QX200 Droplet Reader and Qx IDE Manager Software

User Guide
Version 1.0.1

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Qx IDE Manager Software

Industrial Diagnostic Edition

Version 1.0

BIO·RAD

QX200 Droplet Reader
and
Qx IDE Manager Software

User Guide

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BIO-RAD

Legal Notices

Bio-Rad Technical Support Department

The Bio-Rad Technical Support department in the U.S. is open Monday through Friday, 5:00 AM to 5:00 PM, Pacific Time.

Phone: 1-800-424-6723, option 2

Email: Support@bio-rad.com.com (U.S./Canada Only)

For technical assistance outside the U.S. and Canada, contact your local technical support office or click the Contact us link at www.bio-rad.com.

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Safety and Regulatory Compliance

This section cites regulatory requirements for laboratory and electrical equipment, as well as requirements for working with chemicals and hazardous substances, and also explains safety precautions and recommendations.

Safety Warning Labels

Warning labels posted on the instrument and in this manual warn you about sources of injury or harm. Table 1 defines each safety warning label.

Table 1. Meaning of safety warning labels

Icon	Meaning
	Warning about risk of harm to body or equipment Operating the QX200 Droplet Reader before reading this manual can constitute a personal injury hazard. For safe use, do not operate this instrument in any manner unspecified in this manual. Only qualified laboratory personnel trained in the safe use of electrical equipment should operate this instrument. Always handle all components of the system with care and with clean, dry hands.
	Warning about handling biohazardous materials When handling biohazardous samples, adhere to the recommended precautions and guidelines and comply with any local guidelines specific to your laboratory and location.

Safe Use Requirements

For safe operation of the QX200 Droplet Reader, Bio-Rad strongly recommends that you comply with instructions listed in this section and in Appendix B, Instrument Maintenance.

This instrument is intended for laboratory use only. Bio-Rad is not responsible for any injury or damage caused by use of this instrument for purposes other than those for which it is intended, or by modifications to the instrument not performed by Bio-Rad or an authorized agent.

- This instrument is for use only by trained personnel.

- Use only the power cord supplied with the instrument, and the plug adapter corresponding to the electrical outlets in your region.

- Position the instrument on a solid, stable surface, with adequate room at the back and on each side so that users can easily reach the power cord and USB port.

- This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the provided instructional documentation, may cause harmful interference to radio communications. Operation of the systems in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.

- Do not place the connected computer on top of the reader.

Hazards

The QX200 Droplet Reader is designed to operate safely when used in the manner prescribed by the manufacturer. If the instrument or any of its associated components is used in a manner not specified by the manufacturer, the inherent protection provided by the instrument may be impaired.

Bio-Rad is not liable for any injury or damage caused by the use of this equipment in any unspecified manner, or by modifications to the instrument not performed by Bio-Rad or an authorized agent. Only trained Bio-Rad personnel should perform service on the QX200 Droplet Reader.

Biohazards

The QX200 Droplet Reader is a laboratory product. However, if biohazardous samples are present, adhere to the following guidelines and comply with any local guidelines specific to your laboratory and location.

Note: No biohazardous substances are expended during normal operations of this instrument.

General Precautions

- Always wear appropriate lab apparel, including laboratory gloves and safety glasses with side shields or goggles.

- Keep your hands away from your mouth, nose, and eyes.

- Completely protect any cut or abrasion before working with potentially infectious materials.

- Wash your hands thoroughly with soap and water after working with any potentially infectious material before leaving the laboratory.

- Store all infectious or potentially infectious material in unbreakable leak-proof containers.

- Before leaving the laboratory, remove protective clothing.

- Do not use a gloved hand to write, answer the telephone, turn on a light switch, or touch anything that other people may touch without gloves.

- Change gloves frequently. Remove gloves immediately when they are visibly contaminated.

- Do not expose materials that cannot be properly decontaminated to potentially infectious material.

- Upon completion of an operation involving biohazardous material, decontaminate the work area with an appropriate disinfectant (for example, a 1:10 dilution of household bleach).

Surface Decontamination

WARNING! To prevent electrical shock, always turn off and unplug the instrument prior to performing decontamination procedures.

The following areas can be cleaned with any hospital-grade bactericide, virucide, or fungicide disinfectant:

■ Outer area and chassis

■ Inner plate holders

■ Droplet generation, thermal cycling, and droplet reading surfaces

To prepare and apply the disinfectant, refer to the instructions provided by the product manufacturer. For more information on surface cleaning, see Appendix B, Instrument Maintenance.

Important: Do not use abrasive or corrosive detergents or strong alkaline solutions. These agents can scratch surfaces and damage the system.

Disposal of Biohazardous Material

Dispose of the following potentially contaminated materials in accordance with laboratory local, regional, and national regulations:

■ Test samples

■ Reagents

■ Used reaction vessels or other consumables that may be contaminated

Chemical Hazards

The QX200 Droplet Reader contains no potentially hazardous chemical materials.

Explosive or Flammability Hazards

The QX200 Droplet Reader poses no uncommon hazard related to flammability or explosion when used in a proper manner as specified by Bio-Rad Laboratories, Inc.

Electrical Hazards

The QX200 Droplet Reader poses no uncommon electrical hazard to operators if installed and operated properly without physical modification and connected to a power source of proper specification.

Regulatory Compliance

The QX200 Droplet Reader has been tested and found to be in compliance with all applicable requirements of the following safety and electromagnetic standards:

- UL 61010-1:2004, Laboratory equipment, Test & Measurement Equipment and Industrial Process Controls

- IEC 61010-1:2010 (3rd ed.), EN61010-1:2010 (3rd ed.). Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements

- IEC 61010-2-081:2015, EN 61010-2-081:2015. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 2-081: Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes (includes Amendment 1)

- IEC 61010-2-101:2015 (2nd ed.). Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, particular requirements for in vitro diagnostic (IVD) medical equipment

- IEC 61326-1:2012 (Class A), EN 61326-1:2013 (Class A). Electrical Equipment for Measurement, Control, and Laboratory Use, EMC Requirements, Part 1: General requirements

- CAN/CSA 22.2 No 61010-1-04, Safety Requirements for Electrical, Equipment for Measurement, Control, and Laboratory Use, Part 1: General, Requirements

- Restriction of Hazardous Substances (ROHS) Directive (European Union)

- Registration, Evaluation, Authoriization and Restriction of Chemicals (REACH). European Chemicals Agency (ECHA) June 1, 2007.

- Waste Electrical and Electronic Equipment (WEEE) Directive

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

CE The CE mark indicates that the manufacturer ensures the product conforms with the essential requirements of the applicable EN directives.

The SA mark indicates that a project has been tested to Canadian and U.S. standards, and it meets the requirements of those applicable standards.

The Waste Electrical and Electronic Equipment Directive symbol indicates that when the end-user wishes to discard this product, it must be sent to separate collection facilities for recovery and recycling.

Decommissioning and Disposal

The QX200 Droplet Reader contains electrical materials that should be disposed of as unsorted waste and must be collected separately, according to European Union Directive 2012/19/EU on waste electrical and electronic equipment — WEEE Directive. The purpose of decommissioning is to make sure that the equipment is electrically and environmentally safe for disposal. Before disposal, contact your local Bio-Rad representative for country-specific instructions.

Transport

Before moving or shipping the QX200 Droplet Reader, decontamination procedures must be performed. Always move or ship the instrument with the supplied packaging materials, which will protect the instrument from damage. If appropriate containers cannot be found, contact your local Bio-Rad office.

Warranty

The QX200 Droplet Reader and its associated accessories are covered by a standard Bio-Rad warranty. Contact your local Bio-Rad office for the details of the warranty.

This instrument is intended for laboratory use only. Bio-Rad Laboratories is not responsible for any injury or damage caused by use of this instrument for purposes other than those for which it is intended,or by modifications of the instrument not performed by Bio-Rad Laboratories or an authorized agent. Follow the safety specifications listed here and throughout this manual. Use only the power cord supplied with the instrument, using only the plug adaptor that corresponds to the electrical outlets in your region.

Use of unapproved supermixes may harm the instrument and void the warranty. Alteration of this instrument voids the warranty and safety certification, as it creates a potential safety hazard.

Chapter 1 Introduction to ddPCR for Food Safety Testing

Droplet digital polymerase chain reaction (ddPCR) is Bio-Rad's unique water-oil emulsion technology, which uses a combination of microfluidics and proprietary surfactant chemistries to partition each sample into thousands of highly uniform nanoliter-sized droplets.

Where conventional PCR results in a single measurement in each sample, the partitioning in ddPCR produces thousands of measurements in each sample because reactions take place in each individual droplet. PCR becomes "digital" through the sample partitioning and subsequent statistical analysis of targets detected across the partitions.

Compared to traditional food safety testing methods, ddPCR improves the detection and linkage verification of targets in a single bacterium, and reduces the number of false positive reactions.

The following process segments comprise a full ddPCR cycle:

■ **Droplet generation**, in which each sample is fractionated into up to 20,000 uniform water-in-oil droplets

■ **Thermal cycling**, in which PCR amplification of the targets occurs in each individual droplet through repeated heating and cooling processes

■ **Droplet reading**, in which each droplet is read to determine the fraction of positive droplets in the original sample

For information on Bio-Rad's instruments that are used to perform the full ddPCR cycle, see Appendix C, ddPCR Systems and Components.

Setting Up Your Test

To generate the droplets encapsulating the pertinent bacteria, Bio-Rad provides prepared testing solutions for enriched and purified samples. These test kits combine a highly optimized amplification mix with ready-to-use PCR reagents containing primers and probes specific for particular targets. Each test kit contains sufficient amounts of the required reagents to complete testing on a 96-well plate.

The components and procedures for each food safety test are described in separate, test-specific documents containing the following information:

- Kit components

- Shelf life and storage temperatures

- Additional materials that may be required for the ddPCR process, but are not supplied in the kit

- Safety precautions

- Best practice recommendations

- Protocols for sample enrichment, sample preparation, and ddPCR cycles

Important: To ensure accurate testing, you must follow the instructions and protocols specified in the test user guide.

Finding Out More

For links to technical notes, manuals, videos, product information, and technical support, as well as technical resources on a wide variety of methods and applications related to PCR and ddPCR, go to

http://www.bio-rad.com

For information on test kits available for food safety testing, visit our website at

http://www.bio-rad.com/foodscience

Chapter 2 About the QX200 Droplet Reader

Qx IDE Manager Software connects to the QX200 Droplet Reader and prompts the droplet reading run. This chapter contains information on setting up and using the QX200 Droplet Reader. For information on maintaining the instrument, see Instrument Maintenance on page 71 1.

