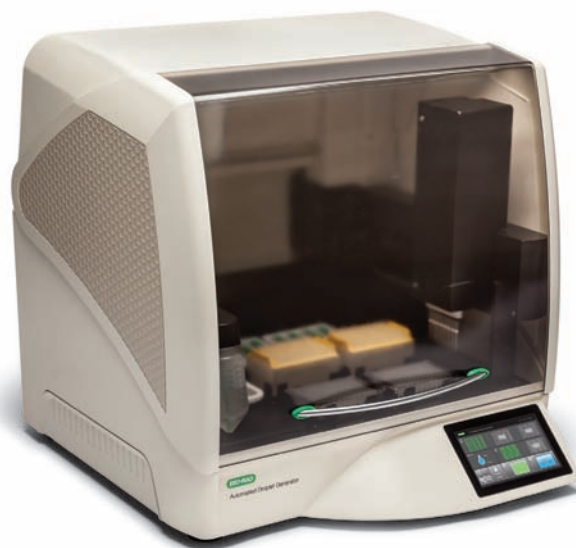

Automated Droplet Generator

Instruction Manual

Catalog #1864101



BIO-RAD

Automated Droplet Generator

Instruction Manual

For Research Use Only

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 (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 bio-rad.com.

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Revision History

Document	Date	Description of Change
Automated Droplet Generator Instruction Manual D112916 Ver F (10043138)	September 2023	Remove references to a power button and add content the instrument remains in an idle state when not in use
Automated Droplet Generator Instruction Manual D112916 Ver E (10043138)	June 2023	Add new legal statement and Managing Waste section; update document into TechCom template; Update items and catalog numbers in Ordering Information and Additional Components topics

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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.

Important: Only trained personnel should use this instrument.




Regulatory Compliance

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

- IEC 61010-1:2010 (3rd:2016, EN61010-1:2010 (3rd ed.). Electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
- 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
- IEC 61010-2-081:2015, 3.0 edition, UL 61010-2-081:2015, CAN/CSA C22.2 No. 61010-2-081:19. 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)
- CAN/CSA 22.2 No 61010-1-04, Safety requirements for electrical, equipment for measurement, control, and laboratory use, Part 1: General requirements
- CAN/CSA C22.2 No. 61010-2-101:2019 IEC 61010-2-101: 2018 (3rd ed.)
- Restriction of hazardous substances (ROHS) directive (European Union)
- Registration, evaluation, authorization 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.




Table 1. Regulatory symbols

Symbol	Definition
	The CE symbol indicates that the manufacturer ensures the product conforms with the essential requirements of the applicable EN directives.
	<p>The CSA symbol indicates that a project has been tested to Canadian and U.S. standards, and it meets the requirements of those applicable standards.</p> <p>This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.</p>
	The Waste Electrical and Electronic Equipment (WEEE) 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.

Safety Warning Labels

Warning labels alert you about sources of injury or harm. [Table 2](#) defines each safety warning label.

Table 2. Meaning of safety warning labels

Icon	Meaning
	<p>Warning about risk of harm to body or equipment</p> <p>Operating the system 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.</p>
	<p>Warning about handling biohazardous materials</p> <p>When handling biohazardous samples, adhere to the recommended precautions and guidelines and comply with any local guidelines specific to your laboratory and location.</p>
	<p>Warning about risk of electric shock</p> <p>In order to prevent electric shock, use caution when plugging and unplugging the instrument. Always turn off and unplug the instrument when performing maintenance procedures.</p>

Safe Use Specifications

For safe operation of the instrument, Bio-Rad™ strongly recommends that you comply with instructions listed in this section.

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 and USB port 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.

Note: Bio-Rad recommends maintaining a backup power source in case of power outages. A universal power supply (UPS) can protect from brown outs and power surges, while a regular backup generator does not.

Personal Protective Equipment

Proper use of gloves is recommended with use of oils and sample plates. OSHA requirements for personal protective equipment (PPE) are set forth in the Code of Federal Regulations (CFR) at 29 CFR 1910.132 (General requirements); 29 CFR 1910.138 (Hand protection); 29 CFR 1926.95 (Criteria for standard personal protective equipment). Any gloves with impaired protective ability should be discarded and replaced. Consider the toxicity of the chemicals and factors such as duration of exposure, storage, and temperature when deciding to reuse chemically exposed gloves.

Listed below are features to aid glove selection for handling of machines, assays, oils, and cleaning solvents:

- Butyl gloves are made of a synthetic rubber and protect against peroxide, hydrofluoric acid, strong bases, alcohols, aldehydes, and ketones
- Natural (latex) rubber gloves are comfortable to wear and feature outstanding tensile strength, elasticity, and temperature resistance
- Neoprene gloves are made of synthetic rubber and offer good pliability, finger dexterity, high density, and tear resistance; they protect against alcohols, organic acids, and alkalis
- Nitrile gloves are made of copolymer and provide protection from chlorinated solvents such as trichloroethylene and tetrachloroethene; they offer protection when working with oils, greases, acids, and caustic substances

Hazards

The instrument 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 Laboratories, Inc. 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 system.

Biohazards

The instrument 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 laboratory coat, 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.
- Change gloves frequently. 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. 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).

