apply beyond the expiration date.

Changing 4200 TapesStation Controller settings will permit the instrument running expired ScreenTape devices, see [“Agilent 4200 TapeStation Controller Software Settings”](#) on page 41.

Resulting data are marked accordingly.

Partially Used ScreenTape Devices

Depending on the number of samples run, a ScreenTape device may not be used up completely and can be stored for later use. The 4200 TapeStation Controller software keeps track of each ScreenTape device.

- The next time the ScreenTape device is inserted to the ScreenTape nest, the number of available lanes is displayed.
- Please insert partially used ScreenTape devices only to the ScreenTape nest of the instrument, never into the ScreenTape rack.

NOTE

Partially used ScreenTape devices should only be placed in the ScreenTape nest of the instrument. The ScreenTape rack should only be filled with unused ScreenTape devices. This ensures the proper prediction of required ScreenTape devices during analysis with multiple ScreenTape devices.

Partially used ScreenTape devices (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.

NOTE

The laptop utilized for performing any previous use(s) of the ScreenTape device must be utilized for all further re-use. ScreenTape run data is stored locally on the instrument laptop. Changing or updating the laptop can cause this information to be lost, resulting in partially used ScreenTape lanes being reused.

NOTE

Partially used ScreenTape devices have a 2 weeks use period after first use. Discard partially used ScreenTape devices beyond this time. A related message will show up in the 4200 TapeStation Controller interface.

Centrifugation Recommendations

Spinning down samples during sample preparation is required to collect all liquid in one droplet for effective mixing, to collect liquids at the bottom of the vial so that they can be picked up by the pipetting robotics of the 4200 TapeStation system, and to remove trapped air bubbles at the bottom of the vial.

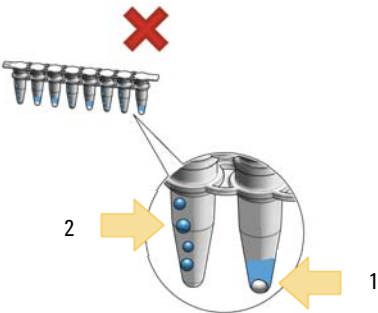

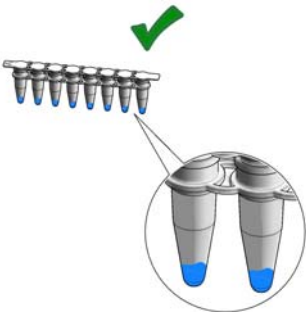
A centrifuge for tube strips and well plates is required. This centrifuge is not supplied with the system. A centrifuge with 8-tube strip rotor and a centrifuge with a rotor for well plates can be used, as well as devices with interchangeable rotors. A suitable centrifuge should allow spinning at a centrifugal force of approximately 500 g and for example for the duration of 10 s. The effectiveness of this step should be confirmed by a visual check.

CAUTION

Improper or skipped centrifugation

Failure to spin down samples can cause empty lanes on the ScreenTape device as no or insufficient sample volume is transferred. Subsequently, no data or data of low quality are created.

- Ensure that the sample liquid persists bubble free at the bottom of the sample tube or well.
-

<p>1 Centrifuge samples to remove spills and air bubbles.</p> 	<p>2 Spin for 10 s at 500 g.</p> 
<p>3 Collect liquid at the bottom of the vial without air bubbles.</p> 	

NOTE

For successful sample analysis in 96-well plates as well as from sample tube strips, both must be centrifuged. A centrifuge with 8-tube strip rotor and a centrifuge with a rotor for well plates can be used as well as devices with interchangeable rotors.

Assays With Heat Denaturation

The two RNA assays below include a heat denaturation step in the workflow.

- RNA ScreenTape assay
- High Sensitivity RNA ScreenTape assay

For heat denaturation, an accurately calibrated block heater or a PCR instrument fitting to 200 μ L vials is required. This equipment is not supplied with the system. Prior to the heating step, the tubes or well plates need to be closed by lids or foil seal.

Heat denaturation typically consists of:

- collecting sample and sample buffer at the bottom by centrifugation,
- incubation at 72 °C for 3 min,
- incubation on ice for 2 min,
- centrifuge to collect samples at the bottom.

NOTE

After each heating step, spinning down samples is required to collect condensed material from lid or cover.

NOTE

Many heat blocks and PCR machines display a temperature that can be incorrect by up to 10 °C. Please ensure your heat block is appropriately calibrated before use.

Ladder Considerations

The ScreenTape assays allow determination of the size of unknown sample fragments or smear regions. This size determination is based on a ladder which is a sample with specific sizing standards. The required ladder for an assay is provided with the ScreenTape Reagents or can be purchased standalone.

For best sizing precision and accuracy, a ladder per ScreenTape device is recommended. Alternatively an electronic ladder is also available for some assays such as the D1000 ScreenTape assay. The electronic ladder can be selected in the Agilent 4200 Controller software and is added to the data automatically.

For the 4200 TapeStation system, the ladder is exclusively loaded from location A1 on the tube strip holder. A ladder is typically prepared like a sample. For an analysis that consists of runs with multiple ScreenTape devices a distinct higher ladder volume is prepared. Please refer to the assay-specific Quick Guide of the assay you plan to run for details on the preparation of this higher ladder volume.

Some ScreenTape assays such as the D5000 ScreenTape assay and Genomic DNA ScreenTape assay require a ladder run per ScreenTape device. These assays do not offer usage of electronic ladders. Running a ladder per ScreenTape device in a multi-ScreenTape analysis is a must for such assay.

RNA ScreenTape assays require only one ladder per complete analysis even if this analysis is involving multiple ScreenTape devices. For RNA assays an electronic ladder can be selected in the 4200 TapeStation Controller software and would then be added to the data automatically.

NOTE

To select usage of an electronic ladder instead of a real ladder run on the ScreenTape device, refer to inserting electronic ladder in ["Agilent 4200 TapeStation Controller Software User Interface"](#) on page 39.

