BioQule™ NGS

Sample Preparation System

User Manual

PerkinElmer®

P/N CLS157603 Rev. B Publication
Date: December 19, 2022

CE

Preface

Revision History

BioQule NGS User Manual CLS157603

Revision	Date	Description
A	November 2022	Initial Release
B	December 2022	Adding Quantification in the introduction

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Proper Equipment Operation

WARNINGS

- *To reduce the risk of electric shock, do not remove the cover. No user serviceable parts are inside. Refer to qualified service personnel if help is required.*
- *Use this product only in the manner described in this manual. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.*

AVERTISSEMENTS

- *Pour réduire le risque de choc électrique, ne pas retirer le couvercle. Ce produit ne contient aucune pièce pouvant être réparée par l’utilisateur. Au besoin, confier l’appareil à un réparateur qualifié.*

- *Ce produit ne doit être utilisé que comme décrit dans ce manuel. Si cet appareil est utilisé d'une manière autre que celle spécifiée par le fabricant, la protection fournie par l'appareil peut être entravée.*

Contact Us

If you have a question about a product that is not answered in this manual, or if you need assistance regarding this product, please contact the PerkinElmer Customer Care Center from 8:00 A.M. to 8:00 P.M., Eastern Time, Monday through Friday:

Phone: (US Toll Free): **800-762-4000**
(Worldwide): **+1 203-925-4602**

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Email: LASService@perkinelmer.com

Internet: https://www.perkinelmer.com

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- Product serial number
- Software version (found by choosing About from the main Help menu)
- If applicable, the *error number* shown in the software or in the log file.

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This device complies with part 15 of the FCC (United States Federal Communications Commission) Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

CE

This device complies with all applicable CE rules and requirements.

NOTE

Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

REMARQUE

Tout changement ou modification apporté à cet instrument non expressément approuvé par l'entité responsable de la conformité peut annuler l'autorisation d'opérer l'appareil accordée à l'utilisateur.

Table of Symbols

Table 1 contains symbols that identify particularly important information and alert you to the presence of hazards. These symbols may appear in this manual and/or on the product it describes.

Table 1. Important Symbols

Symbol Symbole	Description Description
	**DANGER:** An imminently hazardous situation, which, if not avoided, will result in death or serious injury. **DANGER:** Situation présentant un danger imminent qui, s'il n'est pas éliminé, peut entraîner des blessures graves, voire la mort.
	**WARNING:** Caution. Refer to the User's documentation. (ISO 7000-0434B) **AVERTISSEMENT:** Attention. Se reporter à la documentation de l'utilisateur.
	**NOTE:** A cautionary statement; an operating tip or maintenance suggestion; may result in instrument damage if not followed. **REMARQUE:** Énoncé indiquant une précaution à prendre, un conseil de fonctionnement ou une suggestion d'entretien; son non-respect peut provoquer des dommages à l'instrument.
	Hazardous voltage; risk of electric shock. (IEC 60417-6042) Tension dangereuse; risque de blessure par électrocution.

Table 1. Important Symbols (Continued)

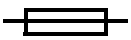
Symbol Symbole	Description Description
	Biological risks. (ISO 7000-0659) Risques biologiques.
	Crush hazard. Risk of body parts, hair, jewelry, or clothing getting caught in a moving part. (ISO 3864) Danger d'écrasement. Faire attention que les parties corporelles, les cheveux, les bijoux ou les vêtements ne soient pas pris dans une pièce mobile.
	Risk of puncture injury. (ISO 3864) Risque de blessure par piqûre.
	Risk of eye injury; wear safety glasses. Risque de lésion oculaire; porter des lunettes de sécurité.
	Risk of poison. (ISO 3864) Risque d'empoisonnement.
	Hot surface; risk of burns. (ISO 3864) Surface chaude; risque de brûlures.
	Laser light; avoid exposure. Risk of eye injury. (ISO 3864) Rayonnement laser; éviter toute exposition. Risque de lésion oculaire.
	Strong Magnetic Field. Champ magnétique puissant.
	Lifting hazard. May result in injury. (ISO 3864) Levage dangereux. Peut entraîner des blessures.
	Keep Dry. (ISO 7000-0626) Garder au sec.
	Temperature limit. (ISO 7000-0632) Limite de température.
	Use by date. (ISO 7000-2607) Utiliser par date.
	Protective ground symbol. (IEC 60417-5019) Symbole de terre de protection.
	Ground symbol. (IEC 60417-5017) Symbole de terre.
	Fuse. (IEC 60417-5016) Fusible.

Table 1. Important Symbols (Continued)

Symbol Symbole	Description Description
	Alternating current. (IEC 60417-5032) Courant alternatif.
	Direct current. (IEC 60417-5031) Courant continu.
	On (power). |(IEC 60417-5007) Marche (alimentation).
	Off (power). (IEC 60417-5008) Arrêt (alimentation).
	CE compliance mark. Marque de conformité CE.
	Batch Code (ISO 7000-2492) Code de lot.
	Serial Number (ISO 7000-2498) Numéro de série.
	Catalog number. (ISO 7000-2493) Numéro de catalogue.
	Do not re-use. (ISO 7000-1051) Ne pas réutiliser.
	Manufacturer. (ISO 7000-3082) Référence du fabricant.
	Date of Manufacture. (ISO 7000-2497) Date de fabrication.
	WEEE symbol (EN50419:2005). Do not dispose of as unsorted municipal waste. See the PerkinElmer website (www.perkinelmer.com) for more information.
	Signifies that the unit has passed safety tests for grounding, power line transience, and current leakage. Signifie que l'appareil a réussi les tests de sécurité pour la mise à la terre, le courant transitoire de ligne d'alimentation et la perte de courant.
	Consult Instructions for Use. (ISO 7000-1641) Consulter les Instructions d'emploi.

Instrument Safety

The following safety information about the BioQule NGS System is included in this documentation. Read and review all safety information before operating the BioQule NGS.

Required Training

Ensure that all personnel involved with the operation of the instrument have:

- Received instruction in general safety practices for laboratories.
- Received instruction in specific safety practices for the instrument.
- Read and understood all related MSDSs.

Chemical and Biological Safety

WARNING

Biological Risks. The BioQule NGS System can be used with potentially biohazardous substances in some applications. Areas and equipment marked with this symbol should be considered potentially infectious and should be handled and disposed of as potential biohazards. Use appropriate personal protection equipment such as gloves, lab coats, eye protection, etc. When handling samples, consumables, or equipment. Avoid direct contact with potentially hazardous chemical substances.

WARNING

In some applications, chemicals or samples used with the BioQule NGS are potentially hazardous and can cause illness.