Disposal of Biohazardous Material

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

- Clinical samples
- Reagents
- Used reaction vessels or other consumables that may be contaminated

Chemical Hazards

The instrument contains no potentially hazardous chemical materials.

Explosive or Flammability Hazards

The instrument poses no uncommon hazard related to flammability or explosion when used in a proper manner as specified by Bio-Rad.

Electrical Hazards

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

Surface Decontamination



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

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

The following areas can be cleaned with 10% bleach solution:

- Outer area and chassis
- Inner plate holders
- surfaces

To prepare and apply the disinfectant, refer to the instructions provided by the product manufacturer. For questions regarding the use of other cleaning agents, contact Bio-Rad Technical Support.

Important: Do not clean the handler Y-axis rail when the front door is open. This is a lubricated surface, and failures will occur if the lubrication is removed.

Decommissioning and Disposal

The instrument 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

You must perform the specified decontamination procedures before moving or shipping the system. 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

Important: The instrument is for research use only, and not for use in diagnostic procedures.

The instrument and its associated accessories are covered by a standard Bio-Rad warranty. Contact your local Bio-Rad office for the details of the warranty. Follow the safety specifications listed in this chapter and throughout this guide.

The instrument is intended for laboratory use only. Bio-Rad Laboratories, Inc. 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. Alteration of this instrument voids the warranty and safety certification, as it creates a potential safety hazard.

Use of unapproved supermixes or additives may harm the instrument and voids the warranty.

Use only the power cord supplied with the instrument, using only the plug adaptor that corresponds to the electrical outlets in your region.

Chapter 1 Introduction to Droplet Digital PCR

Droplet Digital™ PCR (ddPCR™) is a digital polymerase chain reaction method based on water-oil emulsion droplet technology. ddPCR uses a combination of microfluidics and proprietary surfactant chemistries to divide each sample into water-in-oil droplets. The technology uses reagents and workflows similar to those used for most standard TaqMan probe-based assays, and provides absolute quantification of nucleic acid target sequences by counting nucleic acid molecules encapsulated in discrete, volumetrically defined water-in-oil droplet partitions.

ddPCR is highly effective in the following areas:

- **Absolute quantification** — ddPCR provides a concentration of target DNA copies per input sample without the need for running standard curves, making this technique ideal for target DNA measurements, viral load analysis, and microbial quantification.
- **Genomic alterations such as gene copy number variation (CNV)** — CNVs result in too few or too many dosage-sensitive genes responsible for phenotypic variability, complex behavioral traits, and disease. ddPCR enables measurement of 1.2x differences in gene copy number.
- **Detection of rare sequences** — researchers must amplify single genes in a complex sample, such as a few tumor cells in a wild-type background. ddPCR is sensitive enough to detect rare mutations or sequences.
- **Gene expression and microRNA analysis** — ddPCR provides stand-alone absolute quantification of expression levels, especially low-abundance microRNAs, with sensitivity and precision.
- **Next-generation sequencing (NGS)** — ddPCR quantifies NGS sample library preparations to increase sequencing accuracy and reduce run repeats. Validate sequencing results such as single nucleotide polymorphisms or copy number variations with absolute quantification.
- **Single cell analysis** — the high degree (10-fold to 100-fold) of cell-cell variation in gene expression and genomic content among homogeneous post-mitotic, progenitor, and stem cell populations drives a need for analysis from single cells. ddPCR enables low copy number quantification and gene expression of individual cells.
- **Genome edit detection** — ddPCR enables fast, precise, and cost-effective assessment of HDR (Homology directed repair) and NHEJ (non-homologous end joining) generated by CRISPR-Cas9 or other genome editing tools.

ddPCR has the following benefits for nucleic acid quantification:

- **Unparalleled precision** — The massive sample partitioning afforded by ddPCR enables small fold differences in target DNA sequence between samples to be reliably measured.
- **Increased signal-to-noise ratio** — High-copy templates and background are diluted, effectively enriching template concentration in target-positive partitions. This allows for the sensitive detection of rare targets and enables a $\pm 10\%$ precision in quantification.
- **Removal of PCR efficiency bias** — Error rates are reduced by removing the amplification efficiency reliance of qPCR, enabling accurate quantification of targets to near zero.
- **Simplified quantification** — There is no requirement for a standard curve for absolute quantification.

ddPCR Workflow

The ddPCR process adheres to the following workflow:

- You prepare your samples for PCR by combining DNA or RNA with primers, probes dye, and Bio-Rad ddPCR supermix.
- A droplet generator fractionates a sample into droplets with target and background DNA distributed randomly into the droplets during the partitioning process.
- Following droplet generation, the droplets are run through a thermal cycler, which performs PCR amplification of the nucleic acid target in each individual droplet.
- A droplet reader reads each droplet to determine the fraction of positive droplets in the original sample and uses Poisson statistical formulas to determine the absolute quantity.

Note: Positive droplets containing at least one copy of the target DNA molecule exhibit increased fluorescence compared to negative droplets.