7 Essential Measurement Practices

Ladder Considerations



8 Instrument Diagnosis

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This chapter contains information on instrument diagnosis, available tests, and reporting.



Instrument Diagnosis



The Agilent Lab Advisor software is designed to support continuous operation of the 4200 TapeStation system. It provides features for maintenance; routine self-tests and for service needs. This software includes diagnosis tests to verify proper performance of the mechanical, electrical, and optical components. It comes with tools supporting instrument maintenance. The Agilent Lab Advisor software is designed for users and trained Agilent service personnel.

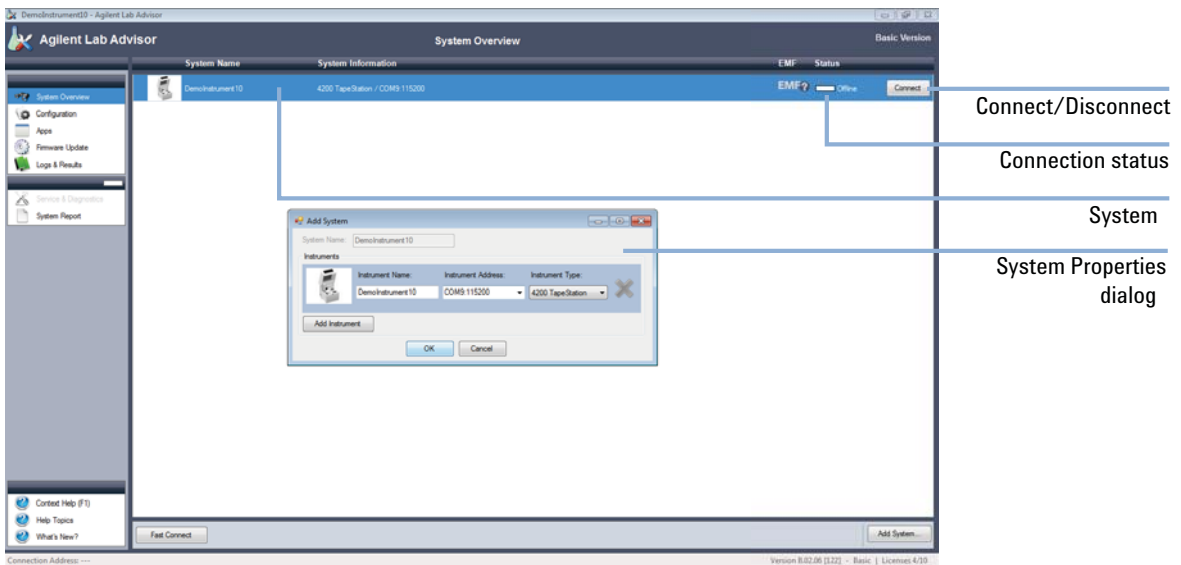
The Agilent Lab Advisor software speeds up remote troubleshooting by providing detailed support information for any instrument error that may arise. The software works standalone. The Agilent Lab Advisor software is not designed to carry out sample analysis with Agilent ScreenTape assays. The Agilent 4200 TapeStation Controller software must be terminated prior to a connection with the Agilent Lab Advisor software.

Tests

Setting up an instrument for tests

Setting up an Agilent 4200 TapeStation instrument in the Agilent Lab Advisor software.

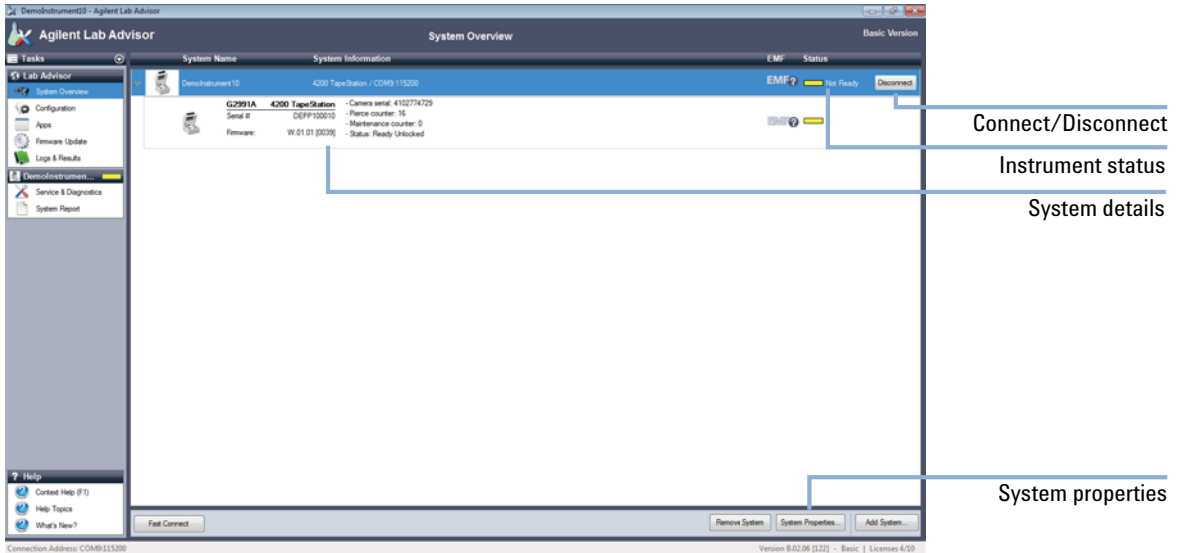
- 1 Start the instrument and the Lab Advisor software.
- 2 Go to **System Overview**.



- 3 Select **New System**.
- 4 Select Instrument Type **4200 TapeStation** from the drop-down list.
- 5 Assign a name to the instrument.
- 6 Select an **Instrument Address** from the drop-down list. If several ports are available, repeat connection with other COM ports.
- 7 Click **OK** and monitor connection taking place.

8 Instrument Diagnosis Tests

- 8 Upon successful connection, the **System Information** with serial number and more details are displayed.