Following the droplet generation and thermal cycling processes, when you run your sample plate through the QX200 Droplet Reader, the instrument

- Singulates the droplets in each sample

- Streams them past a two-color detector to measure fluorescence and identify droplets containing one or more targets

- Generates binary data that Qx IDE Manager Software transforms into analysis data files

Note: For information on other ddPCR instruments and consumables, see Appendix C, ddPCR Systems and Components.

Three main subsystems (Detector, Fluidics, and Motion) comprise the QX200 Droplet Reader.

The droplet reading Detector system controls and monitors voltages and uses two high brightness LEDs (blue and green) to excite the fluorophores. This generates emission signals in the droplets, which are read by two multi-pixel photon counters.

The Fluidics system is a combination of valves and pumps that control the flow and direction of oil for dispensation, droplet acquisition, and rinse/flush coordination.
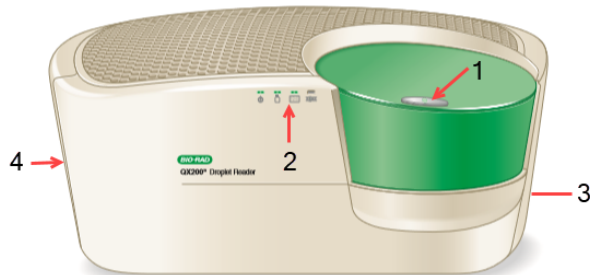
The Motion system maps positive droplets using sensors that travel along the x and y axes.

This chapter explains the following:

- Functional areas of the instrument

- Instrument specifications and setup requirements

- Status indicators

- Assembling and inserting the plate

Instrument Functionality

The following illustration identifies the functional areas:

LEGEND

1	Button to open and close lid
2	Status indicators
3	On the back of the instrument, power and USB outlets
4	Oil and waste compartment

Instrument Specifications and Setup Requirements

Your QX200 Droplet Reader is installed and calibrated by a Bio-Rad service engineer.

Use the dimension and weight information specified in Table 2 to ensure there is enough room on a sturdy, stable surface for the QX200 Droplet Reader and a connected computer. The instrument should be placed in a location away from instrumentation that might interfere electrically or mechanically (vibration-free).

Important: Do not place the computer on top of the droplet reader.

Table 2. Instrument specifications

| Element	Specifications
Weight	56.6 lbs (26 kg)
Dimensions (W x H x D)	26 x 20.5 x 11.5 in (660 x 521 x 292 mm)

Table 3 contains setup requirements to ensure safe use of the instrument. Additional safe use information is explained in Safe Use Requirements on page 10.

Table 3. Setup requirements

Element	Specifications
Operating Power	90-240 VAC, 5A, 50/60 Hz
Rated input power	100–240 V, 50–60 Hz, 1A **Note:** Voltage fluctuations not to exceed +10% of ratings for the included external power supply.
Pollution degree	2
Environment	Indoor use only
Usage temperature	18–30°C
Relative humidity	85% maximum (non-condensing) at 32°C
Altitude	0 to 6,560 ft (0 to 2,000 m) above sea level
installation category	II (external power supply plugs into a standard AC receptable)
Ventilation requirements	The following distances should be unobstructed for proper ventilation: ■ 5 in (12 cm) on the left and right sides of the instrument ■ 10 in (25 cm) behind the machine

Status Indicator Lights

This section describes the indicator lights on the front of the QX200 Droplet Reader.
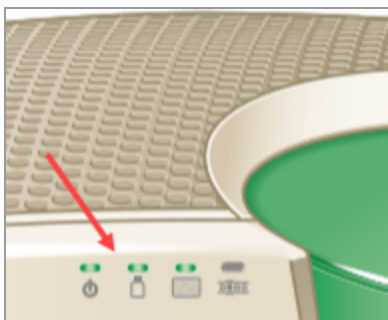
When you power up the instrument, or before you start a run, check the indicator lights to ensure the instrument is in a ready status. For information, see Table 4.

If you need to change the oil and waste containers, see Fluid and Waste Maintenance on page 72.

Table 4. Droplet Reader Status Indicator Lights

Indicator Button	(Power)	(Fluids)	(Plate)	(Run Status)
Solid Green	Power is on	Fluid and space levels OK	Plate loaded properly	Run complete
Flashing Green	N/A	Fluid level and space levels might be inadequate to complete a full run	N/A	Run in progress
Flashing Amber	N/A	Fluid and space levels are critical	N/A	Error during run
No color	Power is off	N/A	No plate loaded	Instrument is idle

Assembling and Inserting a Plate

Before fitting your plate of test samples in the QX200 Droplet Reader plate compartment, you must secure it in the plate holder.

Note: The QX200 Droplet Reader accepts solid, 96-well plates only.

Three separate components comprise the plate assembly:

- A base section to hold the plate

- The plate itself

- A top section to secure the plate

Top section

96-well PCR plate
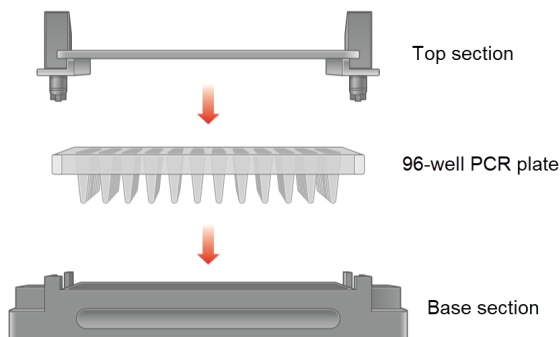
Base section

You must assemble these components before loading the plate for processing.

Assembling The Plate

To assemble the plate

1. Place the plate into the base section.

2. Raise the release tabs on the top section.

3. Place the top section over the plate, and then press the release tabs to secure the plate in the holder.

Press down to secure
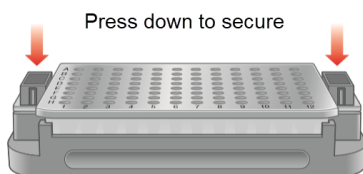
Inserting the Plate

To insert a plate into the QX200 Droplet Reader

1. Ensure the QX200 Droplet Reader is powered on, and then press the button on the lid to open the plate compartment.

Press button to open or close lid
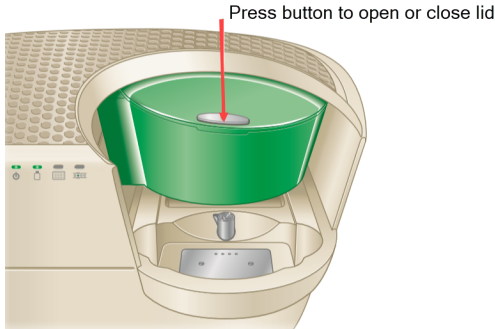
2. Fit the assembled plate into the compartment. Well A1 must be in the top-left position.

Well A01
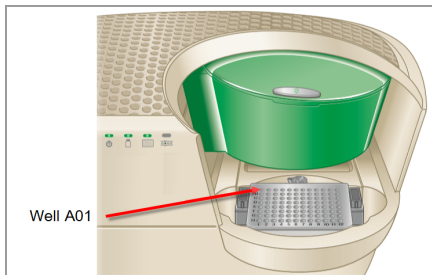
Important: Make sure the tabs on the plate holder are securely clamped and the plate lays flat. Otherwise, the sampling needle can strike the lid and damage the instrument.
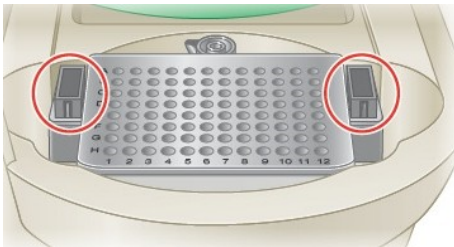
3. Press the button on the droplet reader lid again to close it.

For information on configuring your plate layout and starting a run in the software, see Setting up Plates in Qx IDE Manager Software on page 38.

Chapter 3 About Qx IDE Manager Software

Qx IDE Manager Software, when paired with the QX200 Droplet Reader, provides the necessary functionality to complete food safety testing using assays developed by Bio-Rad's Food Science Division. Using a computer on which Qx IDE Manager Software is installed, you can complete the tasks shown below.

Note: An asterisk (*) indicates the computer must be connected to the instrument to complete the task.

■ Create and save plate layouts containing ddPCR assay configurations

■ *Prompt runs on the QX200 Droplet Reader, in which the instrument collects binary data on your samples

■ Analyze the resulting data files

■ *Prompt prime or flush tasks on the instrument

■ Manage your lab's ddPCR test kit lot inventory

■ View system and software actions in system logs

This chapter explains how to

■ Install Qx IDE Manager Software on Windows 10 computers and connect to the QX200 Droplet Reader

■ Sign into Qx IDE Manager Software

■ Access the functional windows in Qx IDE Manager Software

This chapter also provides information on Qx IDE Manager Software file types and file storage. For information on setting up your samples, see Setting Up Your Test on page 16. For information on identifying your plate contents in Qx IDE Manager Software, see Setting Up and Running Plates on page 37.

Setting Up Your Computers

To execute droplet reading runs, Qx IDE Manager Software must be installed on at least one computer that is connected to the QX200 Droplet Reader.

Bio-Rad recommends a dedicated computer remain connected to the QX200 Droplet Reader for all droplet reading runs.

You can also use the dedicated computer, or another computer on which Qx IDE Manager Software is installed, for plate setup and analyzing data files. If you purchased a Windows 10 computer from Bio-Rad (recommended), the Bio-Rad service engineer can connect the computer to the instrument and ensure proper configuration as part of the installation. The computer is already set up to be used with Qx IDE Manager Software.

Computer Requirements

For additional plate setup and analysis resources, you can also install Qx IDE Manager Software on additional computers, which you can use to set up plate files and analyze data files. If the computers are linked to your company's network, you can access plate and data files from the shared storage folders on the computer connected to the QX200 Droplet Reader.

Table 5 identifies the minimum and recommended computer requirements.