Finding Out More

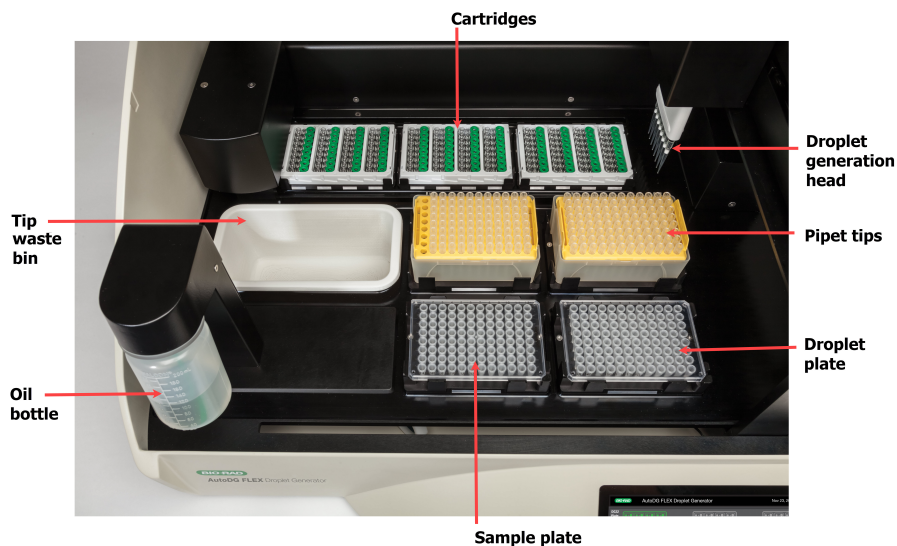
Go to bio-rad.com to access links to technical notes, manuals, videos, product information, and technical support. The website also provides many technical resources on a wide variety of methods and applications related to PCR, Droplet Digital PCR, and gene expression.

Chapter 2 About the Automated Droplet Generator

The Automated Droplet Generator (AutoDG™) partitions each sample into thousands of standard droplets, in which nucleic acid molecules are distributed in a random fashion.

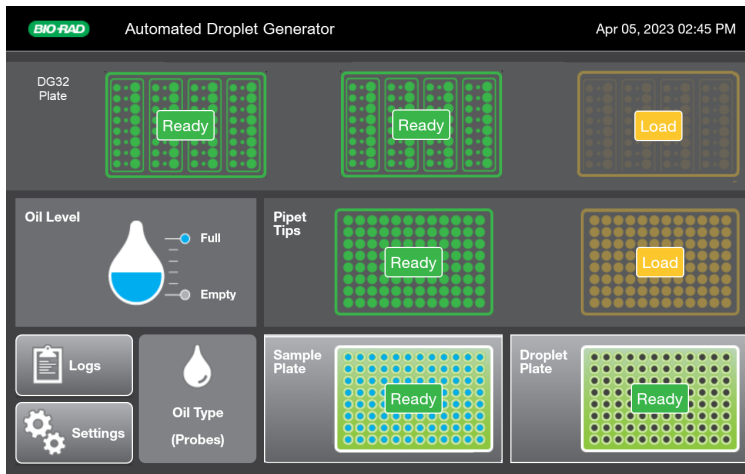
Automated droplet generation eliminates user-to-user variability that is possible with manual droplet generation, and the HEPA-filtered enclosure reduces contamination during droplet generation. The instrument can generate droplets for up to 96 samples in less than 45 minutes.

The following photograph shows the instrument interior:

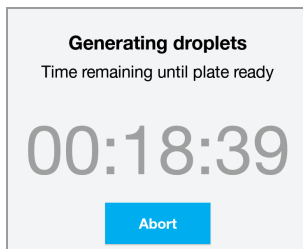


To facilitate run setup, the touch screen provides color prompts and messages to advise you of oil levels and the state of consumables (cartridges, pipet tips, used tips, sample plate, and droplet plate).

After you choose the well columns on the plate layout screen, applicable status icons change to yellow and say Load, and the oil indicator shows the oil level for the oil type currently installed. You must replace oil and consumables in accordance with your plate configuration. For information on the touch screen status icons, see [Status Indicators on page 30](#).



After the run begins, a countdown timer displays the time remaining in the droplet generation run, allowing you to maximize efficiency in your laboratory.



When the plate is ready, the timer sounds and the counter begins going forward from zero to show the time elapsed since the run finished. Every run is stored in an exportable log file for future reference.

Instrument Specifications

Table 3 contains the size and weight of the Automated Droplet Generator.

Table 3. Instrument specifications

Specification	Description
Weight	100 lb (45.4 kg)
Size (W x D x H)	26 x 22 x 26 in (66 x 56 x 66 cm)
	Note: The instrument height is 35 in when the cover is lifted.



Included Items

This section identifies the functional items included and shipped with your purchase.

Table 4. Automated Droplet Generator Included Components

Component	Description	Catalog Number
Automated Droplet Generator	Instrument used to generate standard droplets	1864101
Cooling block accessory	Prevents evaporation during droplet generation	12002819
Power cord	U.S. standard power cord	Contact Bio-Rad Technical Support
Oil purge reservoir	Collects oil waste from priming and flushing	Contact Bio-Rad Technical Support.

Additional Components

The following tables identify additional components you can purchase for use with your system or instrument.