- 9 The COM-port selection can be changed through the **System Properties** dialog if no connection is established. Please verify the instrument is turned on and connected by USB cable.

The system is set up and can be connected or disconnected in the future by a single click on the button.

Executing a Test Suite

- 1 Select **Service & Diagnostic** for a connected 4200 TapeStation instrument.
The connection needs to be established first, see “[Setting up an instrument for tests](#)” on page 79.
- 2 Select the Test Suite that you want to execute and click **Run**.

The screenshot shows the Agilent Lab Advisor software interface. The title bar reads "DemoInstrument10 - Agilent Lab Advisor" and "Service & Diagnostics". The interface is divided into several sections:

- Left Navigation Pane:** Contains "Lab Advisor" (selected) and "DemoInstrument10". Under "Lab Advisor", there are options for "System Overview", "Configuration", "Apps", "Firmware Update", and "Merge & Results". Under "DemoInstrument10", there are options for "Service & Diagnostics" and "System Report".
- Filter Section:** Shows "Tests" (checked), "Calibrations", and "Tools". Below this, a table lists instruments: "DemoInstrument10" and "G2991A 4200" (Serial # DEPP100010).
- Test Suites List:** A list of test suites is shown, including "Core tests" and "Troubleshooting tests".
- Test Details:** Below the list, details for "Core tests" are displayed: "Name: Core tests", "Approx. Time: 10 minutes", and "Description: Core hardware test suite".
- Bottom Section:** Includes a "Run" button and a "more" button. The status bar at the bottom shows "Connection Address: COM8:115200" and "Version B.02.06 [122] - Basic | Licenses 4/10".

Annotations on the left side of the image point to specific elements:

- "Instrument" points to the "G2991A 4200" instrument entry in the filter section.
- "Test suites" points to the "Core tests" and "Troubleshooting tests" list.
- "Test details" points to the "Name: Core tests", "Approx. Time: 10 minutes", and "Description: Core hardware test suite" information.
- "Start" points to the "Run" button.

8 Instrument Diagnosis Tests

- 3 The Test Suite opens, and Test Suite Groups with included tests become visible.
- 4 Click **Start Run** to execute the entire Test Suite. Follow the on-screen instructions closely; see “[System Test Suite](#)” on page 86 and “[Troubleshooting Test Suite](#)” on page 87 for material needed during the test execution.

The screenshot displays the Agilent Lab Advisor software interface. The window title is "Agilent Lab Advisor" and the subtitle is "Service & Diagnostics". The interface is divided into several sections:

- Tasks:** A vertical sidebar on the left contains icons for Lab Advisor, Configuration, Apps, Software Update, Log & Report, DemoInstruments..., and System Report.
- Core tests:** A central panel with a tree view showing various test categories and their sub-items, each with a checkbox. Categories include Setup, Electrode/Cartridge, Vision, Camera Movement, Filter Test, FOV Test, Uniformity Test, Electrophoresis, Temperature Sensors, Robotics, and Cleanup. A "Default" section at the bottom of this panel has "All" and "Clear" buttons.
- Test details:** A table on the right shows test information. The first row is for "Preparation" with a status of "No results available".
- Test start/abort:** A "Start Run" button is located at the bottom center of the interface.
- Print dialog:** "Print Result" and "Back" buttons are located at the bottom right.

Annotations on the left side of the screenshot point to specific areas:

- "Test details" points to the table in the "Core tests" section.
- "Test suite groups" points to the tree view in the "Core tests" section.
- "Test start/abort" points to the "Start Run" button.
- "Print dialog" points to the "Print Result" and "Back" buttons.

Test suite groups

The System Test Suite and Troubleshooting Test Suite consists of test groups:

Table 4 Test suite groups

Setup	Prepares the instrument, requests insertion of material, checks status LED functionality.
Vision	Camera and LED illumination are checked using the TapeStation Test Tape.
Electrophoresis	The voltage supply, current readout, and electrodes are checked using the TapeStation Test Tape.
Robotics	Robotics parts are checked by dedicated movements. Tip and ScreenTape device handling are checked using a full tip rack and one regular ScreenTape device.
Pipetting	This check procedure in the Troubleshooting Test Suite visually checks pickup of liquid from well plates and tube strips.
Cleanup	Resets the instrument to normal operational mode and requests removal of material.

TapeStation Test Tape

The Agilent TapeStation Test Tape (5067-5601) is a device designed to be used with the 4200 TapeStation system for hardware diagnosis. The TapeStation Test Tape can be used to check the performance of electrical and optical components.

It is part of the accessories shipped with the instrument, see “[Accessories Shipment List](#)” on page 106.