- Read and understand the material safety data sheet (MSDS) provided by the chemical manufacturer before you store, handle, or work with any chemical or hazardous material.
- Minimize contact with and inhalation of chemicals and chemical wastes.
- Wear appropriate personal protective equipment when handling chemicals or samples (e.g., safety glasses, gloves, or clothing). For additional safety guidelines consult the MSDS.
- Handle all samples using good laboratory practices to prevent biohazards.
- Handle all infectious samples according to good laboratory procedures and methods to prevent the spread of disease.
- Do not leave chemical containers open. Use only with adequate ventilation, including a fume hood, if necessary.
- Check regularly for chemical leaks or spills. If a leak or spill occurs, follow the chemical manufacturer's cleanup procedures as recommended on the MSDS.
- After emptying waste containers, seal the waste containers appropriately.
- Comply with all local, state/provincial, or national laws and regulations related to chemical and waste storage, handling, and disposal.
- Normal operation may involve the use of test samples that are pathogenic, toxic, or radioactive. It is your responsibility to ensure that all necessary safety precautions are taken before such materials are used.
- Decontaminate the BioQule NGS before requesting service by PerkinElmer. Ask your laboratory safety officer to advise you about the level of containment required for your application and about the proper decontamination or sterilization procedures to follow.

Laser Safety

WARNING

BRIGHT LIGHT HAZARD. The BioQule NGS System includes a Class 2 Laser Barcode Reader. Read and follow all safety instructions included with the handheld barcode reader.

Electrical Safety

For power requirements see Specifications on page 20.

Power Cord

WARNING

- Only plug the power cord into a properly grounded outlet. Use only a standard IEC/EN60320 power cord appropriate for your country.
- Do not replace detachable mains supply cord with inadequately rated cord.

United States and Canada

The BioQule NGS is shipped with an IEC/EN60320 C13/C14 power cord. If the power cord needs to be replaced, substitute power cords must be UL Listed, Type SJT or equivalent, minimum No. 18 AWG, 3-conductor with ground conductor that for safety considerations should never be disconnected or defeated.

The cord's plug to the wall must be a three-pin grounding type connector with a NEMA 5-15P (15A, 125V) C14 plug configuration. The cord's connector at the power supply must conform to requirements for an IEC/EN60320 Standard Sheet C13 connector. The equipment is intended to be plugged into a standard NEMA 5-15R receptacle in the wall.

Power Cord Requirements (outside North America)

Customers outside of North America must supply a power adapter or power cord that is applicable for the country where the BioQule NGS will be installed and used. Use a power adapter that bears the required national agency approvals required in that country. The cord set should have standard IEC/EN60320 C13 connector for proper powering of the BioQule NGS. The cord set should be a 3-conductor type that includes a ground conductor.

Mechanical Safety

WARNING

Using the instrument in a manner other than that intended by the manufacturer can impair the instrument's safety systems, potentially resulting in injury or death.

WARNING

Instrument components may move during operation. Always keep body parts, hair, jewelry, and clothing away from the instrument during operation.

WARNING

- *Procedures which could result in injury may be performed only by operators who have been warned of the potential hazards and have received adequate training in performing the procedures in the safest possible manner.*
- *Always pause or stop the instrument or wait for the instrument to stop moving before loading and unloading consumables. Pause the instrument by opening the front door of the instrument. Stop a run by clicking the Abort button in the software.*

Panels, Cover, and Modules

There are no user serviceable components in the electronics area of the BioQule NGS. Do not remove the outer cover from the BioQule NGS.

Weight Warning

WARNING

- *The BioQule NGS weights approximately 55 lbs. (25 kg) and requires two people to lift the instrument. Do not attempt to move the system without sufficient assistance.*
- *Use both hands and two people when lifting or moving the system. Lift the system only from the bottom.*
- *Disconnect the computer and power cord and remove all consumables before moving the instrument.*

Hot Surface Warning

WARNING

The PCR Door can be hot. Allow the PCR door to cool before touching the handle.

Table of Contents

Introduction

BioQule™ NGS Sample Preparation System is an automation and quantitation solution for Next Generation Sequencing Sample Preparation. It is a fully automated, walk-away library preparation system. The increased degree of automation is obtained through the incorporation of an on-deck thermal cycler (ODTC), a bead pelleting magnet, optical sensor, and an intuitive user interface to run the device from any Windows 10 computer. A library of PerkinElmer-validated NGS scripts enable workflow automation for a wide range of library preparation solutions.

This User Manual explains how to operate the BioQule NGS Sample Preparation System in a typical laboratory environment. The instrument is only for use with consumables created specifically for the BioQule NGS.

This section contains:

Intended Use

The BioQule NGS Sample Preparation and quantitation system is intended to automate pre-written laboratory processes associated with next generation sequencing. BioQule is a walk-away automation system requiring minimal setup time and is designed to robustly perform sample preparation processes.

The BioQule NGS System does not require any previous automation experience to prepare NGS libraries.

The BioQule NGS is for **Research Use Only. Not for use in diagnostic procedures.**

BioQule Software

The BioQule software is used to run the library preparation of up to eight samples. The BioQule software uses the barcodes on the Reagent Plate and the Cartridge to verify the correct assay selection. The assays are included with the BioQule software and cannot be edited.

Hardware Reference

This section includes descriptions of the BioQule NGS Front View and BioQule NGS Rear Panel.

BioQule NGS Front View

Figure 1. BioQule NGS Front View

The BioQule NGS instrument has the following main hardware components:

Front Door - Slides open to place the reagent plate and cartridge into the instrument. The Front Door must be fully closed to run the instrument.

PCR Door - Latches firmly into place to secure the tubing in the cartridge against the heating assembly for thermal cycling and incubation.

Cannula Array Holder - Positions the cannula array so that the cannulas can access the correct wells on the reagent plate. The cannula array holder moves the cannula array up/down (Z axis) to position the cannulas in the wells of the reagent plate.

Plate Holder - Holds the reagent plate during a run. The Plate Holder moves the reagent plate left/right (X axis) to position specific wells on the plate under the cannulas.

BioQule NGS Front View (Continued)

Status Light - A light at the bottom front of the instrument that changes color to indicate the status of the instrument:

- **Solid Green** - Idle.
- **White changing to Green from left to right** - Running an assay, length of the green bar indicates approximate percent complete.
- **Red** - Run aborted.

Internal components

Heating Assembly - Contains a heating unit for automated thermal cycling or incubation of the samples in the tubing. Also contains pinch valves to close the tubing that connects to the cannulas to control air and liquid movement in the tubing. Each set of pinch valves controls the tubing for one row of eight cannulas on the cannula array. The heating array also holds the O-rings that connect the tubing in the cartridge to the internal pressure tubing.

Optical Assembly - Integrated LED and filters for integrated quality control through optical quantification of DNA. The optics assembly moves forward/backward (Y axis) to measure the concentration of each sample.

Magnet Assembly - Contains the magnet for bead wash steps for DNA purification is located under the Plate Holder. The magnet assembly moves the magnet vertically during the assay for bead washing steps.