Table 5. Computer Requirements

System Component	Minimum	Recommended
Operating system	Windows 7	Windows 10 64-bit
CPU	Intel 15 chip set	Intel 17 chip set
Hard disk space	500 GB	1 TB
System memory	8 GB	8 GB
Display resolution	1920 x 1080	1920 x 1080
Ports	1 USB	1 USB

Note: If a Sleep interval will be configured on the dedicated computer, ensure that *at least* 3 hours of wake time is selected in the Windows Settings so that test runs are not interrupted.
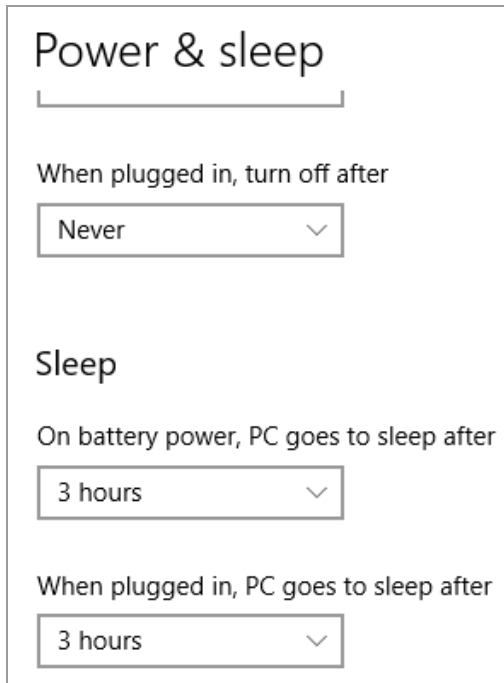
Installing or Upgrading Qx IDE Manager Software

Bio-Rad provides either website access to, or a USB flash drive containing, your software download. If you experience issues with accessing the software installation file or performing the installation, contact Bio-Rad Technical Support.

To install or upgrade Qx IDE Manager Software from a hyperlink

1. Open a web browser and enter the link in the address field, and then press Enter.

2. To log into the Bio-Rad website and open the product web page, click Log In/Register in the upper-right corner.

3. Enter your user name and password, and then click OK.

4. Select the Download tab, and then download the zip file for Qx IDE Manager Software.

5. Unzip the file.

6. Right-click, the installer file and select Run as administrator.

7. Follow the prompts to install the software.

To install or upgrade Qx IDE Manager Software from a USB flash drive

1. Insert the flash drive into a USB port on the computer that connects to the QX200 Droplet Reader.

2. Locate and unzip thefile.

3. Right-click, the installer file and select Run as administrator.

4. Follow the prompts to install the software.

Access Requirements

In this version of Qx IDE Manager Software, all users access the software with a single user account that is configured to open the default display automatically.

Connecting the Instrument and Software

Use the following procedure to connect the QX200 Droplet Reader to a computer with Qx IDE Manager Software installed.

1. Ensure the Qx IDE Manager Software computer is powered off.

2. Connect the USB cable to the QX200 Droplet Reader, and then to the Qx IDE Manager Software computer.

3. Power on the QX200 Droplet Reader. The Power indicator light turns solid green.

4. Power up and log into the connected computer with the Windows user name and password provided by your system administrator.

5. Click the Qx IDE Manager Software icon on the computer screen.

   The software opens with a generic user name.

Tabs to Functional Windows

Tabs to Qx IDE Manager's functional windows appear on the left. The following sections briefly explain the functionality you can access from each tab.

Setup

Click this tab to

- Choose a kit test (authorized tests appear under Select Test)

- Choose to create a new plate or open an existing plate

   Note: You open an existing plate file from the menu in the New Plate layout.
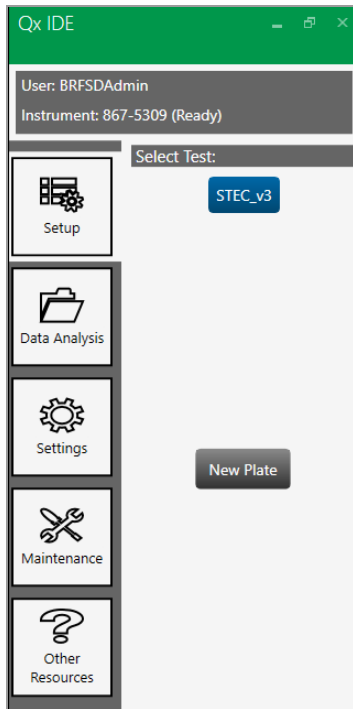
From the Plate Layout window, you can define or edit plate contents and prompt a run on the instrument. See Setting Up and Running Plates on page 37.

Data Analysis
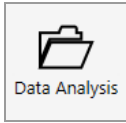
Click this tab to open a file from a completed run for analysis.

Files already opened appear in a list. You can also access your user folder or browse to a different folder.
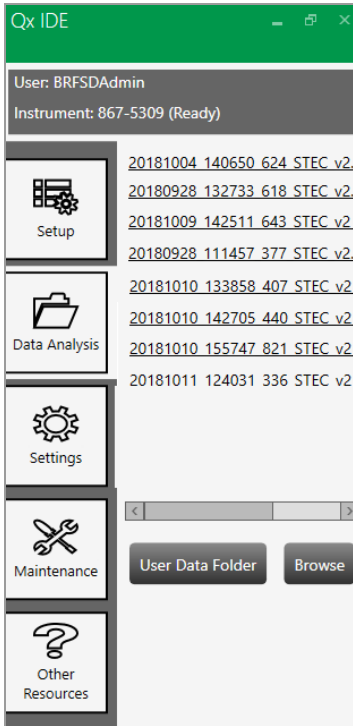
Files open in the Analysis window, where you can review the results. For information, see Data Analysis on page 45.

Settings
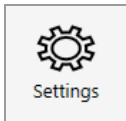
Click this tab to access dialog boxes in which you can

■ Enter information for your laboratory

■ Set up and manage your test kit lot inventory in the Kit Lot Manager
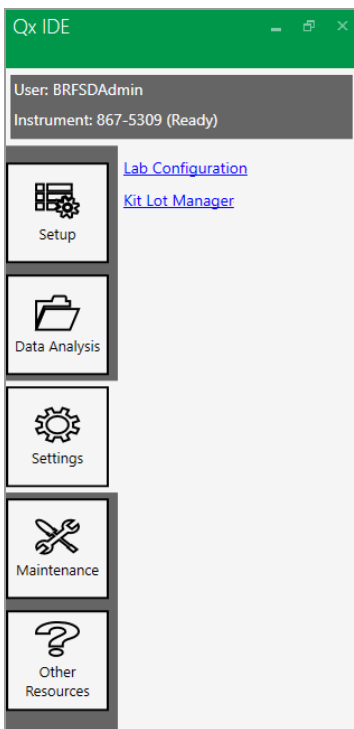
For information, see Lab ID and Inventory Management on page 33.

Maintenance

Click this tab to access dialog boxes in which you can

■ Prompt a prime or flush of the connected instrument

■ View the system logs
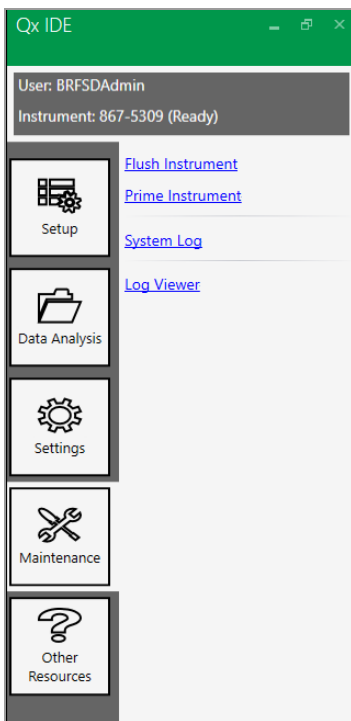
For information on priming or flushing the instrument, see Fluid and Waste Maintenance on page 72.

For log information, see Log Information and Troubleshooting on page 67.

Other Resources
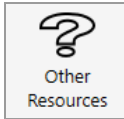
Click this tab to

◼ View the End User License Agreement (EULA)

◼ Access links to the Bio-Rad website and license information.
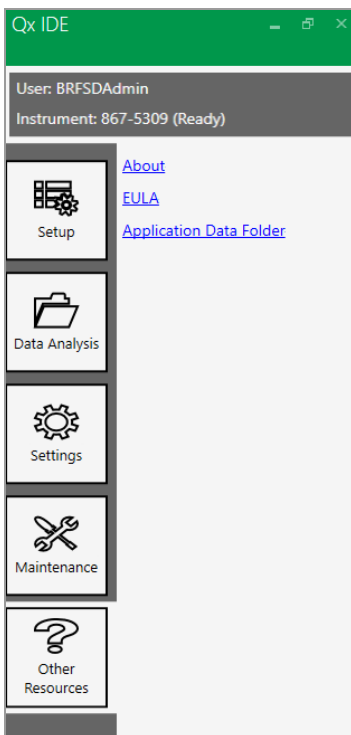
Compatible File Types

Table 6 explains the file types you can open in Qx IDE Manager Software.

Important: Data files created in other Bio-Rad software applications are not accessible using Qx IDE Manager.

Table 6. Compatible software file types

File Type	File Extension	Details
Plate	.ddplt	Plate file containing the layout of your sample plate; this file type opens in the Plate Layout window.
		Note: Plate files can be saved and reused.
Data	.ddpcrx	Analysis file containing the results for your test; this file type opens in the Analysis module.

File Storage

Tip: File paths should appear automatically in the software, based on your own storage system. Contact your software administrator for more information.

Analysis Files

When test runs on the QX200 Droplet Reader are concluded, Qx IDE Manager Software automatically saves the resulting data files and stores them in a default location. These files are available to everyone logging into Qx IDE Manager Software.

Users can also access the folder as follows:

1. Click the Other Resources tab.

2. Click Application Data Folder, and then double-click the RIP folder.

Note: You can also choose to save analysis files to your User Data Folder.

Plate Template Files

You must save your plate files before you can start a test run. Qx IDE Manager Software saves new plate files to a default location. You can navigate to a different folder to save a plate file. The Qx IDE Manager Open File screen automatically opens the last recognized folder. You can also choose to save plate files to your User Data Folder.

Chapter 4 Lab ID and Inventory Management

Before you can run tests using Qx IDE Manager Software, you must identify the kit lots you will use for your samples so you can select the appropriate kit lot to associate with your test.