Table 5. Accessories and consumables

Component	Description	Catalog Number
ddPCR 96-Well Plates	Clear well/clear shell semi-skirted plates	12001925 (pkg of 25)
DG32 Droplet Generation Cartridges	Microfluidic cartridge with gasket for the AutoDG	1864108 (pkg of 30) 1864109 (pkg of 60)
Automated Droplet Generation Oils	Automated droplet generation oils for the AutoDG <ul style="list-style-type: none"> ■ Automated Droplet Generation Oil for Probes ■ Automated Droplet Generation Oil for EvaGreen® 	1864110 1864112
Droplet Reader Oil	ddPCR droplet reader oil for QX600™ and QX200™ instruments and systems	1863004
Pipet Tips	Pipet tips for the AutoDG	1864120 (pkg of 20) 1864121 (pkg of 40)
Pipet Tip Bins	Pipet tip waste bins for the AutoDG	1864125

Table 6. Thermal cyclers and plate sealer

Product	Description	Catalog Number
C1000 Touch Thermal Cycler with 96-Deepwell Reaction Module	Includes the C1000 Touch Thermal Cycler chassis, 96-deepwell reaction module, USB flash drive	1851197
PTC Tempo Deepwell Thermal Cycler	Includes the thermal cycler, power cord, USB cable, and Ethernet cable	12015392

Table 6. Thermal cyclers and plate sealer, continued

Product	Description	Catalog Number
PX1 PCR Plate Sealer	PCR plate sealer, includes heat sealing instrument, plate support block that holds 96-well and 384-well plates, sealing frame, power cord	1814000
Pierceable Foil Heat Seal	Heat seal for the PX1 PCR Plate Sealer	1814040

Table 7. ddPCR supermixes

Supermix	Description	Catalog number	
ddPCR EvaGreen® Supermix	2x supermix, for use in nucleic acid sample preparation with the QX600 and QX200 ddPCR systems	1864033	2ml (2 x 1ml)
		1864034	5ml (5 x 1ml)
		1864035	25ml (25 x 1ml)
		1864036	50ml (50 x 1ml)
ddPCR Supermix for Probes (no dUTP)	2x supermix, for use in nucleic acid sample preparation with the QX600 and QX200 ddPCR systems	1863023	2ml (2 x 1ml)
		1863024	5ml (5 x 1ml)
		1863025	25ml (25 x 1)
ddPCR Supermix for Probes	2x supermix, for use in sample preparation with the QX600 and QX200 ddPCR systems	1863026	2ml (2 x 1ml)
		1863010	5ml (5 x 1ml)
		1863027	25ml (25 x 1ml)
		1863028	50ml (50 x 1ml)
ddPCR Multiplex Supermix	4x supermix especially suited for probe-based detection of multiple targets in DNA samples using the QX600 and QX200 ddPCR systems	12005909	1.2ml (2 x 0.6ml)
		12005910	3 ml (5 x 0.6 ml)
		12005911	12.5 ml (5 x 2.5 ml),
ddPCR Supermix for Residual DNA Quantification	2x supermix, for use in residual DNA detection with the QX600 and QX200 ddPCR systems	1864037	2ml (2 x 1ml)
		1864038	5ml (5 x 1ml)
		1864039	25ml (25 x 1ml)
		1864040	50ml (50 x 1ml)
One-step RT- ddPCR Advanced Kit for Probes	200 or 500x 20 µl reaction kit, for absolute quantification of target RNA in a one-step format with the QX600 and QX200 ddPCR systems	1864021	2ml (2 x 1ml)
		1864022	5ml (5 x 1ml)

Table 8. Buffer controls

Buffer	Catalog Number
ddPCR Buffer Control Kit for Probes	1863052
QX200 Buffer Control Kit for EvaGreen®	1864052

Environmental Requirements

Table 9 lists the environmental requirements for the Automated Droplet Generator.

Important: You must use the supplied shielded cables with your instrument to ensure compliance with the Class A FCC limits.

Table 9. Conditions for safe use

Usage aspect	Requirements
Rated input power	100–240 V, 50–60 Hz, 221W90W (plugs into standard AC receptacle)
Fuses	4 A, 24 V internal (not user serviceable)
Fuses	
Voltage fluctuations	± 10% for the included external power supply Note: Use only the power cord supplied with the equipment.
Pollution degree	2
Usage temperature	18–30° C, optimal range is 23 ± 2° C
Relative humidity	50% max ___% non-condensing
Altitude	0 to 0–6,500 ft (0–2,000 m), optimal range is 0–500 m 0 to ___ ft (0 to ___ m) (above sea level)
Installation category	II (external power supply plugs into a standard AC receptacle) Indoor use only

Usage aspect	Requirements
Ventilation requirements	The following distances should be unobstructed for proper ventilation: <ul style="list-style-type: none"><li>■ __ in (__ cm) on the left and right sides of the instrument<li>■ __ in (__ cm) behind the instrument 5 in (13 cm) unobstructed to the left and right and 2 in (5 cm) behind the instrument

Chapter 3 Getting Started

This section contains suggested best practices and procedures for using the Automated Droplet Generator. Note the following general information:

- For best results, operate the instrument at room temperature (18 to 30° C).
- For your safety, ensure the instrument is placed on a sturdy and level surface that is free from vibration.
- To reduce static electricity, avoid touching the wells if you are wearing latex gloves.