Syringe Assembly - Applies pressure through the internal pressure tubing. The internal pressure tubing connects through the O-rings on the heating assembly to the tubing in the cartridge.

BioQule NGS Rear Panel

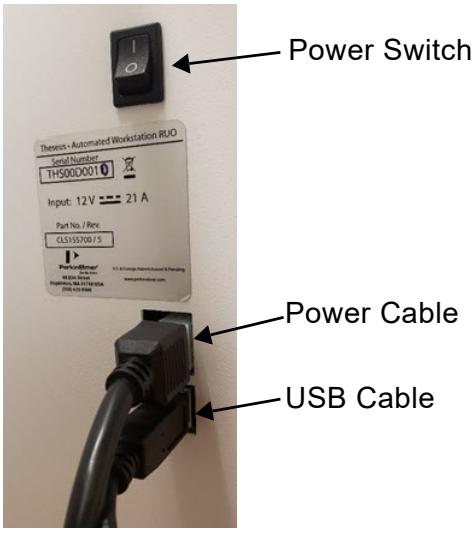


Figure 2. BioQule NGS Back View

Power Switch - Turns power to the instrument On or Off.

Power Cable - Connects to the 12V external power supply.

External Power Supply - AC/DC Desktop Adapter, 12V 252W, supplied with the instrument. Uses an IEC/EN60320 C13/C14 power cord to connect to the mains supply.

WARNING

- Only plug the power cord into a properly grounded outlet. Use only a standard IEC/EN60320 power cord appropriate for your country.
- Do not replace detachable mains supply cord with inadequately rated cord.

USB Cable - Connects to a USB port on a computer with the BioQule software installed.

Consumables

The BioQule NGS instrument uses a disposable Reagent Plate and a disposable Cartridge for each assay run.

Reagent Plate

The BioQule NGS Reagent plates are barcoded 384-well plates that are pre-filled with most reagents required for a specific assay. The plates are disposable and only for single use.

Figure 3. Reagent Plate

The reagent plate is shipped frozen and is pre-loaded. Non-frozen reagents are added by the user using a provided loading template and the instructions in the corresponding BioQule Assay User Guide. Remove the loading template and then load the cartridge into the instrument. Below the loading template is a pierce-able foil seal, sections of which must be removed before use to facilitate optical quantification. The barcode on the front of the reagent plate links the plate to the correct software assay.

Cartridge

The BioQule NGS Cartridge consists of a cannula array with two rows of eight cannulas (16 total cannulas), sixteen separate lengths of tubing, and a tubing frame to position the tubing properly. The barcoded Cartridge is disposable and is only for single use.

Figure 4. Cartridge

The lengths of tubing in the Cartridge provide the functional space to perform the assay. The liquids can be positioned in front of the heating assembly, where the tubing is pressed against the heating assembly for incubation and thermocycling.

The tubing frame holds the tubing in place and provides the connection of each length of tubing to the syringe pumps in the back of the instrument. The barcode on the front of the tubing frame links the cartridge to the correct software assay.

Inspect the cartridge prior to use for kinks, holes, or damage. Discard after each use.Contact PerkinElmer Customer Care if assistance is required (see page 3).

Specifications

Table 1: Specifications

Parameter	Description
Instrument Dimensions (LxWxH)	27" x 11.25" x 16.5" (69cm x 29cm x 42cm)
Instrument Weight	55 lbs. (25 kg)
Mains Output Voltage	100-240VAC (±10%), 50/60 Hz
Over-voltage Category	II (105-135% rated output voltage)
Power Input Rating	12VDC 21A
Altitude	< 2200 m (7218 ft.)
Pollution Degree	2
Protection Class	I
Degree of Ingress	IPX-1
Operating Environment	15-30°C (59-86°F) @ 20-80% relative humidity For Indoor use only.
Storage Environment	15-50°C (59-122°F) @ 20-80% relative humidity
Transport Environment	0-55°C (32-131°F) @ max. 85% humidity
Shipping Weight	65 lbs. (30 kg)

Installation

This section explains how to install the BioQule NGS Instrument and software.

This section includes the following information:

Computer Required

The user must provide a computer running Windows 10 to operate the instrument. The computer must meet the following minimum requirements:

Operating System	Windows 10
Processor model (preferred)	Intel 11th Generation Core i5
Processor cores	4-core (quad-core)
RAM	4GB DDR4 3200 MHz
USB Ports	2
Total Storage Capacity	256 GB
Screen resolution	1920x1080

Site Requirements

The BioQule NGS Instrument must be placed on a flat, level surface capable of supporting, 55 lb/25 Kg the weight of the BioQule NGS Sample Preparation system. Verify the surface is level. Non-level surfaces can cause liquid to leak or overflow.

The selected location must accommodate the instrument dimensions (see Specifications on page 20). Additional space for the computer and monitor must be provided within 6 ft (1.8 M) of the instrument.

Site Requirements (Continued)

One clean, grounded 100-240VAC/50-60 Hz power outlet is required for the BioQule NGS Instrument. Additional AC power outlets may be required for the computer and monitor, as supplied by the customer.

The environment must meet the recommended operating conditions shown in Specifications on page 20.

Crate Contents

The BioQule NGS is shipped in a crate that measures approximately 19”x26”x32.5” (49cm x 66 cm x 83cm) and weighs approximately 65 lbs (30 kg).

The BioQule NGS shipping crate contains:

- (1) BioQule NGS instrument
- (1) External power supply
- (1) USB-A to USB-B cable
- (1) USB barcode scanner
- (1) USB flash drive containing the BioQule software

The user must provide a computer running Windows 10 to operate the instrument.

Until the instrument is installed, store the shipping crate in a location that meets the Storage Environment shown in Specifications on page 20.

Lifting and Carrying

WARNING

- *The BioQule NGS weights approximately 55 lbs. (25 kg) and requires two people to lift the instrument. Do not attempt to move the system without sufficient assistance.*
- *Disconnect the computer and power cord and remove all consumables before moving the instrument.*
- *Use both hands and two people when lifting or moving the system. Lift the system only from the bottom.*

Installing the BioQule NGS Instrument

To install the BioQule NGS instrument:

1 Unpack the BioQule instrument from the shipping crate.

WARNING

- *The BioQule NGS weights approximately 55 lbs. (25 kg) and requires two people to lift the instrument. Do not attempt to move the system without sufficient assistance.*
- *Use both hands and lift the system only from the bottom.*

2 Place the BioQule NGS instrument on a level, stable surface with enough space to accommodate the instrument dimensions shown in Specifications on page 20.

WARNING

Appliance inlet is disconnecting device. Place device or equipment in a manner so that disconnecting device is accessible at all times.

3 Slide the front door open and remove any packing from inside the instrument.

4 Connect the provided power cable from the power supply block to the power port (see Figure 5) on the back of the instrument.