Use the information in this chapter to

■ Identify your lab and the test performed in analysis reports you generate in Qx IDE Manager Software

■ Enter and update your inventory of test kit lots
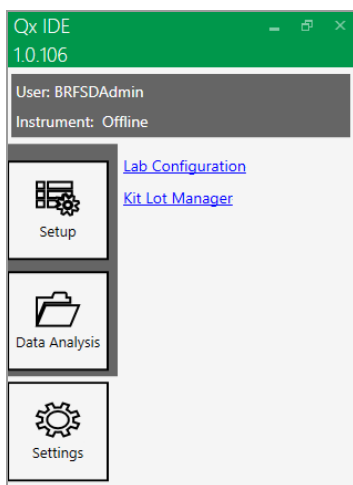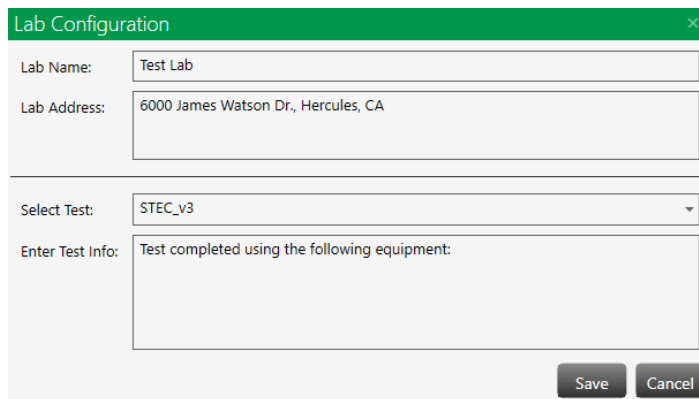
Setting Your Lab and Test Information

When you enter your laboratory name and address, and then select a test, the information prints on the analysis report generated from your run data. The entries and selections remain in place until they are manually modified.

To enter or modify lab contact information and identify a test

1. Click the Settings tab, and then click Lab Configuration.

    The Lab Configuration dialog box appears.

2. Enter the lab name and address.

3. Select a test performed in the lab.

4. Enter information pertaining to the test, such as lab instrument used.

5. Click Save.

    New information entered or selected overwrites existing information and prints on all reports.

Adding and Updating Kit Lots

Use the Kit Lot Manager window to create and update the inventory of kit lots you will use to test your ddPCR assays. Active lots also appear in the dd-Check Kit Lot # dropdown list the Plate Layout window.

Important: For traceability purposes, after you enter a kit lot and save the record, you cannot delete the kit lot record. However, you can archive the record so it does not appear in the list of active lots.

Adding a Kit Lot

To add a kit lot

1. Click the Settings tab, and then click Kit Lot Manager.

   The Kit Lot Manager dialog box appears.

2. Click in the empty field under Test Name and select a test.

3. Enter the lot number.

4. Enter the expiration date for the lot. You can enter the date manually in MM/DD/YYYY format, or click the dropdown arrow to display the calendar and select the expiration date.

5. To create a permanent kit lot record, click Save.

Editing a Kit Lot

To edit a kit lot

1. Click the Settings tab, and then click Kit Lot Manager.

2. Locate the record and click in a field to edit the information.

3. To update the kit lot record, click Save.

Archiving a Used Kit Lot

To archive a used kit lot

1. Click the Settings tab, and then click Kit Lot Manager.

2. Locate the applicable lot in your inventory list, and then select the checkbox in the Used column.

3. Click Save.

   The lot is removed from the displayed list.

Retrieving an Archived Kit Lot

To retrieve an archived lot

1. Click the Settings tab, and then click Kit Lot Manager.

2. Select the Show Expired & Used Lots checkbox and click Save.

   The archived lots appear in the list.

   Tip: If you archived a kit lot in error, you can clear the associated Used checkbox.

Chapter 5 Setting Up and Running Plates

This chapter explains how to create a new plate layout for your test, or use an existing plate layout that was saved for reuse.

Note: The QX200 Droplet Reader accepts 96-well plates only, but you do not need to fill the entire plate.

Plate setup information includes

- Sample type — identify the contents in each well in accordance with the options provided

- Sample ID — alphanumeric string to name your sample

   Note: Sample ID appears for Unknown selections only.

- dd-Check kit lot number — kit lot selected from your inventory

As you specify your plate configuration in the Plate Layout window, Qx IDE Manager Software completes the following sequential tasks:

1   Collects the information to validate your plate setup

2   Enables the Run button upon confirming your plate setup

3   Prompts you to save the plate configuration

4   Runs a status check on the instrument to ensure it is ready for the run

5   Runs your plate through the QX200 Droplet Reader

6   Creates and saves a corresponding data file

Important: On the computer connected to the instrument, ensure that any Sleep interval configured in the Windows settings specifies at least 3 hours of wake time before the system goes into Sleep mode. This will prevent the inadvertent interruption of test runs.

Setting up Plates in Qx IDE Manager Software

When you are ready to identify your plate contents in Qx IDE Manager Software, you can create a new plate configuration or use an existing plate configuration.

Selecting the Test

You must select the test to be run on your samples.

To select a test

1. Click the Setup tab.

2. Under Select Test, click the applicable test.
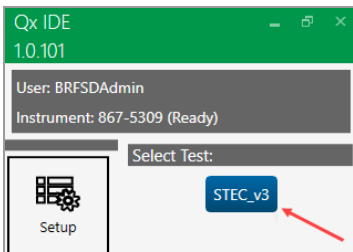
Creating New Plate Layouts

You can create a new plate layout to run a test, or you can use a layout that has been saved as a template. You can run the template layout as is, or make changes before the run.

To create a new plate layout

1. Click the Setup tab and then click New Plate.

    An empty plate layout appears. All plate options are enabled when you select a well.
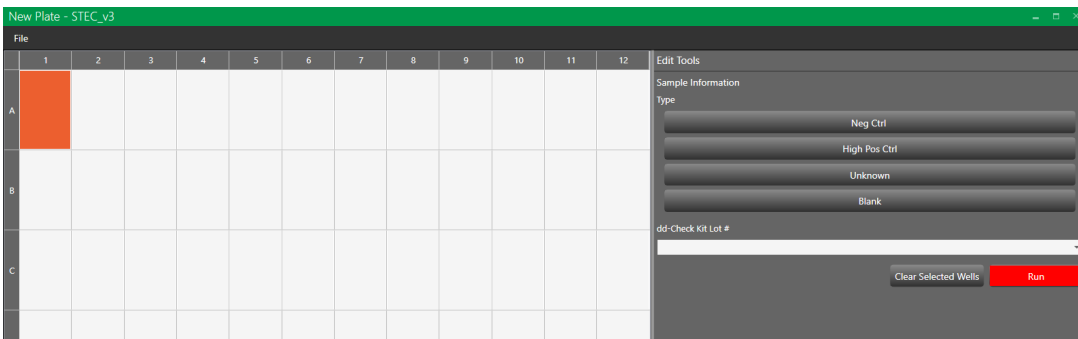
2. Select and identify positive and negative controls if required.

   ■ A positive control mimics a well in which the expected targets are found and meet the specified criteria.

   ■ A negative control mimics a well in which the targets are absent or do not meet the specified criteria.

3. Select a well and click Unknown, then enter a unique sample name for the well in the Sample ID field.

4. Repeat until all sample IDs are defined. Each well designated as Unknown must have a different sample name in the Sample ID field.

   Upon recognizing a valid plate configuration for your test, Qx IDE Manager Software enables the Run button. This can occur before you are finished setting up your plate layout.

5. If your non-sample wells are empty or contain buffer, select the wells and click Blank.

   Tip: You are not required to identify wells with no sample.

6. From the dd-Check Kit Lot # dropdown list, select the kit lot used for your samples.

   You can enter the kit lot number when you are defining controls or unknown sample wells. For information on setting up and maintaining your kit lot inventory, see Adding and Updating Kit Lots on page 35.

   Important: Only one kit lot number can be assigned to a plate. Therefore, if you change the kit lot for one well, the kit lot also changes for all other wells. If you must open a new kit to complete a plate, enter the second kit number in the Analysis Run Information screen, which contains a field for Well Notes. Cite the wells using the new kit lot.

7. Continue to Completing the Preliminary System Check and Running the Test on page 41.

Using Existing Plate Layouts

To open and configure (optional) an existing plate layout

1. Click the Setup tab, and then click New Plate.

   An empty plate layout appears. All plate options are disabled.
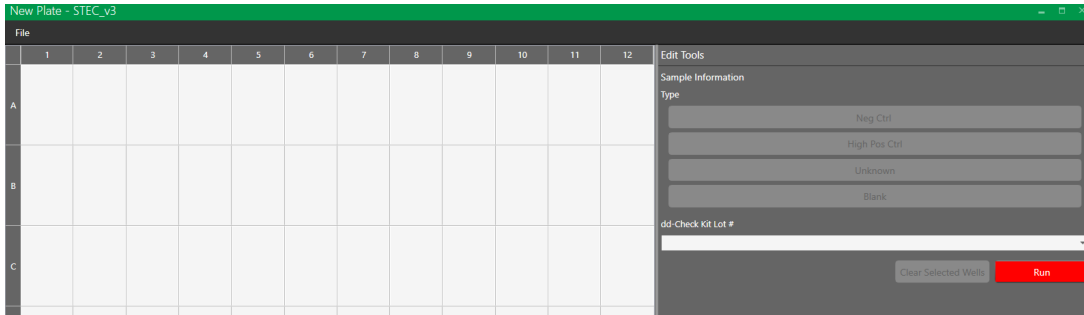
2. From the File menu, select Open.

3. From the Open dialog box, select a template (ddplt) file.

   Note: You can select the file from the default location or navigate to a different folder.

4. After you select the file, click Open.

   The configured plate layout appears, with the Run button already enabled.
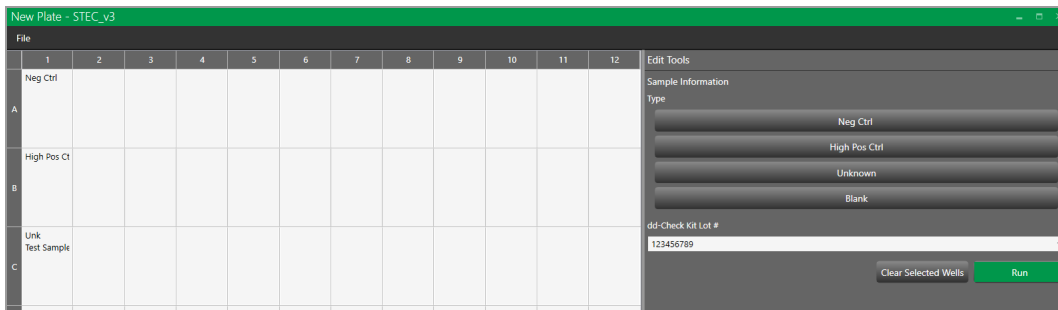
5. Do one of the following:

   ■ Run the plate as is. See Completing the Preliminary System Check and Running the Test on page 41.

   ■ Change the plate configuration before the run. Repeat Steps 2 through 6 in Creating New Plate Layouts on page 38.

6. Continue to Completing the Preliminary System Check and Running the Test on page 41.

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Completing the Preliminary System Check and Running the Test

After your wells are defined and validated for the test type, Qx IDE Manager Software enables the Run button and prompts you to save the file. After the file is saved, Qx IDE Manager Software runs the preliminary system check on the QX200 Droplet Reader. If all check steps pass the assessment, you can run the test.