Connecting the Instrument

Only a Bio-Rad service engineer is authorized to perform initial setup and qualification procedures for your droplet generation instrument. If you need to move it from one location to another, follow the instructions below.

To place and connect the instrument

1. Place the AutoDG instrument on a sturdy counter top or table, positioning it so it can be easily disconnected from the power source.
2. To ensure proper ventilation, ensure there is 2 in (~5 cm) clear space behind the instrument, and 5 in (~13 cm) clear space on either side of the instrument.

Note: For information on other requirements for placement of the instrument, see [Environmental Requirements on page 24](#).

3. Connect the instrument power supply to the power source.

Important: Use only the power cord, adapter, and USB port provided.

Starting the Instrument

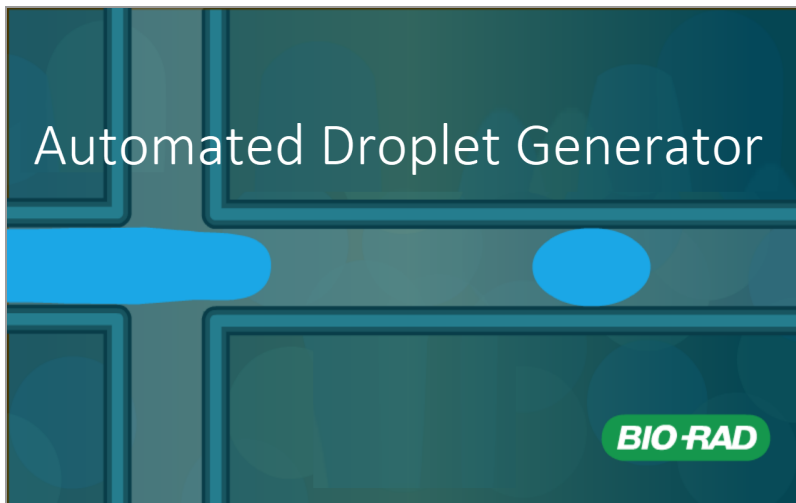
The AutoDG is designed to remain powered on in order to preserve positive airflow inside the instrument and to track consumables use. The instrument remains in an idle state when not in use.

To exit idle mode

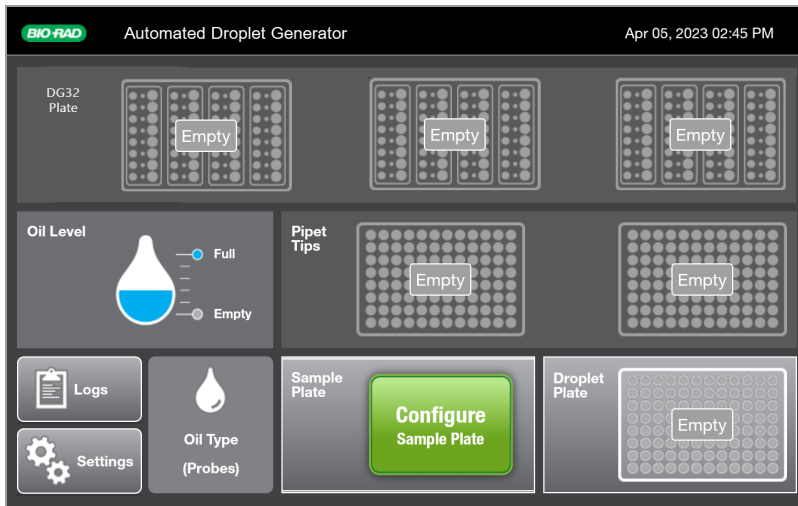
- ▶ Tap the touchscreen.

Note the following:

- For best results, operate the instrument at room temperature (18 to 30° C).
- For your safety, ensure the instrument is placed on a sturdy and level surface that is free from vibration.
- To reduce static electricity, avoid touching the wells if you are wearing latex gloves.









When the startup is finished, the touch screen appears and the buttons advise where used consumables must be removed before you load new ones. On first use, the icons should be gray and read Empty, as shown in the following graphic. For subsequent usage, gray icons indicate Empty or Used.



Status Indicators

The indicator lights with text on the Home screen are colored to indicate the status of the instrument.

Table 10. Status indicators

Deck light status	Touch screen status indicator color	Touch screen status indicator text	The user can...
On		Used	Remove used consumables.
Off		Empty	Configure the plate layout.
Yellow		Load	Load consumables, as prompted, for the specified plate layout.
Green		Ready	Load the sample and droplet plates; consumables in the green positions are ready for use.
Blue		Complete	Run complete and droplets ready.
Red		Unknown	Consumable status unknown after power loss. User must manually confirm or replace consumables.

Chapter 4 System Settings

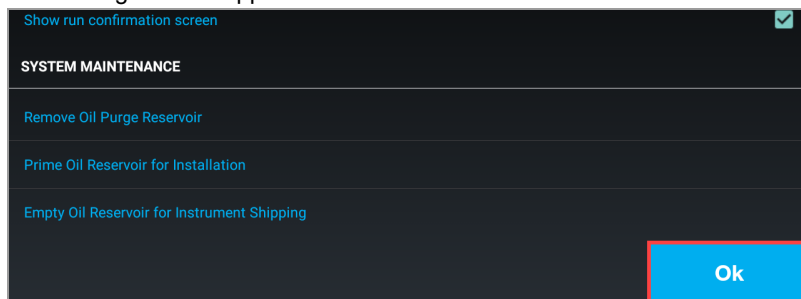
The Automated Droplet Generator features a scrolling Settings screen, which provides the options shown and described in [Table 11](#), [Table 12](#), and [Table 13](#).