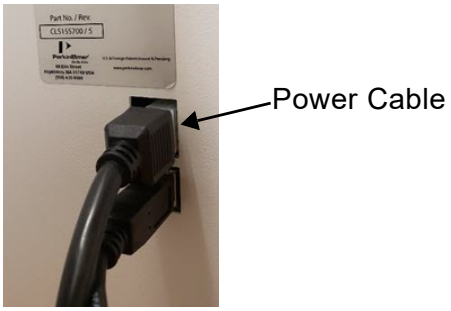


Figure 5. BioQule NGS Power Cable

5 Connect the second power cable from the power supply block to an appropriate AC power outlet or surge protector. The power outlet must meet the Specifications on page 20.

6 Turn the BioQule instrument on by switching the ON/OFF switch (see Figure 6) on the back of the instrument to the ON position. The instrument initializes.

Installing the BioQule NGS Instrument (Continued)

Figure 6. BioQule NGS Power Switch

7 When initialization is complete, the instrument enters an Idle state and the status light illuminates blue.

Installing the Computer and Barcode Scanner

The BioQule instrument can be controlled by a desktop or laptop computer running Windows 10.

1 Install a desktop or laptop computer within 6 feet (1.8 M) of the BioQule instrument. If using a desktop computer, connect the monitor, keyboard, and mouse.

2 Plug the barcode scanner into an empty USB port on the computer.

3 Install the barcode scanner near the instrument, following the instructions that are included with the barcode scanner.

Installing the BioQule Software

The BioQule NGS instrument includes a a USB flash drive used to install the BioQule software and the device drivers.

To install the BioQule software:

1 Insert the included BioQule NGS USB flash drive into an available USB port on a Windows 10 computer.

2 Using File Explorer, copy the entire \BioQule\ folder to a location on the computer.

3 In File Explorer, navigate to the \BioQule\ folder.

4 Double-click the **BioQule.msi** file. The BioQule Setup Wizard opens as shown in Figure 7 on page 25.

Installing the BioQule Software (Continued)

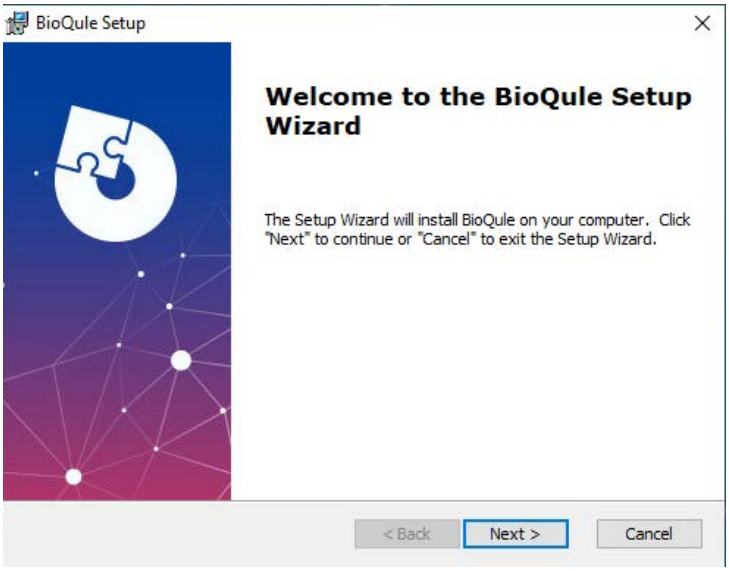


Figure 7. BioQule Setup Wizard

5 Click **Next**. The Select Installation Folder window opens.

6 Leave the default path and click the **Next** button. The Ready to Install window opens.

7 Click the **Install** button and wait until the Finish window opens.

8 Click the **Finish** button. The BioQule shortcut is added to the Windows desktop.

9 Using File Explorer, copy the entire **\CP210x_Universal_Windows_Driver** folder to a location on the computer.

10 In File Explorer, navigate to the **\CP210x_Universal_Windows_Driver** folder.

11 Double-click the **CP210xVCPInstaller_x64.exe** file for 64-bit Windows 10 or the **CP210xVCPInstaller_x86.exe** file for 32-bit Windows 10.

The Device Driver Installation Window opens as shown in Figure 8 on page 26.

Installing the BioQule Software (Continued)

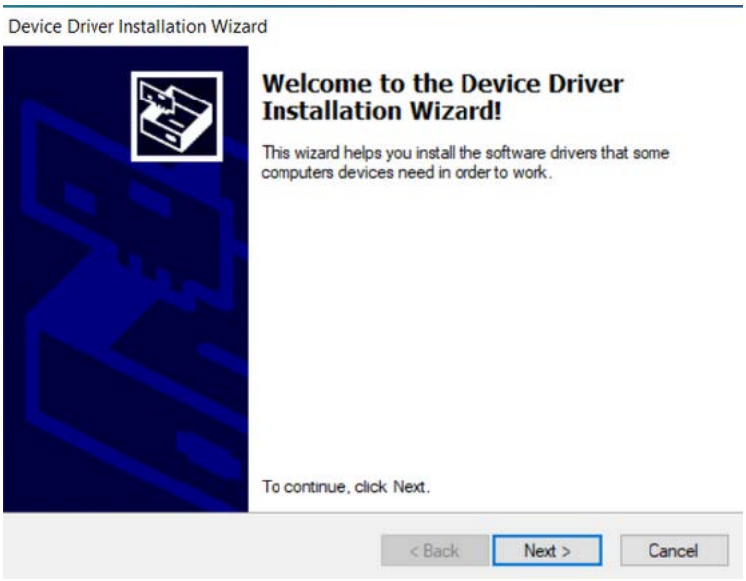


Figure 8. Device Driver Installation Wizard

12 Click **Next**. The drivers install and then the Completing the Device Driver Installation Wizard window opens.

13 Click the **Finish** button. The driver installation is complete.

BioQule Software Folders

The following folders are created by the BioQule Software Installation:

- **C:\Users\<UserName>\Documents\BioQule** - contains the BioQule NGS User Manual, BioQule software shortcut, and folders for assay files, log files, and result files.
- **C:\Users\<UserName>\Documents\BioQule\Assays** - contains the assays developed for BioQule.
- **C:\Users\<UserName>\Documents\BioQule\Logs** - contains the log files of all runs.
- **C:\Users\<UserName>\Documents\BioQule\Results** - contains all of the CSV data files for all runs.
- **C:\Program Files (x86)\PerkinElmer Inc\BioQule\BioQule** - Contains the files and folders to run the BioQule.exe application. A shortcut to BioQule.exe is also added to the Windows Start menu.

Starting the BioQule Software

After hardware and software installation is complete, you should start the BioQule software and connect to the BioQule instrument to verify the instrument and software are functioning correctly.