Initiating the Preliminary System Check

To save the file and initiate the preliminary system check

1. Click Run.

2. When the Save As dialog box opens, enter a name for the plate in the File Name field and click Save.

    Tip: The file is automatically saved as a .ddplt file, which you can reuse for future tests.

    After saving the file, Qx IDE Manager Software completes a check on the instrument and displays the results in the Instrument Status panel.

    ■ A green check mark appears next to each status item that passes the prerun assessment. If all items are green, you can start the run.

    ■ If a red X appears next to one or more items, the instrument cannot start the run until you resolve each issue.
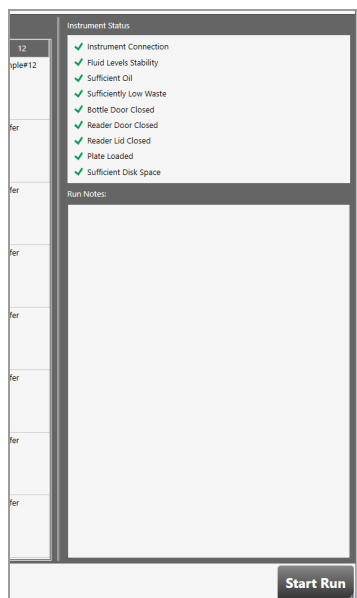
    Note: For information on the status items, see Run Prerequisites Checklist on page 43.

Starting the Run

Important: On the computer connected to the instrument, ensure that any Sleep interval configured in the Windows settings specifies at least 3 hours of wake time before the system goes into Sleep mode. This will prevent the inadvertent interruption of test runs.

To start the run

1. Click Start Run.

    Qx IDE Manager Software prompts the connected QX200 Droplet Reader to begin the droplet reading run. The estimated time to complete the run appears above the plate and a green progress bar measures the run completion.
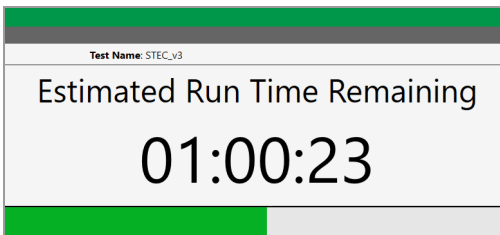
    When the run is finished, the following message appears:
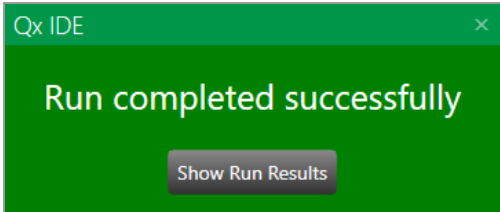
    Note: If the run is interrupted or stopped, Qx IDE Manager Software displays an error message. You must resolve the issue before rerunning the test. See Appendix A, Log Information and Troubleshooting for information on errors and suggested solutions. If you cannot resolve the issue, contact Bio-Rad Technical Support for assistance.

2. To view the run results in the Analysis format, click Show Run Results.

    For information on analysis displays, see Data Analysis on page 45.

Run Prerequisites Checklist

If you encounter a problem with the instrument or software that is not described here, see Log Information and Troubleshooting on page 67.

For information on each issue that can prevent the instrument from starting the run, see Table 7.

Table 7. Pre-Run Error Indicators

Status Check Item	Issue	Suggested Resolution
Instrument Connection	USB cable connection is not recognized. Power connection is not recognized.	Disconnect, and then reconnect, the USB cable between the instrument and the computer. Ensure the power outlet is working. Disengage the power cord from the outlet, and then reinsert it into the outlet.
Fluid Levels Stability	The oil or waste is moving within the bottle so the level cannot be accurately determined.	Wait until the liquid is settled, then try again. Ensure the instrument rests on a solid, stable surface.
Sufficient Oil	Oil level is below the acceptable level for a run.	Remove the oil bottle and replace it with a full one.
Sufficiently Low Waste	Waste level is above the acceptable level for a run.	1. Empty any remaining oil from the bottle and then place a Waste label (provided by Bio-Rad) over the Oil label. 2. Insert the bottle into the Waste slot. For information on changing containers, see Instrument Maintenance on page 71.
Bottle Door Closed	Bottle door is not closed properly.	Open the bottle door and ensure there are no blockages, and then close the door again.

Table 7. Pre-Run Error Indicators, continued

Status Check Item	Issue	Suggested Resolution
Reader Door Closed	Reader door is not closed properly.	Open the reader door and ensure there are no blockages, and then close the door again.
Reader Lid Closed	Reader lid is not closed properly.	Open the reader lid and ensure there are no blockages, and then close the lid again.
Plate Loaded	Plate is not loaded properly.	1. Open the reader door and remove the plate. 2. Ensure the tabs of the plate cover are securely clamped. 3. Insert the plate again and ensure it lays flat. For information on loading plates in the QX200 Droplet Reader, see Assembling and Inserting a Plate on page 21.
Sufficient Disk Space	There is not enough storage space available for the run data.	Delete or archive older data files to clear space.

Chapter 6 Data Analysis

During each droplet reading run, the QX200 Droplet Reader works with Qx IDE Manager Software to generate data as it reads each well. When the run concludes, the software produces a .ddpcrx file that contains an automatic analysis of the generated data.

You can view the data in 1D and 2D amplitude windows, and in a plate layout where the 2D amplitude is shown for each well. Formats include dot plots, histograms, and heat maps. Each well is also represented in a Well Selector grid, and information for each selected well is shown in the Well Data table. You can expand the default display to show additional data columns.

Note: Test results and displays might vary from test to test. This chapter uses a 14-well STEC test example to illustrate analysis functionality and explain the displays and options. One of the wells is set as a high positive control and another is set as a negative control. The remaining twelve wells contain unknown samples to be tested for linked virulence genes (STX and EAE) from the same bacterium. For information specific to your test analysis, consult the Test Information and Instructions document for the test you performed.

While viewing the amplitude charts, you can

- Prompt an automatic reanalysis of one or more selected wells

- Define a fixed axis scale

- Manually adjust automatically defined thresholds

Important: Only experienced users should manually adjust thresholds.

For information on the Run Information tab, see Viewing Run Information and Creating Reports on page 63.

Well Selector and Data Table

The 1D and 2D Amplitude analysis windows contain a Well Selector grid and a Well Data table.

Use the Well Selector to choose the wells to display in the charts. When you select a well, a black border appears. Each well is labeled with an abbreviated droplet reading result, which is explained in Table 8.

Table 8. Well selector grid abbreviations

Result	Color	Description
POS	■	Positive
PP	■	Presumptive positive
NEG	■	Negative
INV	■	Invalid Reason well is considered invalid is shown in the Invalid Reason column of the Well Data Table.
DIL	■	Dilute Well contents are too concentrated and must be diluted using the dilution ratio is specified in the Sample Result column of the Well Data table.
High Pos Ctrl VAL	☐	Valid high positive control
Neg Ctrl VAL	☐	Valid negative control

To select one or more wells

▶ Do one of the following:

  ■ Click a well.

  ■ Press the Ctrl key to select multiple wells.

  ■ Press the Shift key to select multiple contiguous wells.

Wells chosen in the Well Selector appear as rows in the Well Data table in the order selected. The table provides more descriptive information on the sample results.

▶ To sort the data in ascending or descending order, click the arrow on the right in the header row.

  Important: To return to the original sort order, select the column and press CTRL and left-click.

Fields, rows, or columns selected in the Well Data Table appear with a black background.

Well Data						+ ≡
Wells	Sample ID	Sample Type	Sample Result	Invalid Reasons	Linkage %	Well Notes
E08	E08	Unknown	Positive: linked targets		93.3	
E07	E07	Unknown	Negative		66.7	
D08	D08	Unknown	Too concentrated, dilute 1/100			
G06	G06	Unknown	Invalid	Invalid; not enough droplets		
F03	NegCTRL	NegCtrl	Valid ctrl			
G03	HighPOsCtrl	HighPosCtrl	Valid ctrl		92.5	

Well Data Table Column Definitions

Table 9 defines each available column in the Well Data table.

Note: In your analysis (ddpcrx) file, the *<target>* entry is replaced by the actual target name or acronym.

Table 9. Fields in the Data Table

Column Name	Description
Wells	The well location in the plate, based on well numbers A01 through H12 (appears by default) **Note:** The QX200 Droplet Reader accepts only 96-well plates.
Sample ID	Sample name assigned by the user (appears by default)

Table 9. Fields in the Data Table, continued

Column Name	Description
Sample Type	Sample type selected in the Plate Layout window (appears by default) **Note:** Choices appear on the right.
Sample Result	More detailed description of droplet reading result (appears by default)
Invalid Reasons	Reason that Qx IDE Manager determined the well contents were invalid
Linkage %	Proportional value percentage of linked virulence genes from the same bacterium (appears by default) **Note:** For information on the linkage calculation, refer to the Test Information and Instructions document for your test.
Well Notes	Pertinent notes for a well, added by the user (appears by default)
<target> Value (Copies)	For each target, number of copies detected in the well
Accepted Droplets	Total number of droplets created
Mean Amplitude of Positives (*<target>*)	Mean amplitude value of all droplets that contain the target
Mean Amplitude of Negatives (*<target>*)	Mean amplitude value of all droplets that contain no target
Ratio	Target 1 value (copies) divided by Target 2 value (copies)
Ch1+Ch2+	Number of droplets that contain both Channel 1 and Channel 2 targets
Ch1+Ch2-	Number of droplets that contain just the Channel 1 target
Ch1-Ch2+	Number of droplets that contain Just the Channel 2 target
Ch1-Ch2-	Number of wells that contain neither target

Showing or Hiding Columns in the Well Data Table

For information on each available column in the Well Data Table, see Well Data Table Column Definitions on page 47.

Note: The Wells, Sample ID, Sample Type, Sample Result, Display Text, Linkage, and Well Notes columns appear by default, as shown in the following graphic.

To add or remove columns in the display

1. Click the ☰ icon in the upper-right corner of the table.

2. Click Show/Hide columns.

3. Select or clear checkboxes to customize the table display.

4. Click in the display outside of the menu to close the menu dialog.

The new column selection appears in the Well Data Table.

Analysis Windows and Results

You can analyze your test results using one-dimensional (1D) and two-dimensional (2D) amplitude window. You can also view all 2D results in a full plate layout.

Note: When you open an analysis (.ddpcrx) file, the display defaults to the 2D Amplitude display.

The chart and Well Data table populate as you select one or more wells. Amplitude charts illustrate the droplets by degree of dye fluorescence.

1D Amplitude

In the 1D Amplitude display, Qx IDE Manager Software shows

■ On the left, dot plots with positive droplets in color and the negative droplets in grayscale for each fluorophore.