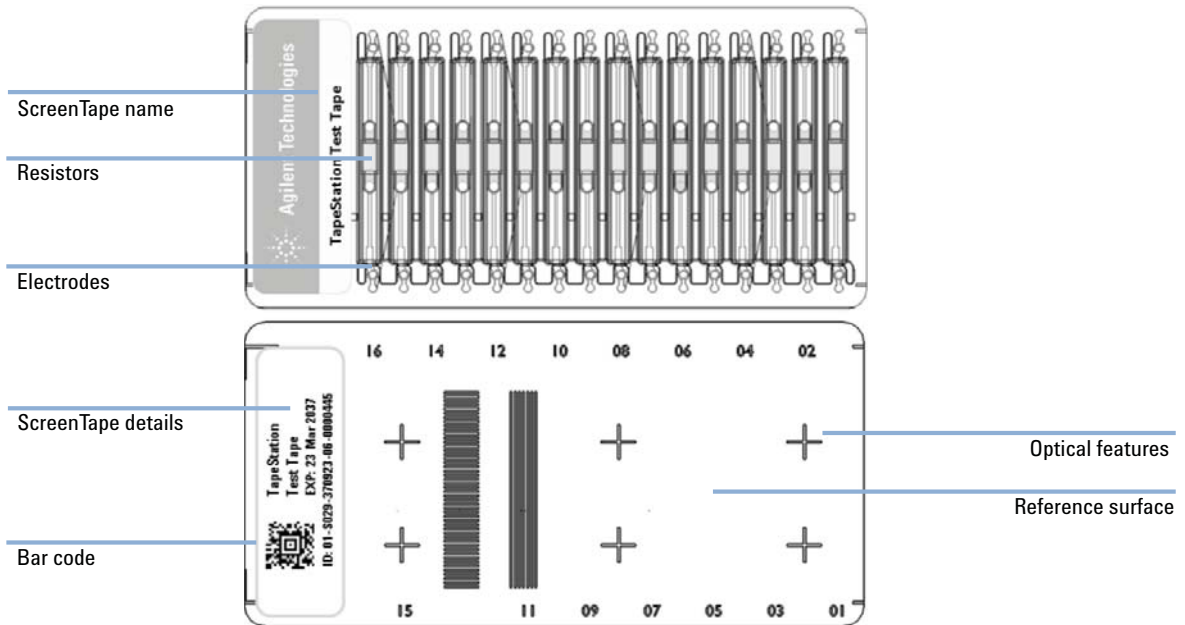


Figure 13 TapeStation Test Tape

Within the Lab Advisor software, it can be used for routine confirmation of the system functionality in the System Test Suite (see “[System Test Suite](#)” on page 86) or for instrument troubleshooting in the extended Troubleshooting Test Suite (see “[Troubleshooting Test Suite](#)” on page 87) as directed by your support representative.

Dialogues during test suite execution (see “[Executing a Test Suite](#)” on page 81) will request you to insert this TapeStation Test Tape to the ScreenTape nest.

CAUTION**Wrong insertion of TapeStation Test Tape**

The TapeStation Test Tape is a specialized test device that differs in physical properties from regular ScreenTape devices. Incorrectly inserting the TapeStation Test Tape can irreversibly damage it.

- Do not insert the TapeStation Test Tape to the ScreenTape rack for the ScreenTape handling test within the robotics test suite.
 - Only insert the TapeStation Test Tape to the ScreenTape nest.
 - Follow the instructions during the robotics test suite closely.
-

NOTE

The TapeStation Test Tape is designed for instrument diagnostic purposes only, and as such will not apply any changes to the TapeStation instrument.

Each TapeStation Test Tape has an operation life of 2 years.

NOTE

Protect the TapeStation Test Tape from excessive force. Do not bend or flex the Test Tape and store away from direct light and chemicals in the provided packaging when not in use.

The TapeStation Test Tape is inserted into the 4200 TapeStation instrument in the same way as a regular ScreenTape device. The label with the barcode faces towards the back of the instrument.

Upon insertion of the TapeStation Test Tape to a 4200 TapeStation instrument that is connected to the TapeStation Controller software the start of the diagnostic software Agilent Lab Advisor is triggered. A dialog will guide you through this process.

System Test Suite

The System Test Suite consists of tests to confirm functionality of various components of the system. Test duration is approximately 10 minutes. Tests are organized in test groups for robotics, electrophoresis, and vision system. The test suite comes with predefined test. Deselection of individual tests is possible. After entering the suite, the selection can be modified. Some tests are dependent and require execution of others as prerequisite.

The Agilent Lab Advisor software runs automated and semi-automated tests which possibly require user input during execution.

The System Test Suite requires the following material upon start:

- TapeStation Test Tape (5067-5601)
- empty 96-Well Plate (5042-8502)
- full rack of Loading Tips (5067-5598)
- One regular ScreenTape device

During the test, one regular ScreenTape device of any assay type needs to be inserted temporarily to the ScreenTape rack to conduct a robotics test.

The robotics test is non-destructive. The number of available lanes on this device will not change. After the test, this ScreenTape device can be stored again in the refrigerator and used at a later point in time within the regular shelf life time.

It is required to ensure the ScreenTape nest covers and the gantry cover are in place during execution of the test suite.

Troubleshooting Test Suite

The Troubleshooting Test Suite consists of all System Test Suite tests (see [“System Test Suite”](#) on page 86) plus additional tests. It creates comprehensive information for troubleshooting by service and support personnel. Test duration is approximately 20 minutes.

The Troubleshooting Test Suite requires the following additional material upon start:

- A foil sealed 96 well plate with:
 - 5 μ L water in wells A1, H1, A12, H12,
 - 20 μ L water in wells D6, D7, E6, E7.
- Two tube strips each with:
 - 5 μ L water in wells A and H.

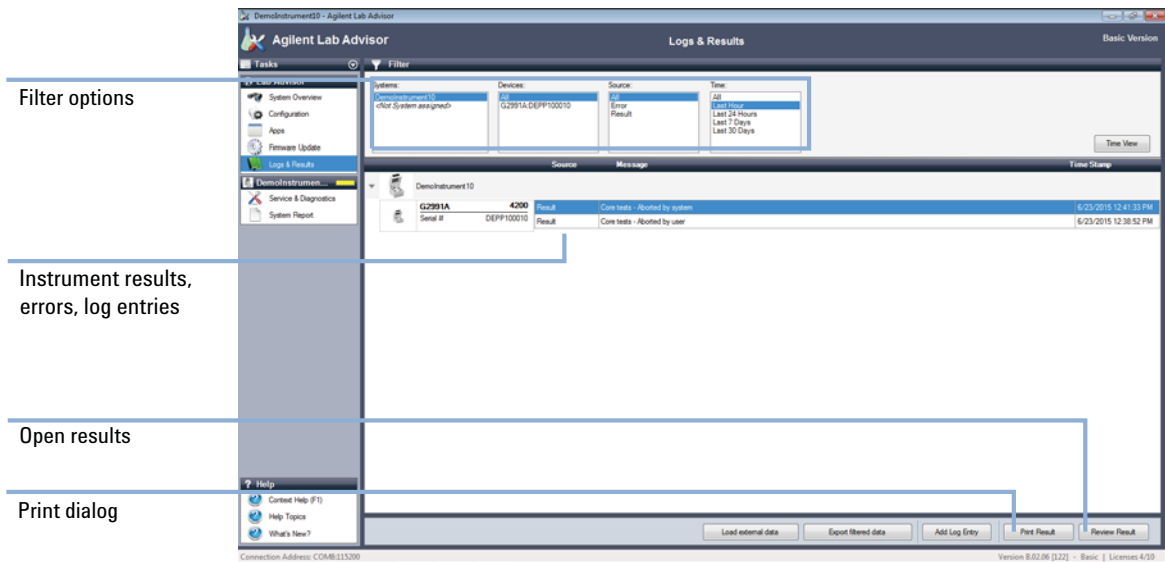
Please collect liquid at the bottom of the vial by centrifugation before starting the liquid handling check. Spilled liquid or trapped air bubbles will affect the results. Please refer to [“Centrifugation Recommendations”](#) on page 72.