To start the BioQule hardware and software:

1 Double-click the **BioQule** icon on the Windows desktop. The BioQule software opens.

2 Follow the instructions in Starting the BioQule Software and Connecting to the BioQule NGS Instrument on page 31 to turn on the instrument and connect the software.

Operation

This section explains how to operate the BioQule NGS Sample Preparation System.

This section includes the following information:

WARNING

Biological Risks. The BioQule NGS Instrument can be used with potentially biohazardous substances in some applications. Use appropriate personal protection equipment such as gloves, lab coats, eye protection, etc. When handling samples, consumables, or equipment.

Principles of Operation

The BioQule NGS Sample Preparation System is an 8-sample automation platform for a variety of library preparation and quantitation processes. The BioQule NGS System uses an intuitive interface, automated thermal cycling, an on-board magnet, and integrated quality control through optical quantification to produce reproducible, high-quality NGS libraries from as little as 10 ng of starting material. The BioQule uses two single use disposables: a reagent plate and a cartridge. Samples are contained within these two disposables the entire time they are in the instrument, preventing contamination risk.

During operation, the user prepares the reagent plate by pipetting the samples, and necessary reagents into the plate and then loads the plate and cartridge into the instrument. Barcoded consumables ensure appropriate assays are selected for the consumables.

After starting the run, no user intervention is required until removing the samples at the end of the run. The BioQule NGS prepares the libraries using the included automation protocols, the integrated thermal cycler, and the on-board bead wash system, and then measures the concentration of each library using the internal fluorescence-based optical quantitation system.

Preparing the BioQule NGS Instrument

The BioQule software is loaded onto a computer during the installation. If you need to install the software on a different computer, see Installing the BioQule Software on page 24. This procedure describes how to connect the computer to the instrument.

To prepare to run the BioQule NGS instrument:

1. Install the instrument as described in Installing the BioQule NGS Instrument on page 23.
2. Plug the instrument into an appropriate power source and turn on the instrument power.
3. Start the computer.
4. Make sure the BioQule software is installed on the computer as described in Installing the BioQule Software on page 24
5. Connect the provided USB cable to the instrument and to the computer with the BioQule software installed.

Starting the BioQule Software and Connecting to the BioQule NGS Instrument

When starting the BioQule software, the software is not connected to any BioQule NGS instrument. In the BioQule software, you must choose the name of the instrument to connect to.

1 Double-click the **BioQule icon** on the Windows desktop or select **Start > BioQule** on the Windows Start menu. The BioQule software opens with the Refresh Devices button in the middle of the window as shown in Figure 9.

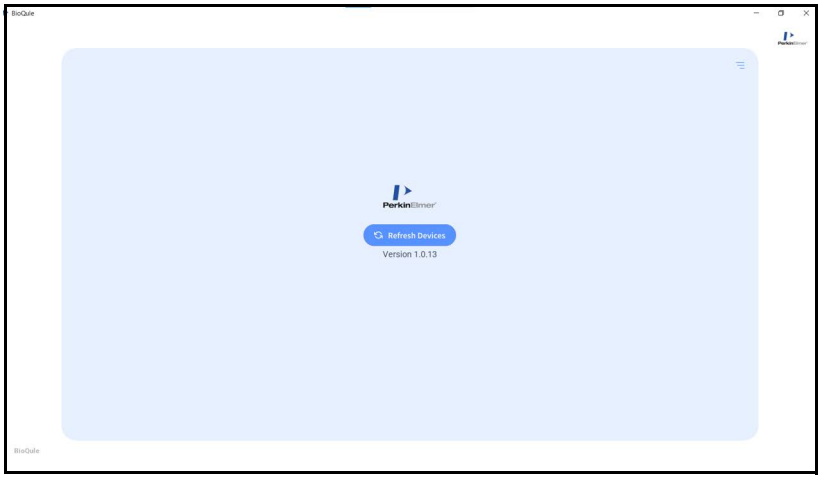


Figure 9. Refresh Devices Button

2 Click the **Refresh Devices** button to list the BioQule instruments connected to the computer as shown in Figure 10.

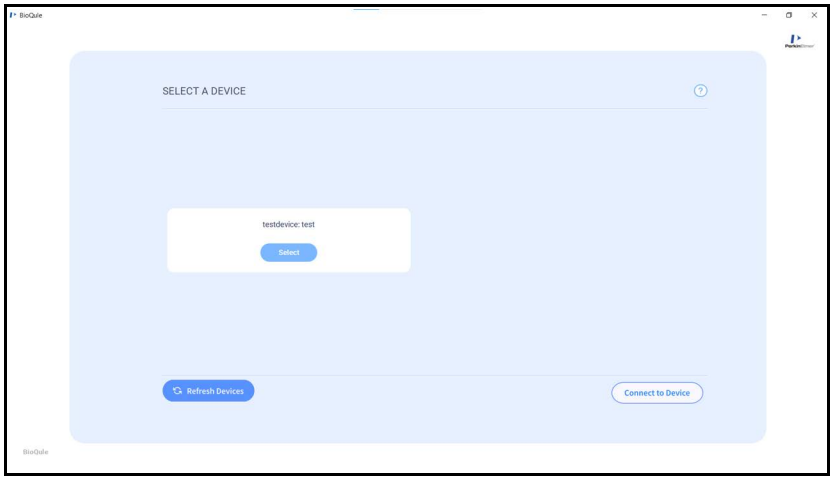


Figure 10. Select a Device Window

Starting the BioQule Software and Connecting to the BioQule NGS Instrument (Continued)

3 Click the **Select** button under the instrument that you want to run. The instrument is highlighted and the Select button changes to a **Flash Light** button.

4 If you want to verify that you are selecting the correct instrument, you can click the **Flash Light** button to flash the lower status lights on the BioQule NGS instrument. Multiple instruments can be connected to the same computer, if desired.

5 Click the **Connect to Device** button. If the software can communicate with the instrument, a message displays the COM port and the serial number of the instrument that the software connected to as shown in Figure 11.

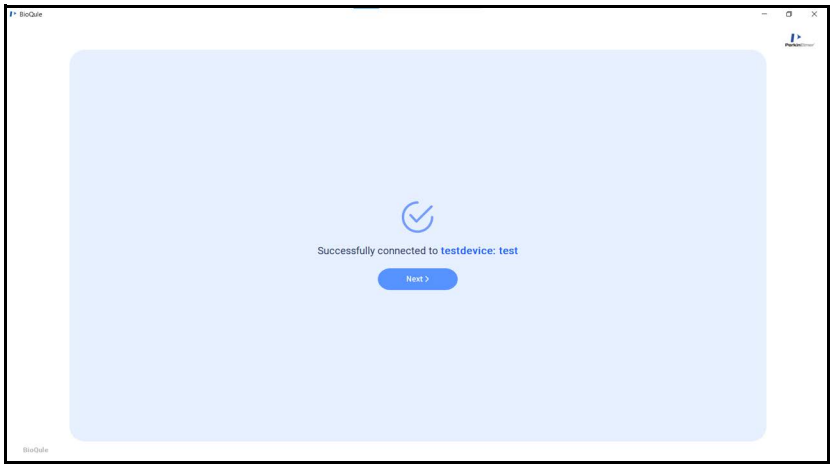


Figure 11. Instrument Connected

Preparing the Reagent Plate

To prepare the reagent plate:

1 After connecting to the instrument, click the **Next** button. The Prepare Samples window prompts you to prepare the samples and reagents.