The following graphic shows, for each channel, the amplitude for a selected positive well. Channel 1 is blue for Target 1 and Channel 2 is green for Target 2. In the Well Data table, the Linkage column shows the percentage where the two targets are linked.
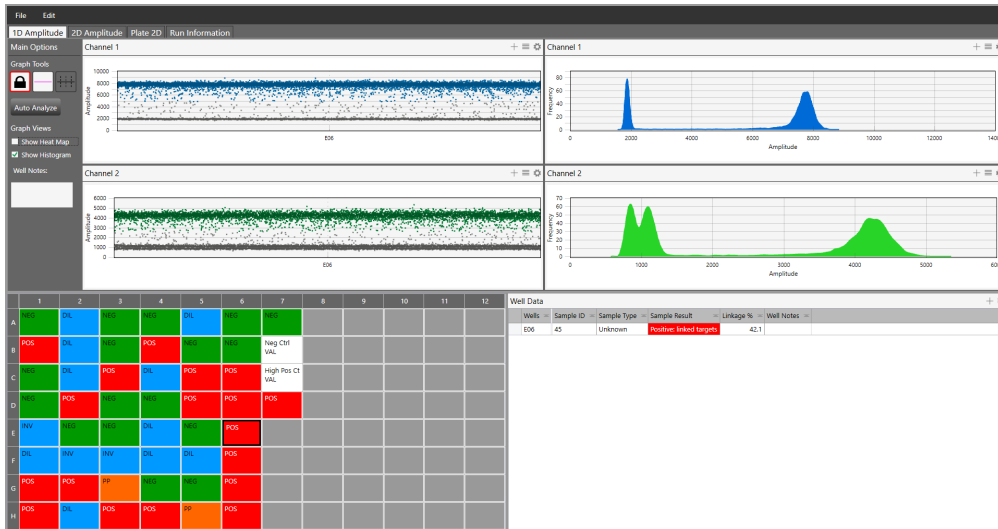
When you select the 1D Amplitude tab, the toolbar options allow you to change thresholds (recommended for experienced ddPCR users only), show or hide the histogram plot, and show or hide the heat map. For detailed information on each toolbar option, see Analysis Options on page 54.

Notes: The third graph tools icon is enabled when you select more than one well.

■ On the right side, a histogram illustrating the fluorescence range for the droplets

The location of the volcano plot on the x-axis indicates the maximum number of droplets in the specified amplitude range. The following graphic indicates a higher number of droplets in the low-fluorescence range.

Note: The Histogram icon is enabled by default. Therefore, a Histogram (Volcano) chart appears automatically for each fluorophore (channel).

■ Amplitude in a Heat Map view for the selected well for temperature gradient experiments
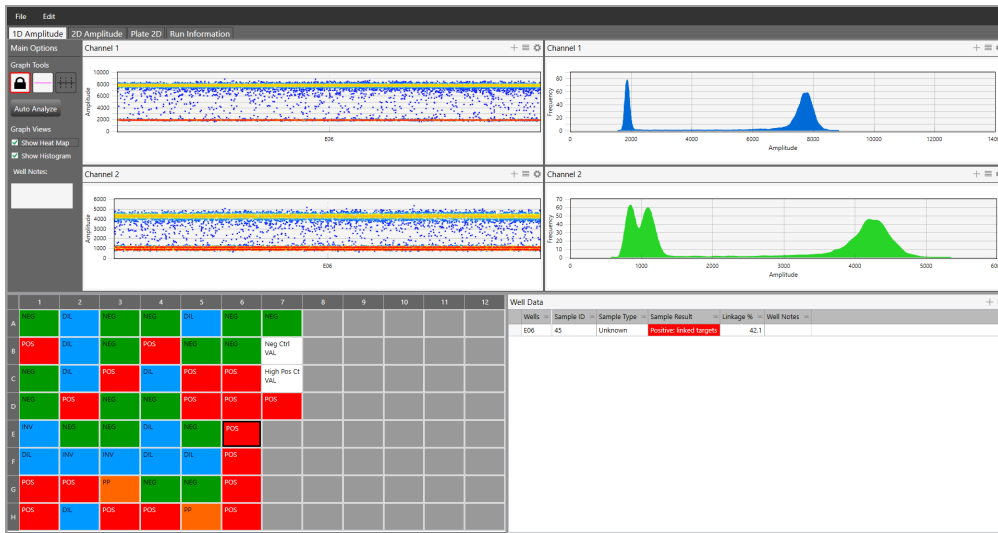
2D Amplitude

For the wells you choose in the Well Selector, the 2D Amplitude chart illustrates your targets in quadrants.

Default color assignments for 2D amplitude dots are

- Positive Channel 1 (blue dots) — Target A positive, Target B negative

- Positive Channel 2 (green dots) — Target A negative, Target B positive

- Double Positive (orange dots)* — Both targets positive

- Double Negative (gray dots) — Both targets negative

When you select the 2D Amplitude tab, the toolbar options allow you to change thresholds (recommended for experienced ddPCR users only) and show or hide the heat map. For detailed information on each toolbar option, see Analysis Options on page 54.

**Tip:** On some monitors, the orange color may appear brown.

Plate 2D

To facilitate comparisons of amplitude in the processed wells, the Plate 2D tab provides a two-dimensional amplitude view for each well in the plate layout.
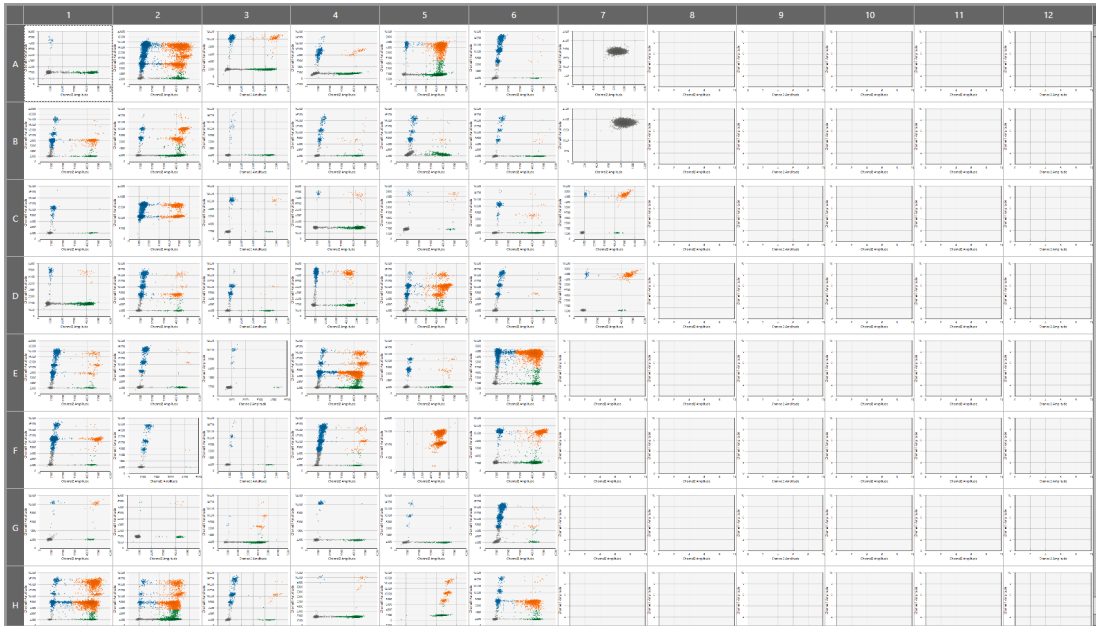
Analysis Options

In 1D and 2D amplitude charts, you can

- Expand or reduce the chart size

- Modify thresholds

- Re-apply automatic analysis

- Show or hide histograms (1D amplitude only) and heat maps

- Modify the chart scales

- Show or hide grid lines

- Copy or export the Well Data table

- Copy, save, or print the chart

- Show point values in tool tips

Note: You can also export the information in the Well Data table to Excel or .csv files, and show or hide columns.

Important: Only experienced ddPCR users should modify thresholds. If you have questions regarding the analysis results automatically calculated by Qx IDE Manager Software, contact Bio-Rad Technical Support.

Expanding or Reducing the Chart Size

You can expand the chart to a full screen display, and then reduce it to its original size.

To expand the chart size

▶ Click to show the chart in full screen mode. The Well Selector and Well Data table do not appear in the full screen display.

To reduce the chart size

▶ Click to return the chart to its original size. The Well Selector and Well Data table reappear in the display.

Using Tools and Views

When you select a chart type, the available tools and views appear in the left panel.
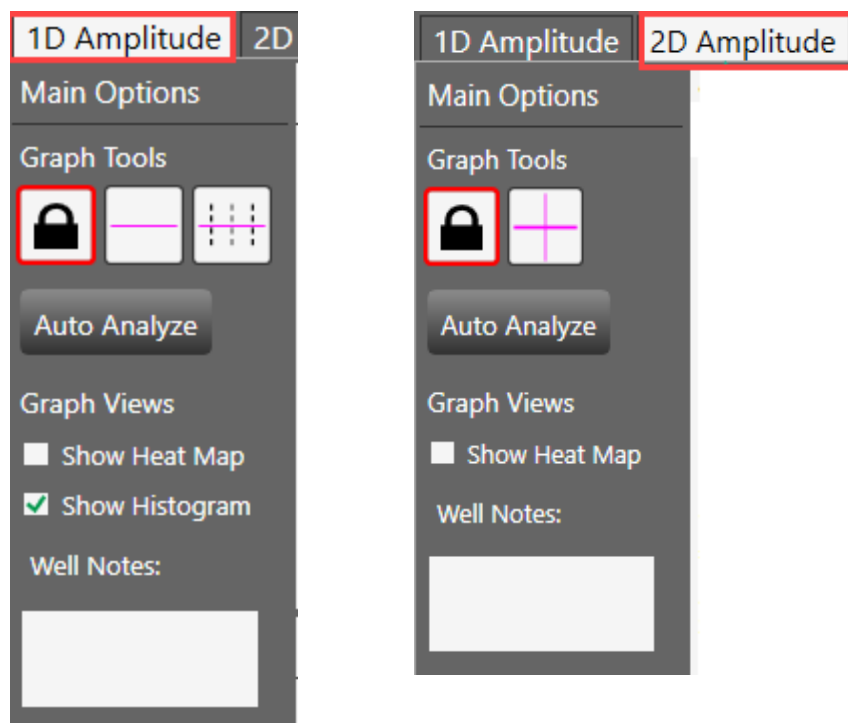
As long as the well data meet the expected quality metrics, Qx IDE Manager Software uses an internal calculation to automatically assign a threshold above which droplets are considered positive.