To open the Settings screen

1. Tap the Settings button in the lower-left corner.



The Settings screen appears.



2. Scroll to the applicable option category.
3. Tap an option (in blue text), and then tap OK.

Table 11. Settings screen 1

Use this...	To do this...
General settings	<ul style="list-style-type: none">■ Set the date and time conform to your time zone and standard or daylight savings time■ View license and version information at the About link
Run Settings	<ul style="list-style-type: none">■ Show or hide the run confirmation screen

Table 11. Settings screen 1, continued

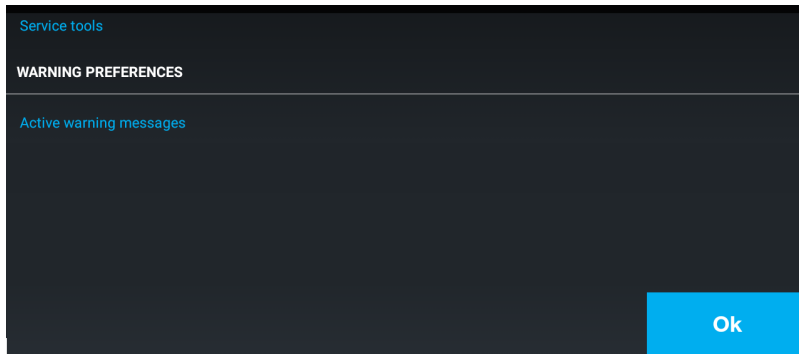
Use this...	To do this...
System Maintenance	<ul style="list-style-type: none"> ■ Remove, prime, or empty the oil reservoir

Table 12. Settings screen 2

Use this...	To do this...
Logs	<ul style="list-style-type: none"> ■ View the run history log
Update	<ul style="list-style-type: none"> ■ Update the software and firmware, or restore system defaults
Service tools	<ul style="list-style-type: none"> ■ Access service tools

Table 13. Settings screen 3

Use this...	To do this...
Warning preferences	<ul style="list-style-type: none">■ View active warning messages about the instrument and droplet generation runs■ Select or clear the checkboxes to choose the messages to display for small droplets



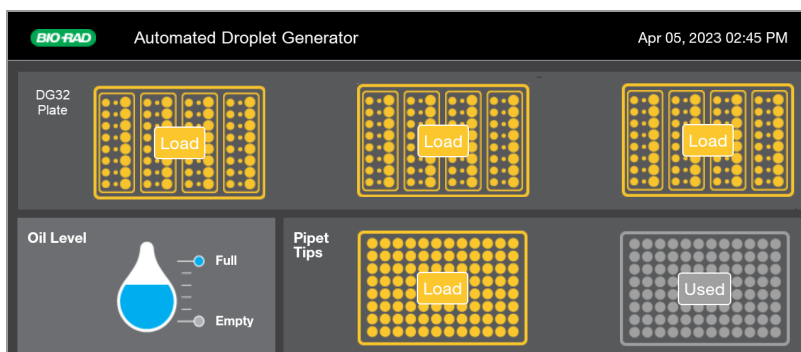
Chapter 5 Setting Up the Run

This chapter contains information on the following:

- Best practices
- Preparing the cooling block
- Preparing the sample
- Setting the plate layout
- Loading the cartridges
- Loading the pipet tips
- Replacing the oil or changing the oil type (Probes or EvaGreen®)
- Loading the sample plate
- Loading the cooling block and droplet plate

You must replace certain consumables for every run. The AutoDG calculates what is needed based on the number of columns you specify on the Plate Layout screen, and then indicates on the touch screen the consumables that must be loaded, or emptied and then loaded. Consumables include oil, pipet tips, waste bins, DG32 cartridges, gaskets, and plates.

Important: If a power loss occurs at any time the instrument prompts you to check, and possibly replace, the consumables. If you do not receive a message, but are not sure about consumables still in the instrument, go ahead and replace them.



Best Practices

The following sections describe recommended practices for setting up your run. Complete the instructions in order. Before you begin, ensure the power light on the instrument deck is illuminated, indicating the instrument is started up.

General Recommendations

- If the instrument has not been used for a week or more, but remained connected to the power source, Bio-Rad recommends performing a flush and prime routine before running a plate. The Flush and Prime options are available from the Settings menu.
- Replace the oil when the bottle volume is low or empty and change the oil when the type does not match your chemistry.

Tip: When you change the oil, the instrument automatically performs a flush and prime sequence.

- To avoid contamination, load consumables from back to front. Do not place anything else on the instrument deck.

Tip: Consumables include automated droplet generator oil, pipet tips, tip waste bins, DG32 cartridges, gaskets, and plates.

gaskets, and plates.

- The instrument's electronic braking system prevents the door from closing accidentally. However, keep your hands clear to avoid accidental injury.

Tip: If the door is left open for over 20 minutes, it closes automatically to protect the HEPA-filtered enclosures.