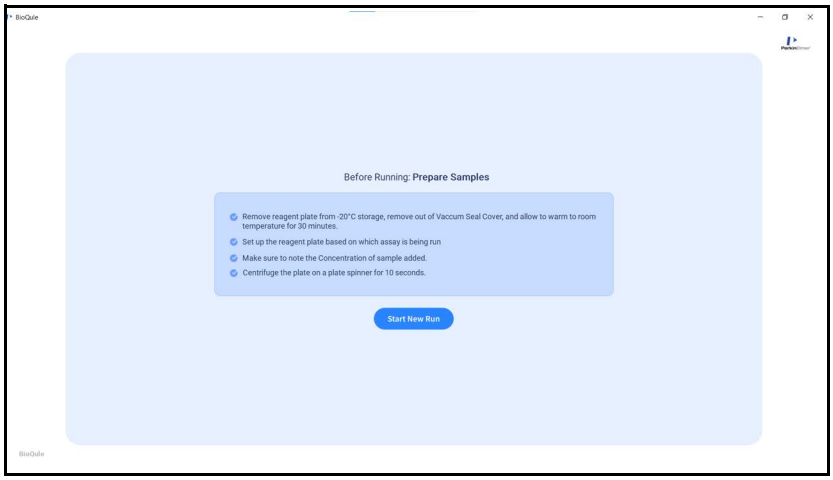


Figure 12. Prepare Samples Window

2 Follow the instructions in the software and the instructions in the Assay Guide for your assay to prepare the reagent plate.

NOTE

Only use reagents and consumables that are within their expiration date.

Selecting the Assay and Loading the Consumables

After preparing the reagent plate:

1 Click the **Start New Run** button. The Select Assay Window opens as shown in Figure 13.

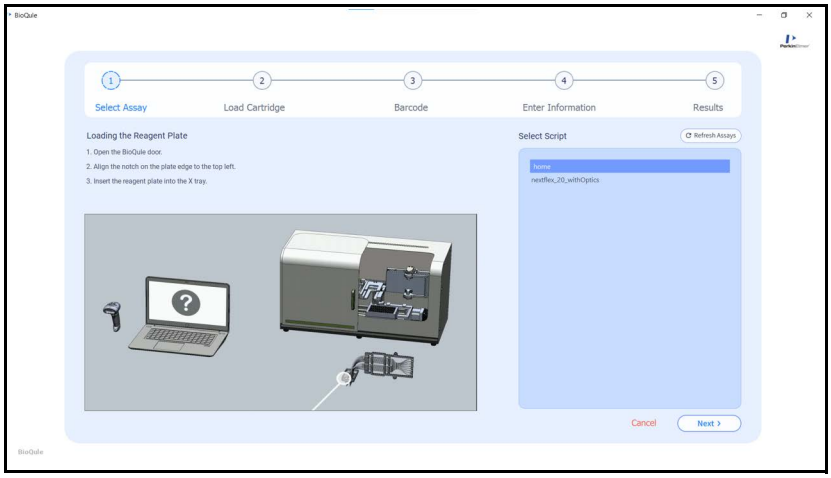


Figure 13. Select Assay Window

2 Slide the instrument door to the left to open the door.

WARNING

Pinch Hazard. Use caution when accessing internal parts.

3 Load the reagent plate into the instrument by positioning the plate with A1 in the upper left corner, sliding the top left corner of the plate under the overhang on the plate holder (see Figure 14), and then pressing the plate down into the plate locator. Make sure the plate is seated flat in the plate locator and the spring pins in the locator are pressed against the sides of the reagent plate.

Selecting the Assay and Loading the Consumables (Continued)

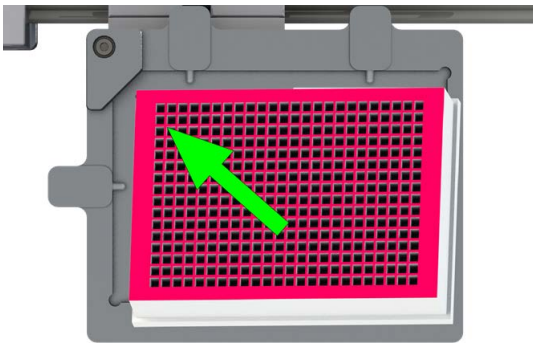


Figure 14. Load the Reagent Plate

4 On the right side of the window, select the **name of the assay** you want to run.

5 Click the **Next** button. The Load Cartridge window opens as shown in Figure 15.

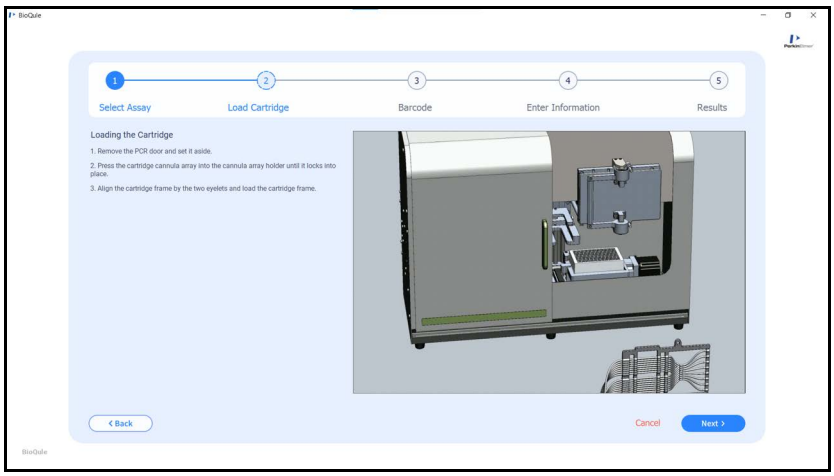


Figure 15. Load Cartridge Window

WARNING

The PCR Door can be hot. Allow the PCR door to cool before touching the handle.

6 Move the PCR Door Handle to the right side and then remove the PCR Door and set it aside.

Selecting the Assay and Loading the Consumables (Continued)

7 Place the Cartridge onto the BioQule NGS:

a Orient the cannula array with the arrow on the plastic flap toward the front (as shown in Figure 16) and then slide the cannula array all the way back into the cannula array holder.

b Orient the tubing frame so that the air holes on the tubing frame are toward the back (as shown in Figure 16) and meet the air holes on the heating assembly. The barcode is toward the front and at the top.