The graph tools described in Table 10 allow experienced ddPCR users to manually adjust thresholds where appropriate.

Table 10. Graph tools
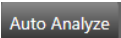
Icon	Mode	Description
	Lock view	Current threshold settings are locked You cannot modify thresholds while the icon is selected.
Auto Analyze	Automatic analysis	Applies automatic analysis to selected wells **Note:** Initial well determinations in the Well Selector grid may change.

Table 10. Graph tools, continued

Icon	Mode	Description
	Threshold, single well	1D Amplitude only Sets manual single-line thresholds for a single well
	Threshold, multiple wells	1D Amplitude only Sets manual single-line thresholds for multiple wells
	Threshold quadrant	2D Amplitude only Sets manual thresholds across both Channel 1 and Channel 2, dividing droplets into distinct target and non-target clusters

Applying Manual Thresholds

Important: Only experienced users should manually adjust thresholds. If you have questions regarding the automatic data analysis, contact Bio-Rad Technical Support.

To apply manual thresholds for selected wells

1. Click anywhere in the plot and do one of the following:

   ■ Drag the lines horizontally or vertically in the plot area

   ■ Enter a new threshold value in the boxes at the end of each threshold line

   ■ Click the up and down arrows to incrementally adjust the numbers

2. To restore the automatic analysis results, click Auto Analyze.

The graph views described in Table 11 allow users to show or hide chart displays and add notes for one or more wells.

Table 11. Graph views

Selection	Description
Show Heat Map checkbox	Displays the chart in heat map format
Show Histogram checkbox	Selected by default, shows the chart data in a volcano plot **Note:** Histograms are not available in the 2D amplitude display.
Well Notes field	Area for relevant notes on the data **Note:** You can add notes to selected wells. If you select multiple wells, the note is added to each. As long as wells with the same note are selected, the note appears in its entirety. If you select wells with different notes, a "multiple notes" message appears in the field.

Setting Chart Scale and Display Options

Chart scale options allow you to adjust the numerical scale for each open chart, and the Display option allows you to show or hide gridlines.

To set chart scale and display options

1. Click the ⚙ icon in the upper-right corner of the chart to open the corresponding Options menu.

1D Amplitude Options

Options

Scale
○ Auto ● Fixed

Y Axis

Min	Max	Inc
0	14000	2000

Display
☑ Grid Lines

1D Histogram Options

Options

Y Axis
☐ Log

2D Amplitude Options

Options

Scale
○ Auto ● Fixed

X Axis

Min	Max	Inc
0	7000	1000

Y Axis

Min	Max	Inc
0	14000	2000

Display
☑ Grid Lines

Note: When you open an analysis data file, Auto and Grid Lines are selected by default.

2. To change the scale:

    a. Select Fixed.

    b. Enter minimum, maximum, and increment values in the Min, Max, and Inc fields, respectively.

3. To hide grid lines, clear the Grid Lines checkbox.

Table 12 explains each option.

Table 12. Chart Scale Options

Option	Chart	Description
Scale	1D dot plot, 1D histogram	Auto — Automatically sets the scale in the chart according to the data. *This is the default setting.*
		Fixed — Enables the Min (minimum), Max (Maximum) and Inc (increment) fields for manual entries.
		Note: You can set your scale on the Y axis in 1D dot plots and histograms, and on the X axis and Y axis in 2D amplitude charts.
Display	1D dot plot, 1D histogram	Grid lines — displays gridlines in the chart display.
Log	1D Histogram	Changes the scale to logarithmic values.

Using Chart Menu Options

Chart menu options allow you to copy, save, or print the chart image, and show point values in dot plots.

To select a chart menu option

1.   Click the ≡ icon to open the menu.

Copy

Save Image As...

Print...

☐ Show Point Values
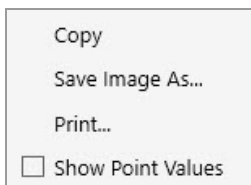
2. Do any of the following:

- Click Copy to copy the chart to an image format. You can paste the image into another document.

- Click Save Image As to save the image to a selected folder.

  ☐ When the Image Properties dialog box opens, you have the option to change the image properties.
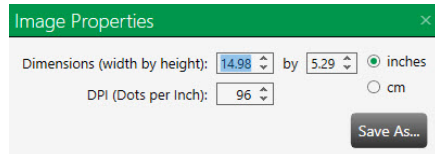
  ☐ To save the image file, click Save As, and then navigate to the applicable folder.

  ☐ In the Save As dialog box, you have the option to change the image file name.

  ☐ Click Save to save the image.

- To print the image file, click Print and follow the prompts.

- To show point values in the 1D and 2D dot plots, select the Show Point Values checkbox. When you pause on a dot, the value appears in a tool tip.
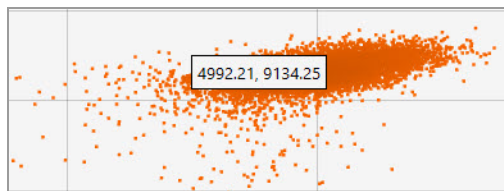
Using Table Menu Options

The table options allow you to copy or export selected rows in the data table to an Excel or .csv file, and to show or hide table columns.

To use the table options

1. Select one or more rows in the data table.

2. Click the ☰ icon to open the menu.

3. Do any of the following:

    ■ Click Copy to copy the selected rows and paste them into another document.

    ■ Click Export to Excel to export the entire table to an Excel file.

    ■ Click Export to CSV to export the entire table to a comma-delimited text file.

    Note: Excel and .csv files are automatically given a name according to established naming conventions. You can change the name if you save the file.

- Click Show/Hide Columns to select or clear checkboxes for available data columns.

  Notes: For information on showing or hiding columns, see Showing or Hiding Columns in the Well Data Table on page 49. For information on each available data column, see Well Data Table Column Definitions on page 47.

Closing the Analysis Window

▶ Click the X in the upper-right corner to close the Analysis window.

Note: If the window freezes, press CTRL-ALT-DEL and select Task Manager. Select the Qx IDE Manager application and click End Task to close the window.

Chapter 7 Viewing Run Information and Creating Reports

From the Analysis window, you can also complete the following tasks:

- View information specific to your test run on the Run Information tab

- Generate a PDF report containing information about the run

Run Information

Select the Run Information tab to view the following information for the run:

- Sample ID for each well

- Kit lot number used and expiration date

- Run notes, if applicable

- Run start time

- Test name

- User name

- Plate type

- Instrument serial number

You can also use the Run Notes section on the right to enter pertinent information about the run or the resulting data.
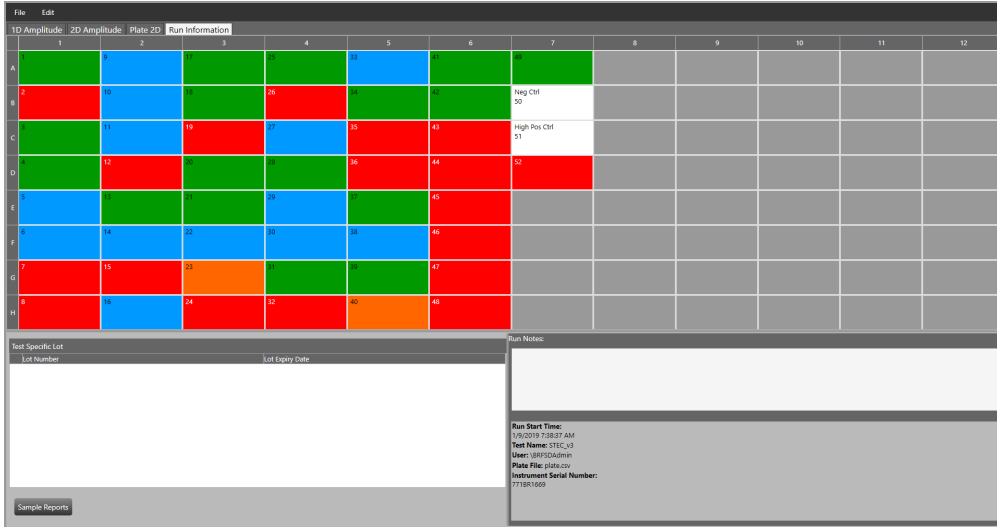
Creating a Summary Report

To create a summary report

1. In the 1D Amplitude or 2D Amplitude view Well Selector, select the wells to include in the report results.

2. Click Sample Reports in the lower-left corner.

   Qx IDE Manager Software generates a Run Summary Report. The report appears as a PDF file in Windows Explorer.

3. Double-click the report to open it in a PDF viewer.

The report contains the following information:

- Plate layout for all wells

- Test results for each selected well

- Test results for calibrator and control wells

- 2D amplitude for each well illustrated in a full plate view

- Run and test kit information

- Errors generated during run, if any

4. To save the report, right-click and select Save As.

   The default report name is Run Summary Report.pdf.

5. Modify the report name to identify your test and, optionally, include other information such as the date.

6. If necessary, navigate to the appropriate storage folder.

7. Click Save to save the file.

Appendix A Log Information and Troubleshooting

This section describes the log formats you can access in Qx IDE Manager Software, and contains information on troubleshooting and correcting minor issues you may experience with your instrument and software.

Note: For information on flushing and priming the instrument, see .
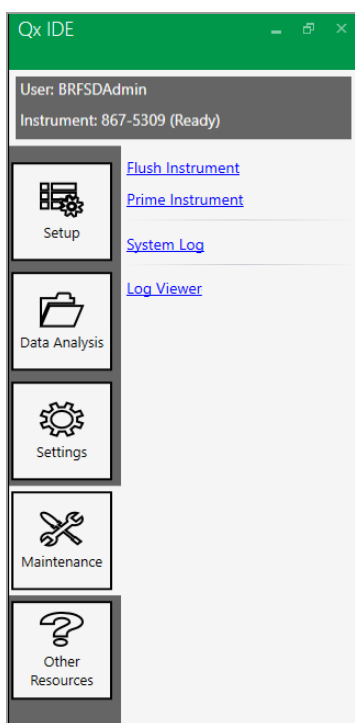
System Log

The System Log is a PDF document containing summary data on your instrument and installed software. This data includes the instrument name and serial number, connection, prime/flush, fluid level, and disk space status, software version and computer operating system, available assays in the Kit Lot Manager, and an error history.

Log Viewer

The Log Viewer opens a table where all software actions, including those directing the Qx IDE Manager Software, and errors are logged.

Error Messages

If an error occurs during a QX200 Droplet Reader run, the software cancels the run and displays an error message. Tables 1, 2, and 3 contain information on common errors.