Environmental Recommendations

1. Operate at room temperature between 18–30° C (ideally 23° C).
2. Locate the AutoDG on a level, sturdy bench that is free from vibration.
3. When possible, avoid wearing latex gloves and touching the wells in ddPCR plate to avoid static electricity.

Preparing the Sample

1. Empty the ddPCR Supermix tube completely and vortex vigorously at maximum speed for 15 sec.
2. Ensure the supermix concentration is 1x in final reaction.
3. Prepare sample in low-bind Eppendorf tubes or ddPCR 96-Well Plate (catalog #12001925).
Note: Use Rainin tips for all sample handling steps.
4. Ensure the pipet is calibrated according to manufacturing recommendations.
5. If the sample plate was stored at 4° C, let the sample plate equilibrate to room temperature before initiating the AutoDG run (~10 min).
6. Fill up the entire column in the ddPCR plate with samples or control buffer.

Sealing the Plate

1. Seal a plate with Bio-Rad's PX1 PCR Plate Sealer (catalog #1814000) at 180° C for 5 sec:
 - a. Use Pierceable Foil Heat Seal (catalog #1814040).
 - b. Do not seal the plate twice.
 - c. Use setting 180° C for 5 sec.
 - d. Do not store the block in PX1.
 - e. Do not roll the plate after sealing.

Vortexing the Plate

- ▶ To mix the sample vigorously and uniformly, vortex the entire plate with the plate attachment for 15 sec at maximum speed (3200–3500 rpm).

Note: If the vortex has only a cup head, vortex the ddPCR Plate in at least 6 locations on the plate for 5 seconds each at maximum speed (3200–3500 rpm).

Tip: As an alternate option for mixing, pipet up and down half volume of reaction 20 times per well.

Centrifuging the Plate

Important: To avoid contamination or debris in samples, seal the plate before centrifuging.

- ▶ Centrifuge the plate at 1000 rcf for 1 minute and verify there are no bubbles on bottom of wells.

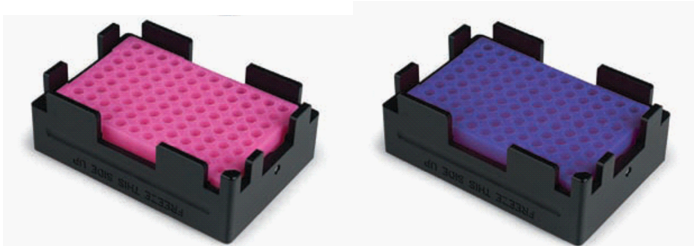
Note: If there are bubbles, flick the wells or tap the plate and centrifuge again.

Preparing the Cooling Block

To prepare the cooling block

- ▶ Place the cooling block upside down in a -20°C freezer for at least two hours before configuring your run and inserting the droplet plate assembly into the AutoDG.

The block changes from pink (room temperature) to dark purple (correct temperature).



When the block is properly cooled you can place it in the instrument, followed by the droplet plate, and then begin your run.

Important: Ensure the remaining sequential tasks specified in this chapter are completed first.

Tip: When the run is finished, you can put the cooling block back in the freezer to save time preparing your next run. Ensure the cooling block is upside down.

Preparing the Sample

This section contains suggested best practices and procedures for preparing the sample for the droplet generation run. Note the following general recommendations for best practices in preparing the PCR reaction.

- Combine ddPCR supermix, 20x primers and probe, and DNA sample according to the instructions in the supermix product insert.
 - Use standard lab precautions to avoid contamination of the reaction mix and sample. Wear gloves, work in a clean area (such as a PCR hood) and use clean pipets and low protein binding tubes.
 - Use only the PCR supermixes recommended in [Appendix C, Ordering Information](#).
 - Approved supermixes contain reagents required for droplet generation. Follow instructions in the product inserts to prepare the samples for droplet generation.
 - Using unapproved supermixes can harm the instrument and void the warranty.
 - Ensure the supermix concentration is 1x in final reaction.
 - Prepare the sample in low-bind Eppendorf tubes or ddPCR 96-Well Plate (catalog #12001925).
 - The concentration of intact human genomic DNA should be less than 66 ng per 20 μ l reaction. If using higher concentrations, digest DNA with a restriction endonuclease that does not cut target or reference amplicons.
 - Mix by vortexing in short pulses, and then briefly centrifuge. Note the following:
 - Vortex entire plate with plate attachment for 15 sec at maximum speed (3200–3500 rpm) to mix the sample vigorously and uniformly.
 - If the vortex has only a cup head, vortex the plate in at least 6 locations on the plate for 5 sec at each spot at maximum speed (3200–3500 rpm).
 - You can also pipet up and down half volume of reaction 20 times per well.
- Note:** Vortex the supermixes thoroughly to ensure homogeneity (maximum speed for 15 sec), since a concentration gradient may form during -20° C storage. Alternatively, pipet up and down more than 20 times to mix. Before dispensing, centrifuge briefly to collect contents at the bottom of the tube.
- Ensure the pipet is calibrated according to manufacturing recommendations.