Reporting

Reviewing Test Suite Results

Results from test suite executions can be printed to reports after the end of test suites or later by selecting the menu item **Logs & Results**. Existing results can be selected and opened for review.

Result reports from test suite executions can be saved in PDF format.



NOTE

From the Agilent TapeStation Analysis software log files in ZIP format can be exported to be sent to Agilent technical support experts. See [“Collecting Troubleshooting Information”](#) on page 104 for details. These log files will automatically contain the latest test results.



9 Maintenance

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This chapter describes the maintenance of the Agilent 4200 TapeStation system.



Maintenance Information

Needle Pierce Counter

Each time a ScreenTape lane is pierced for sample application during the analysis the needle pierce counter is increased. The 4200 TapeStation Controller software and the Lab Advisor software display the number of pierces. The needle should be exchanged after 3840 pierces to ensure optimal instrument performance. The 4200 TapeStation Controller software displays a warning message when this threshold value is reached. Further analysis is inhibited if the maximum number of 4480 pierces is reached.

The command **Change Needle** (see “[Exchange the Needle](#)” on page 92) from the Agilent 4200 TapeStation Controller software leads to an exchange of the needle and a reset of the needle pierce counter.

An unused Needle Change Cartridge (5067-5783) is prerequisite for the needle exchange and is recognized by the software. The Needle Change Cartridge is designed for one time use. An extracted needle cannot be remounted.

Maintenance Counter

Each time a ScreenTape lane is used for electrophoresis the maintenance counter is increased. The 4200 TapeStation Controller software and the Lab Advisor software show the maintenance counter and a respective warning when a threshold value of 50000 samples is reached. The electrodes in the ScreenTape nest contacting to the contact point on the ScreenTape devices should be exchanged after a defined number of analyses to ensure optimal instrument performance. Please schedule planned preventive maintenance by Agilent Service at this point.

Preventive Maintenance

An annual preventive maintenance is essential for the 4200 TapeStation system as it has many moving parts. Besides the planned yearly service, the 4200 TapeStation Controller software will flag the need for such service based on the instruments' throughput. A warning message appears after the analysis of 50000 samples.

The preventive maintenance should be arranged with your local Agilent representative and consists of:

- needle replacement,
- electrophoresis probe block replacement,
- firmware and software update if applicable,
- internal instrument inspection for wear,
- check for foreign objects and general cleaning of instrument inside and outside,
- execution of functional hardware test.

The Preventive Maintenance service does not include repair activities.

For customers with exceptionally high usage, the needle replacement procedure (see [“Exchange the Needle”](#) on page 92) can also be performed between annual Preventive Maintenance services.

Exchange the Needle

Parts required	p/n	Description
	5067-5783	Needle Change Cartridge

CAUTION

Damage to the cartridge or nest

The Needle Change Cartridge cannot be inserted into the ScreenTape nest in normal operation mode. It is required to start the needle exchange process by software first, this will open the ScreenTape nest.

- Do not use excessive force when inserting the Needle Change Cartridge into the ScreenTape nest.
- Insert Needle Change Cartridge to the ScreenTape nest only when requested by the software dialogue.

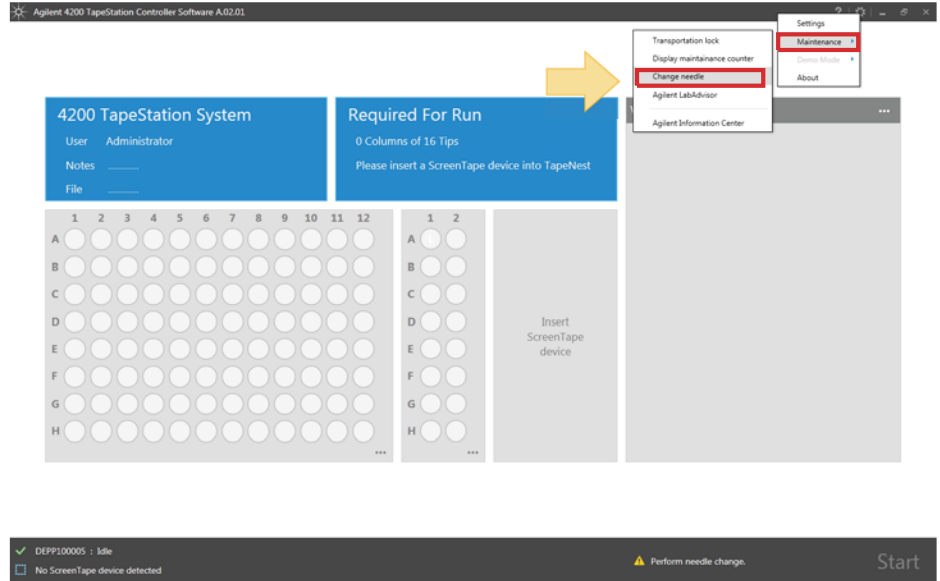
CAUTION

Analyses fail

Turning the instrument off during the calibration procedure after the needle exchange will result in a fail of all subsequent analysis. Turning the instrument off during calibration will require a different new needle change cartridge.

- Do not turn the instrument off during the calibration procedure after needle exchange.