Perform the steps in the solution column before starting a new run, and if the suggested solution does not resolve the problem, contact Bio-Rad Technical Support immediately.

Communication errors can be caused by instrument, connectivity, or power failures.

Table 13. Communication errors

Error Code	Description	Solution
102, 103, 104*, 110*, 111	Communication loss between the instrument and software, detector board error, loss during a run, or unable to reestablish a connection **Note:** For codes marked with an asterisk (*), some data may be usable.	Disconnect and reconnect the USB cable, and then power cycle the instrument.
302, 308	Communication error involving pump **Note:** Some data might be usable.	Power cycle the instrument.
502	Invalid checksum value	
900	Invalid command	

An electrical error is typically triggered by an invalid setting.

Table 14. Electrical errors

Error Code	Description	Solution
406	Electrical Error; invalid power value setting. **Note:** Some data might be usable.	Power cycle the instrument.

Mechanical errors can be caused by fluid issues (low oil, high waste), instrument operation errors, or binary data collection errors.

Table 15. Mechanical errors

Error Code	Description	Solution
105, 106	Fluidics or motion response was invalid. **Note:** Some data may be usable.	Power cycle the instrument.
201	Motors disabled **Note:** Some data may be usable.	1. Remove and reinsert the plate and plate lid. 2. Check for incorrect or multiple heat seal foil layers. 3. Check for strain on all motor axes. 4. Power cycle the instrument.
205, 207, 210, 211, 212, 218	X, Y, or Z-axis, unable to reach target location or home in allotted time. **Note:** Some data might be usable.	Check for motor obstructions, and then power cycle the instrument.
301, 303, 304, 305, 307, 312, 316, 317	Pump errors **Note:** Some data might be usable.	Power cycle the instrument.

Appendix A Log Information and Troubleshooting

Appendix B Instrument Maintenance

Bio-Rad recommends regular maintenance of your equipment, which includes

- Keeping the surface areas clean

- Regularly checking the fluid levels

- Changing the oil, and waste bottles

- Inspecting the equipment for damaged parts or wiring

Bio-Rad also recommends annual preventive maintenance on your instrument by a Bio-Rad service engineer.

Surface Cleaning

For general cleaning, use distilled water and wipe down the instrument with a dampened cloth.

For decontamination, use 10% bleach in distilled water, followed by 70% ethanol in distilled water.

Important: Do not use acetone or tap water.

Fluid and Waste Maintenance

This section explains how to properly maintain the oil and waste bottles on your QX200 Droplet Reader. Oil and waste levels should support at least one full run. However, you may be able to run a smaller number of samples in a plate when the indicator light is flashing green. Table 16 describes fluid level maintenance for your instrument.

Table 16. Fluid Levels

Fluid Level	Status
Oil level is greater than 30% and waste level is less than 70%	Bottle levels OK. You can complete at least one full run.
Oil level is less than 30% but greater than 10% and waste level is greater than 70% but less than 90%	You may be able to start a run on fewer than 96 wells. If there is not enough oil in the dispenser, or enough room in the waste container, to perform a run on the number of wells designated in the Plate Layout window, the software prevents the run until you replace the oil and waste containers.
Oil level is less than 10% and waste level is greater than 90%	Levels critical. The software prevents the run until you replace the oil and waste containers.

Use each empty oil bottle as the new waste bottle. Bio-Rad provides a new Waste label to cover the Oil label. Discard the waste bottle after one use. Before discarding, add 50ml of 10% bleach solution to the bottle to prevent microbial growth.

When handling and disposing of generated waste, you must apply standard Material Safety Data Sheet (MSDS) and OSHA practices. Following is a typical waste profile:

Fluorinated oils	95%
Water	5%
Bleach	Less than 0.5%
Proteins, nucleic acids, fluorescent dye	Less than 0.1%

Important: Before external disposal, Bio-Rad recommends collecting the waste bottles in a polyethylene container and discarding the container within one month of the oldest waste collected. While Bio-Rad droplet reader fluids are nonflammable and inert, with low toxicity and environmental impact, they are based on fluorinated hydrocarbon chemistry and disposal should comply with institutional, state, and local regulations. Contact your local environmental health and safety specialists for guidance on proper disposal, including locations in your area.

To replace the oil bottle

1. Slide the container carriage out using the handle on the side of the instrument.

2. Remove the oil bottle and set it aside, to use when changing the waste bottle.

3. Insert a new bottle of oil, and tighten the cap into place.

After replacing the oil bottle, you should prime the instrument. See Flushing or Priming the Instrument on page 74.

To replace the waste bottle

1. Remove the waste bottle.

2. Place the new Waste label over the Oil label on the oil bottle.

3. Insert the last empty oil bottle into the waste container slot.

After replacing the waste bottle, you should flush the instrument. See Flushing or Priming the Instrument on page 74.

Flushing or Priming the Instrument

You should flush the instrument after you replace the waste bottle, and prime the instrument after you replace the oil bottle.

Note: For information on the logs, see Log Information and Troubleshooting on page 67.
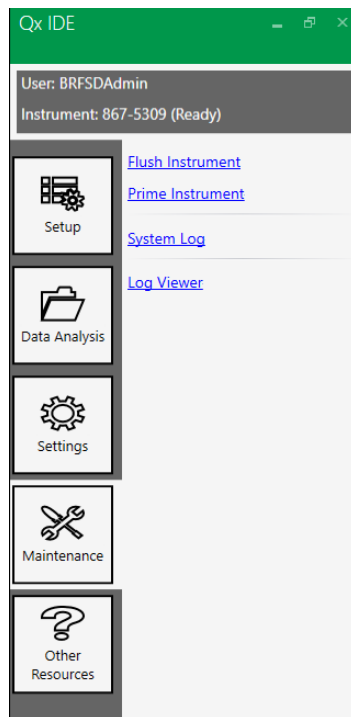
To flush the instrument

1. Select the Maintenance tab and click Flush Instrument.

   A message appears, asking if you want to flush the instrument.

2. Click Yes to begin.

3. A "Performing Flush" message appears.

   When the flushing process is finished, an operation complete message appears.

4. Click OK.

To prime the instrument

1. Select the Maintenance tab and click Prime Instrument.

    A message appears, asking if you want to prime the instrument.

2. Click Yes to begin.

3. A "Performing Prime" message appears.

    When the priming process is finished, an operation complete message appears.

4. Click OK.

Instrument Maintenance Log

QX200 Droplet Reader System Maintenance Log

Droplet Reader Serial Number	
Last Annual Maintenance Date	

Month	
Year	

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
As necessary																															
Replace droplet reader oil																															
Wipe droplet reader plate holder (if wet)																															
Discard waste bottle after one-time use																															
Use empty oil bottle as new waste bottle																															
Add 50ml of 10% bleach to new waste bottle																															
Signature																															
Daily																															
Clean work area (before and after use)																															
Discard used consumables																															
Weekly (at start of week)																															
Check droplet reader oil expiration date																															
Restart the droplet reader																															
Restart the connected computer and software																															
Monthly																															
Clean droplet reader plate holder metal surface in the instrument with 80% ethanol or isopropanol																															
Prime instrument																															
Quarterly																															
Purge droplet reader oil																															
Backup the database																															
Annual Maintenance																															
Call Bio-Rad																															

Appendix C ddPCR Systems and Components

This appendix contains descriptions and catalog numbers for new or replacement instruments, accessories, and consumables for Bio-Rad's ddPCR products, including your QX200 Droplet Reader.

Note: Bio-Rad also produces an Automated Droplet Reader, but this instrument is not recommended for dd-Check assays.

ddPCR System and Instrument Packages

Table 17 contains information on recommended ddPCR instruments

Table 17. ddPCR System and Instrument Packages

Product	Description	Catalog Number
QX200 Droplet Generator	Includes the droplet generator, cartridges and gaskets (24 each), cartridge holders (2), and power cord	17005227
QX200 Droplet Reader	Includes the droplet reader, plate holders (2), USB cable, and power cord	17005228
CFX96 Touch Deep Well System	includes C1000 Touch Thermal Cycler chassis, CFX96 Deep Well Optical Reaction Module, USB cable, and power cord.	3600037

QX200 Droplet Reader Accessories

Table 18 contains information on accessories for the QX200 Droplet Reader.

Table 18. QX200 Droplet Reader Accessories

Product	Description	Catalog Number
Computer	Computer that connects to the QX200 Droplet Reader for data collection and analysis	17006702
USB cable and power cord	Cable connecting the computer to the instrument and power cord connecting the instrument to the power source **Note:** Contact Bio-Rad Technical Support for replacement information.	Included
Droplet reader plate holders (2)	Used to position the 96-well plate in the droplet reader plate compartment **Note:** Two plate holders are included with the droplet reader purchase.	12006834

QX200 Droplet Generator Accessories

Table 19 contains information on the accessories for the QX200 Droplet Generator.

Table 19. QX200 Droplet Generator Accessories

Product	Description	Catalog Number
DG8 droplet generator cartridges	Microfluidic cartridges used to mix sample and oil for droplet generation	17005222
DG8 droplet generator gaskets	Gaskets to seal the cartridges **Note:** You must seal the cartridge to prevent evaporation and to apply required pressure for droplet generation.	17005223
Droplet generator cartridge holder	Positions and holds the droplet generator cartridge in the instrument compartment	1863051
Power cord	Connects the QX200 Droplet Generator to the power source **Note:** Contact Bio-Rad Technical Support for replacement information.	N/A

Note: For information on CFX96 Thermal Cycler accessories, see the information at the following link:

http://www.bio-rad.com/foodsciences

ddPCR Materials and Consumables

Table 20 contains information on accessories and consumables for Bio-Rad instruments.

Table 20. Consumables and Other Materials

Product	Description	Catalog Number
96-well PCR plates	ddPCR 96-well plates	17005224
Rainin Pipets	20 μl for sample loading 50 μl for droplet transfer 8-channel, 200 μl for oil	L-20, L8-20 L-50, L8-50 L8-200
Rainin Pipet tips	Filtered	GP-L10F GP-L200F
Foil plate seals	Pierceable foil plate seals	17005225
Plate sealer	PX1 PCR plate sealer	17005226
Buffer controls	QX200 buffer control kit for probes	1863052
Droplet reader oil	ddPCR droplet reader oil	17005221
Droplet reader waste bottle	You can use an empty droplet reader oil bottle to collect the waste from droplet reading. **Note:** If you did not receive the initial empty container, contact Bio-Rad Technical Support.	N/A

Appendix D Revision History

Release Date	Document Number and Version	Description of Change
September 2020	10000110358 Ver B	*Document change only.* Change all instances of "laptop" to "computer." To update warranty, add language from QX Manager UG

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