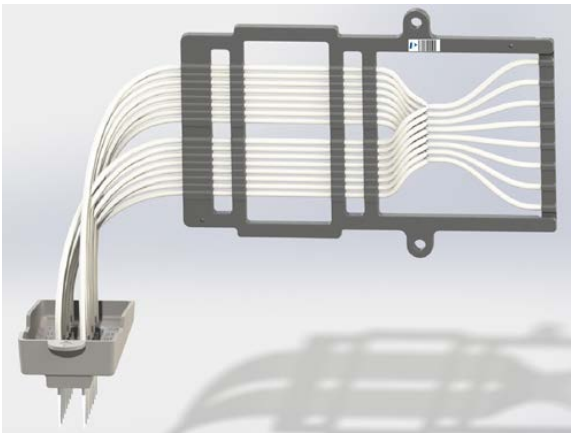


Figure 16. Cartridge Orientation

8 Slide the tubing frame onto the mounting pins and all the way against the heating assembly.

9 Install the PCR Door and swing the PCR Door Handle to the right to lock the PCR door.

10 Click the **Next** button. The Barcode window opens as shown in Figure 17.

Selecting the Assay and Loading the Consumables (Continued)

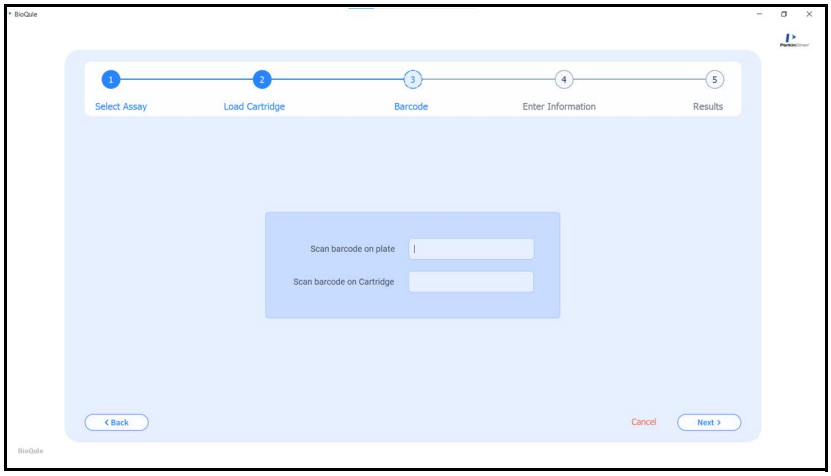


Figure 17. Barcode Window

11 Use the handheld barcode scanner to scan the barcode on the reagent plate. The barcode displays in the Plate Barcode text box.

12 Scan the barcode on the cartridge. The barcode displays in the Cartridge Barcode text box.

13 The software verifies that the correct plate is being used for the selected assay and that the Cartridge Barcode is in the correct format. The Next button is not enabled until both barcodes are correct.

14 If the plate barcode is incorrect, either:

- the incorrect reagent plate is being used and you must prepare the correct reagent plate, or
- the incorrect assay was selected. You can click the **Back** button to select an assay compatible with the reagent plate or click the **Cancel** button in the lower right corner of the window to cancel the run.

Selecting the Assay and Loading the Consumables (Continued)

15 Click the **Next** button. The software displays a prompt to close the PCR Door as shown in Figure 18.

Figure 18. Close PCR Door

16 If the PCR door is not already closed, close the PCR door securely.

17 Click the **OK** button to close the window.

18 Click the **Next** button. The Enter Information window opens as shown in Figure 19.

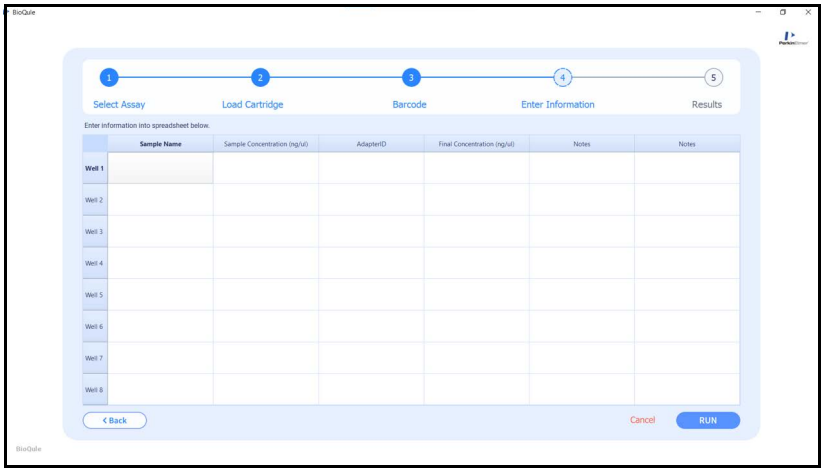


Figure 19. Enter Information Window

Selecting the Assay and Loading the Consumables (Continued)

19 Type the Sample Name, Initial Sample Concentration, AdapterID, and any notes about the sample in each well. The AdapterID is the ID number of the Adapter Set used on the reagent plate.

20 See Starting the Run on page 39.

Starting the Run

After entering the sample names and concentrations on the Enter Information window:

1 Click the **Run** button on the Enter Information window to start the run.

2 The software prompts you to close the BioQule NGS door as shown in Figure 20.

Figure 20. Close BioQule NGS Door

3 Slide the BioQule NGS door to the right to close the door.

4 Click the **OK** button to start the run. The BioQule software displays the command execution status as the assay runs as shown in Figure 22.

5 Wait for the run to complete. The **Finish** button is only available after the run is complete.

Starting the Run (Continued)

Figure 21. Run Window

6 Remove the reagent plate from the instrument.

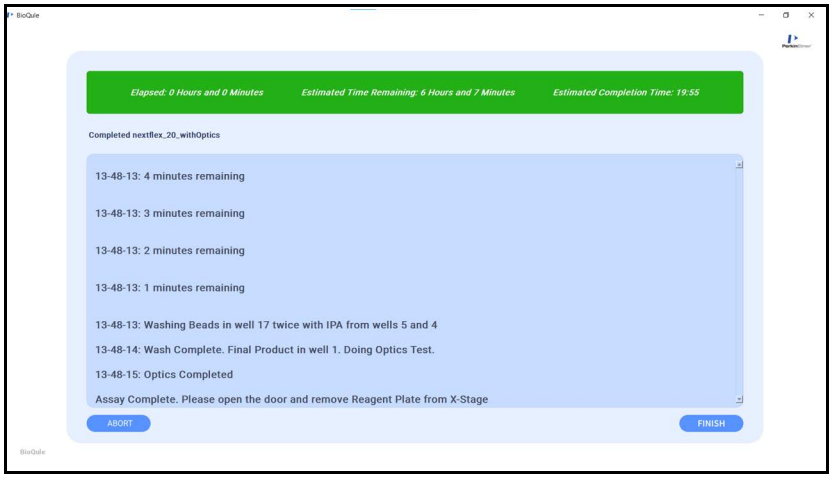


Figure 22. Remove Reagent Plate Prompt

7 Click the **Finish** button. The data in the Results window is saved to a file in C:\Users\<UserName>\Documents\BioQule\Results\ folder. The data file name is thes_results_<AssayName_<Date>_<Time>.