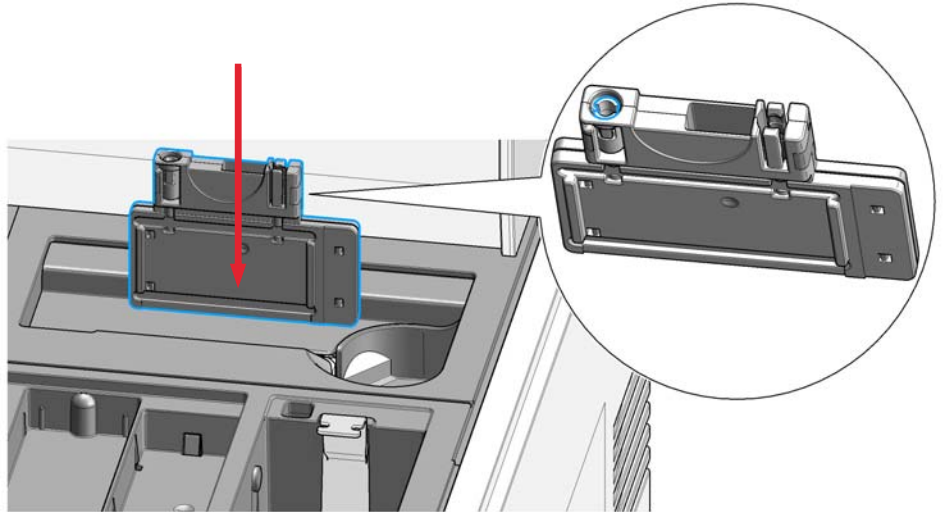
- 1 Prepare instrument by selecting Needle Exchange from the 4200 TapeStation Controller software settings menu: **Settings > Maintenance > Change needle**. The exchange process opens the ScreenTape nest to allow insertion of the needle cartridge.



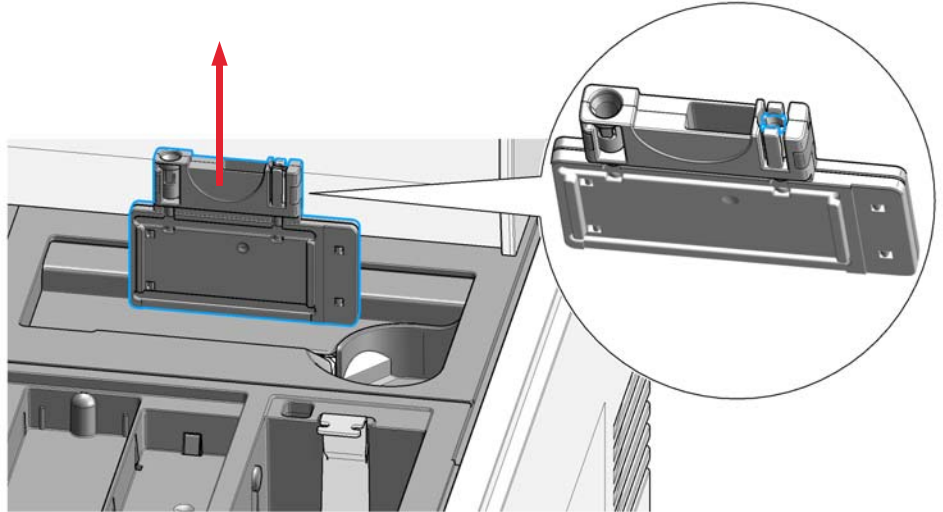
9 Maintenance

Exchange the Needle

- 2 Insert an unused Needle Change Cartridge to the ScreenTape nest. Insert the cartridge with the bar code facing towards the back of the instrument. An unused new cartridge has a new needle in the left side and an empty slot on the right. The open slot on the right hand side has hooks.



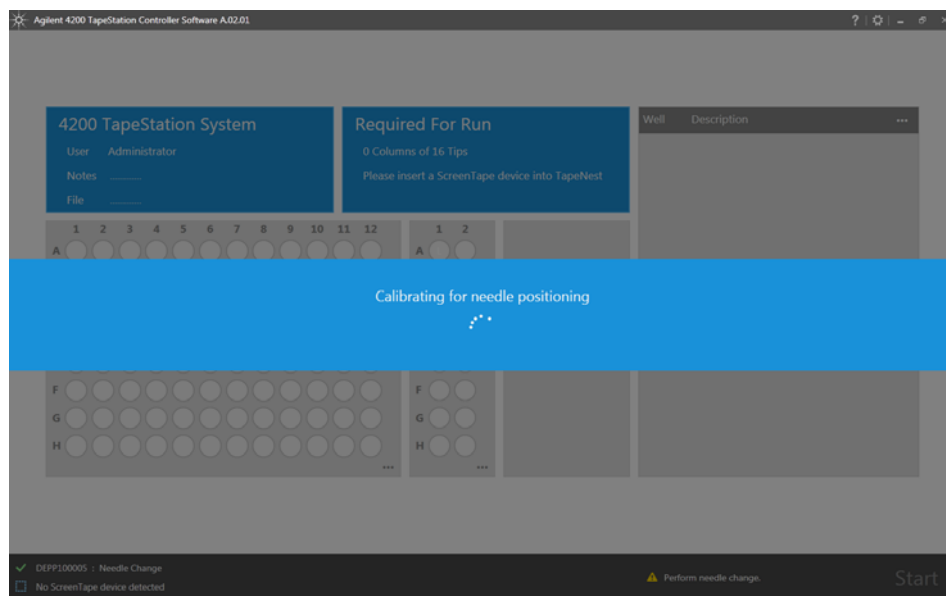
- 3 Click **Inserted** to continue.
- 4 After exchange: Remove Needle Change Cartridge from ScreenTape nest and discard. The used cartridge has an open slot on the left side and the old needle in the slot on the right.



9 Maintenance

Exchange the Needle

- 5 Wait until the automated needle calibration is complete. It is crucial not to turn off the instrument or terminate the software during the needle change, this could impact performance of all future analysis.



Preparing the Instrument for transportation

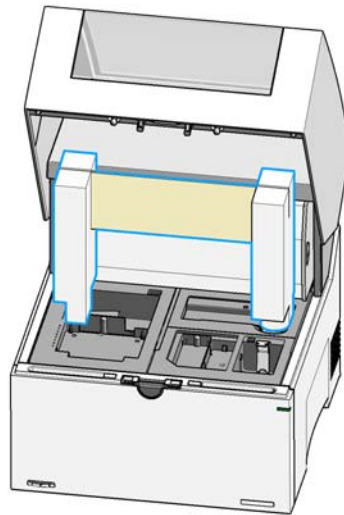
The 4200 TapeStation instrument must be placed into transport mode before being moved. Please follow the instructions below.

WARNING

A piercing needle is located behind the gantry cover.

- Do not reach under the cover.
- Do not remove the cover.

- 1 Remove all loose components such as tip waste, tip rack, tube strip holder, well plate and ScreenTape rack from the instrument.
- 2 Activate transportation lock. The Transportation Lock command from the 4200 TapeStation Controller software menu moves all robotic parts to save position.
- 3 Power down the instrument.
- 4 Install the fixing foam. The foam has two differently shaped pillars. Align the foam in such way with the instrument that the round shaped pillar is located in the ScreenTape nest. The foam sits tight and holds the gantry cover in place during transportation once the lid is closed.



- 5 Close the lid.

Transportation Lock

The execution of the Command **Transportation lock** (see “Engaging the [Transportation Lock](#)” on page 99) from the Agilent 4200 TapeStation Controller software leads to locking of two moving mechanical parts of the instrument. The robotics for liquid handling and the moving parts of the vision system are fixed to the chassis of the instrument. This locking is required prior to any transportation of the instrument.

1 Liquid handling:

The transportation lock for the robotics for liquid handling can be exclusively released by pressing a dedicated button at the instruments' gantry. The transportation lock for the robotics for liquid handling cannot be reverted by a software interaction.

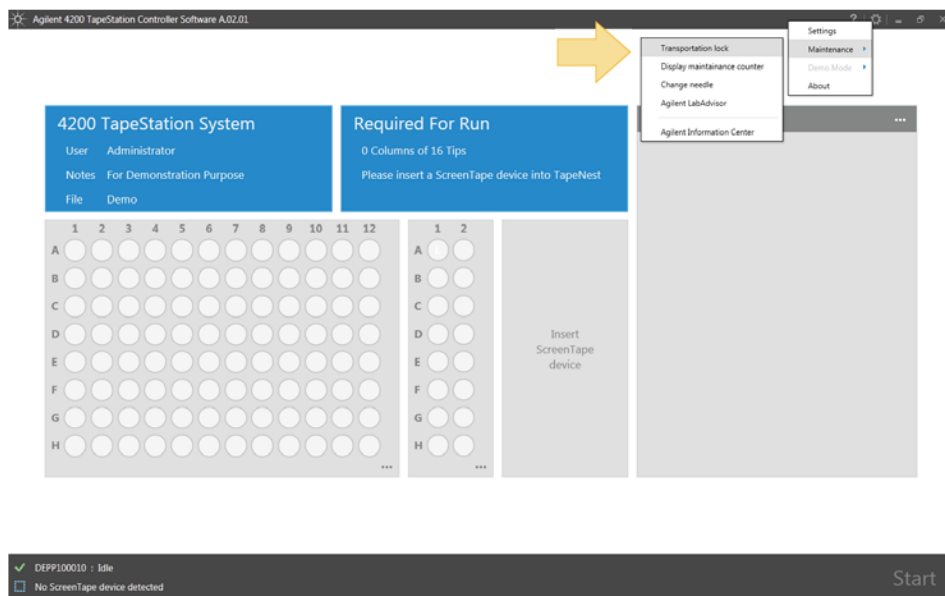
2 Vision system:

The moving parts of the vision system are unlocked automatically at the next analysis start. There is no manual user interaction required to release the vision system lock.

Engaging the Transportation Lock

Engaging the Transportation Lock by software is possible for an instrument that is powered on, successfully connected by USB, has a closed lid and functional robotics.

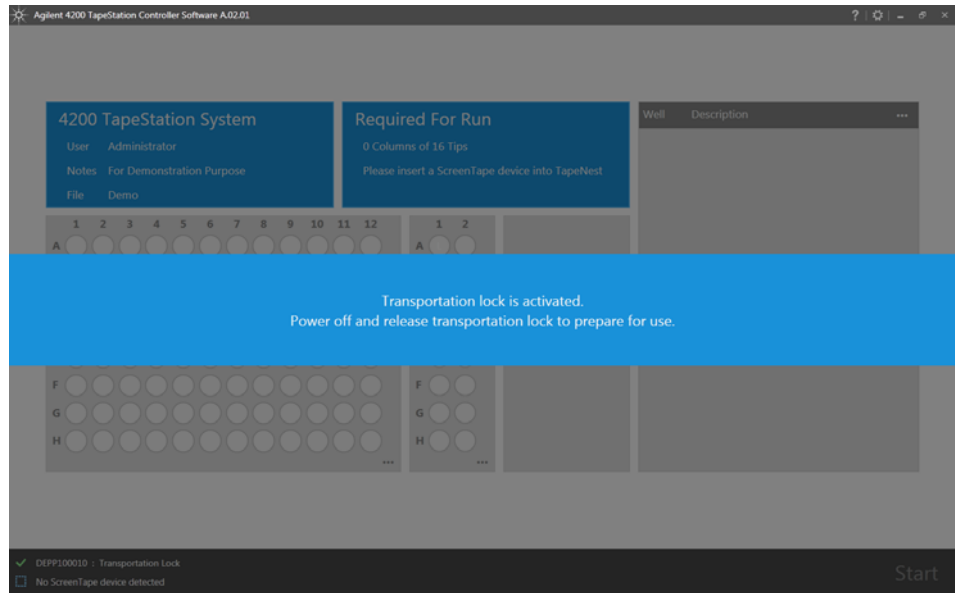
- 1 Transportation Lock command moves all robotic parts to a safe position.