8 A message box displays the path to the data file. Click **OK** to close the message box.

Viewing the Results

1 After the run is complete, the Results window displays the **Final Concentration** of each sample as shown in Figure 23. The Final Concentration is calculated using the BioQule optics.

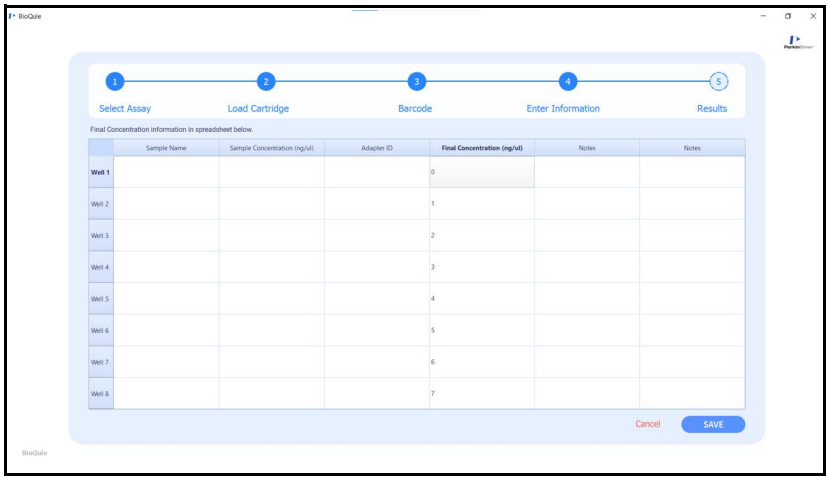


Figure 23. Results Window

2 If desired, type the concentration of each sample at the beginning of the run in the **Initial Sample Concentration** column.

3 If desired, click the **Save** button to save any changes in a new CSV file.

4 Click the Close (X) button in the upper right corner to close the software or click the **Cancel** button in the lower right corner to run another assay.

5 When the run is finished, remove the cartridge from the instrument.

6 After viewing the final concentrations, remove the samples from the reagent plate (see page 43).

Pausing a Run

Opening the front door of the instrument during a run will pause the run and stop any movement of the interior components of the instrument. Depending on the steps in progress and the length of time the door is open, pausing may deteriorate the quality of the output.

Stopping a Run

During a run, click the **Abort** button at the bottom of the Run Window to stop the run. The run cannot be restarted after being aborted. The samples and cartridge cannot be reused after aborting a run in process.

Figure 24. Run Window

Removing the Samples from the Reagent Plate

Remove the consumables from the instrument immediately after the run is finished.

To remove the samples:

1 Slide the instrument front door to the left.

WARNING

Wear appropriate personal protective equipment when handling chemicals or samples (e.g., safety glasses, gloves, or clothing). For additional safety guidelines consult the MSDS.

2 Remove the reagent plate from the instrument.

3 Remove the samples from the reagent plate as described in the Assay Guide for the assay you are running.

Disposing of the Consumables

To dispose of the consumables:

1 Remove the reagent plate from the instrument and remove the samples from the plate (see Removing the Samples from the Reagent Plate on page 43).

2 Swing the PCR door handle to the left to unlock the door.

3 Pull the PCR door straight out to remove the PCR door.

4 Remove the cartridge by sliding the tubing frame off the heating assembly and sliding the cannula array out of the cannula array holder.

5 Dispose of the reagent plate and cartridge as biological waste according to local, state/provincial, or national laws and regulations.

Shutting Down

The instrument and computer can be left running or you can shut down the instrument and computer.

To shut down the instrument and computer:

1. Close the BioQule software.
2. Shut down the computer.
3. Switch the power switch on the back of the BioQule NGS instrument to the OFF position.
4. If a different computer will be used, unplug the USB cable from the computer.

Maintenance

This section describes the required maintenance procedures for the BioQule NQS instrument. Follow the maintenance procedures recommended in this section to ensure proper instrument operation.

The following information is included:

- Monthly Maintenance (below)
- Annual Maintenance (below)
- Cleaning the Instrument (below)
- Removal of Equipment from Use for Repair or Disposal on page 46

WARNING

Do not perform any maintenance procedures other than those included in this manual.

Monthly Maintenance

Clean the instrument at least once per month or any time liquids spill or drip inside the instrument. See Cleaning the Instrument below.

Annual Maintenance

Annual preventive maintenance and certification is recommended to ensure proper operation.

Cleaning the Instrument

If liquid spills inside the instrument

1. Use a clean cloth or disposable paper towel to absorb the liquid from the interior of the instrument.
2. Wipe with a damp cloth and isopropyl alcohol. Do not use harsh or abrasive cleaners.

Removal of Equipment from Use for Repair or Disposal

to prepare the instrument for removal from use, transportation, or disposal:

1. Remove the Reagent Plate and Cartridge from the instrument.
2. Clean the instrument as described in Cleaning the Instrument on page 45.
3. Conform to all local, state/provincial, or national environmental and health regulations when disposing of waste.

WEEE Do not dispose of the BioQule NGS instrument as unsorted municipal waste. See the PerkinElmer website (www.perkinelmer.com) for more information.

Troubleshooting

For software problems, please contact the PerkinElmer Technical Support Center (see Contact Us on page 3).

Stages not Moving

If the software is operating correctly, but the stages do not move, the most common reason is that the front door is not closed completely. Make sure the front door is all the way to the right or the safety interlock will not allow the instrument hardware to move.

Stalled Motor

If one of the axis motors cannot reach the end of travel, the axis associated with the assay plate may require re-calibration. Make sure any object or cables that may interfere with the movement of the axis is removed from the instrument, then power cycle the instrument using the ON/OFF switch on the back of the instrument. Allow the instrument to re- initialize. Run the **Home** assay and verify that the motor homes correctly. If the motor stalls again, contact PerkinElmer Technical Support (see Contact Us on page 3).

Stages not in the Correct Position

If the stages are in the incorrect position, the following problems can occur:

- the Cannulas can crash into plate wells
- the plate locator can move too far right and stall at the end of the x-axis
- the magnet can contact the plate holder

The most likely cause is that the stages have not homed correctly due to loose cables or foreign objects inside the instrument. Ensure that there is nothing inside the BioQule NGS that interferes with the movement of the axes and run the **Home** assay. If the stages are still not in the correct position after homing, please call PerkinElmer Technical Support (see Contact Us on page 3).

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