9 Maintenance

Engaging the Transportation Lock

- The transportation lock is now activated. Please close the 4200 TapeStation Controller software and power down the instrument.

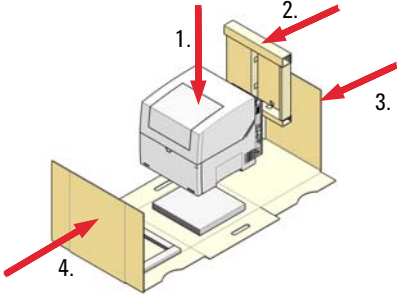
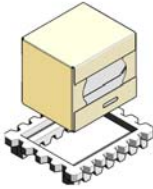
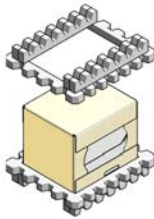
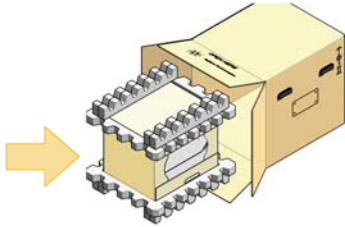


Boxing for Transportation

An instrument with activated pack lock and inserted fixation foam (see “Preparing the Instrument for transportation” on page 97) is ready for boxing.

WARNING Be careful when lifting the instrument.

→ Because the instrument is heavy, lifting it will require the assistance of a second person to prevent injury.

<p>1 Place inner cardboard box on the floor and lift instrument with two persons onto it. Mount the cardboard box to the back.</p>  <p>The diagram shows a grey instrument being placed onto a yellow inner cardboard box. Red arrows indicate the following steps: 1. The instrument is lowered onto the box. 2. The back panel of the inner box is closed. 3. The top foam insert is being positioned. 4. The front panel of the inner box is closed.</p>	<p>2 Close inner cardboard box and place the instrument onto the bottom foam with two persons.</p>  <p>The diagram shows the grey instrument resting on a white foam base inside the closed yellow inner cardboard box.</p>
<p>3 Add the top foam of the inner cardboard box.</p>  <p>The diagram shows a white foam insert being placed on top of the instrument inside the yellow inner cardboard box.</p>	<p>4 Slide the instrument into the outer cardboard box.</p>  <p>The diagram shows the yellow inner box with the instrument inside being slid into a larger yellow outer cardboard box. A yellow arrow points to the right, indicating the direction of movement.</p>

9 Maintenance
Boxing for Transportation



10 Troubleshooting

Collecting Troubleshooting Information 104

This chapter gives an overview about the troubleshooting features of the Agilent 4200 TapeStation system.



Collecting Troubleshooting Information

A dedicated feature within the Agilent TapeStation Analysis software assists you in your dialog with Agilent technical support experts. For troubleshooting in a support case you might be asked to run the Troubleshooting Test Suite (see “[Troubleshooting Test Suite](#)” on page 87) from the Lab Advisor software and then export log files using the menu **File > Help > Export Log Files**.



Export Log Files

Export log files from the Analysis and Controller applications to a zip file.

The collected files contain internal log files generated by your 4200 TapeStation system, diagnostic information and result files from Lab Advisor test suits. For your convenience, this complete set is collected from various folder locations and provided as a ZIP file on the desktop to be sent out to Agilent technical support experts. Be aware that this package of log files package does not include data files, experimental information or sample information. To properly describe your issue completely, you need to collect and compile this information in addition.



11 Appendix

Accessories Shipment List 106

This chapter contains parts information.



Accessories Shipment List

The following table lists accessories shipped together with the Agilent 4200 TapeStation system.

Printed Quick Guides for 4200 TapeStation system

p/n	Description
G2991-90020	Agilent RNA ScreenTape Assay Quick Guide for 4200 TapeStation System
G2991-90030	Agilent D1000 ScreenTape Assay Quick Guide for 4200 TapeStation System
G2991-90050	Agilent D5000 ScreenTape Assay Quick Guide for 4200 TapeStation System
G2991-90040	Agilent Genomic DNA ScreenTape Assay Quick Guide for 4200 TapeStation System
G2991-90120	Agilent High Sensitivity RNA ScreenTape Assay Quick Guide for 4200 TapeStation System
G2991-90130	Agilent High Sensitivity D1000 ScreenTape Assay Quick Guide for 4200 TapeStation System
G2991-90150	Agilent High Sensitivity D5000 ScreenTape Assay Quick Guide for 4200 TapeStation System

Instrument Accessories

p/n	Description
G2964-64030	Software and User Information, USB stick and Booklet, Box
5067-5601	TapeStation Test Tape
5188-8047	USB cable A to B, 2 m
G2991-40007	4200 TapeStation ScreenTape Rack, 1 rack
G2992-40042	4200 TapeStation Tube Strip Holder, tray for 16 tubes
G2992-40046	4200 TapeStation Tip Waste Bucket, 1 bucket

Additional Material

p/n	Description
401425	Optical Cap 8x Strip, Box of 120, 0.2 mL
401428	Optical Tube 8x Strip, Box of 120, 0.2 mL
5042-8502	96-Well Plate
5067-5154	96-well Plate Foil Seal, Pack of 100 foils
5067-5598	Loading Tips

NOTE

In the initial shipment, loading tips come as single pack with 112 tips. This is suitable for running 7 ScreenTape devices.

Please order further packs of Loading Tips (5067-5598) or a set of 10 packs of Loading Tips (5067-5599) in order to run more ScreenTape assays.

Other orderable equipment:

p/n	Description
5067-5783	Needle Change Cartridge
5067-5599	Loading Tips 10 packs of 112 tips

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In This Book

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- Introduction to the system
- Site requirements and specifications
- Installation
- Software
- Operation of the system
- Instrument diagnosis
- Maintenance
- Troubleshooting
- Product notices

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