- Use Rainin pipet tips for all sample handling steps.
- Thaw and equilibrate reaction components to room temperature. Note the following:
 - If the sample is prone to thermal degradation, prepare the reaction mix on ice, but equilibrate the reaction mix to room temperature (approximately 3 min) before loading in the sample plate.
 - If the sample plate was stored at 4°C, let the sample plate equilibrate to room temperature before initiating the Automated Droplet Generator (approximately 10 min).
- Fill up the entire column in ddPCR plate with samples or control buffer.
- Seal the plate using Bio-Rad's PX1 PCR Plate Sealer (catalog #1814000) at 180°C for 5 sec. Note the following:
 - Use Pierceable Foil Heat Seal (catalog #1814040).
 - Use the 180°C setting for 5 sec to seal.
 - Do not seal twice.
 - Do not store the cooling block in the PX1.
 - Do not roll the plate after sealing.
- Centrifuge the plate at 1000 rcf for 1 min and verify no bubbles on bottom of wells. Note the following:
 - Make sure to seal plate first to avoid contamination or debris in samples.
 - If there are bubbles on bottom of wells, flick wells or tap plate and centrifuge again.
- Use the cooling block as following:
 - Ensure the cooling block is properly in place and flush in holder with new empty ddPCR plate pressed firmly into the cooling block.
 - The block should sit flat. Ensure there is no protruding ice on the outside of the block.
 - Ensure cooling block is cold and does not contain liquid.

Specifying the Plate Layout

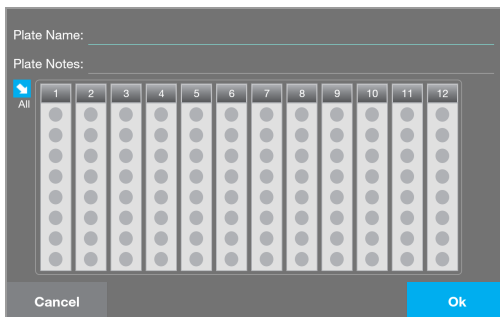
The instrument accepts either a sealed or an open 96-well PCR plate containing prepared ddPCR reactions. You can specify a full or partial plate to match the one containing your samples.

To specify the columns containing the samples

1. Tap the touch screen to end idle mode.
2. When the touch screen is enabled, tap Configure Sample Plate.



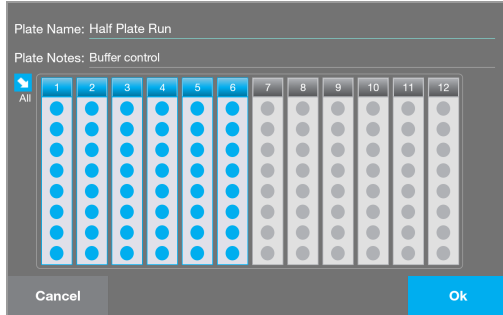
The plate layout appears, with all wells shown as empty.



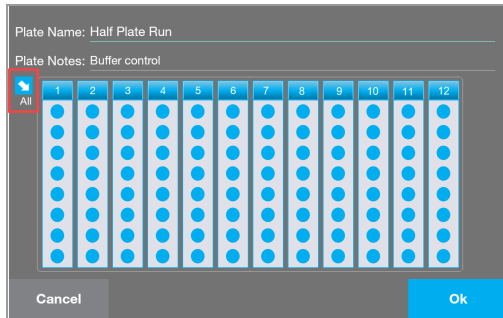
3. Tap in the Plate Name field to display the virtual keyboard and enter a descriptive name for the plate.
4. (Optional) Tap in the Plate Notes field and enter pertinent information.

5. Do one of the following to identify the sample positions in the plate. You can select full columns only.

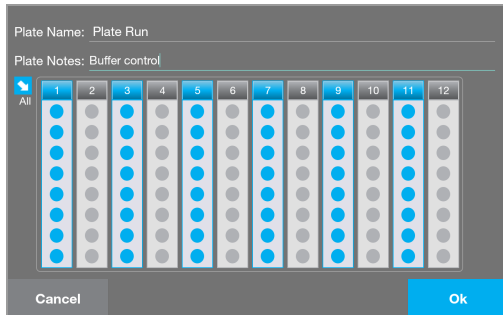
- Swipe across the plate layout to select sequential columns.



- Tap the All icon to select all columns.



- Tap non-contiguous columns, as shown in the following example graphics.



When your plate layout is identified, the instrument calculates the corresponding amounts of consumables that must be loaded.

Opening the Instrument Door

To open the instrument door

1. Ensure the power light on the instrument deck is illuminated, indicating the instrument is started up.
2. Lift up on the handle until it clicks into a locked position.
3. Complete the tasks in the remaining sections to load the required consumables.

Loading the Cartridges

After you select the cartridge type according to the droplet size, you must load the cartridges inside the instrument, along the back row. Each cartridge fits onto one of the three raised blocks.



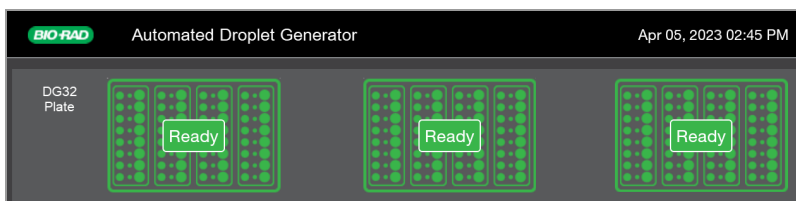
Important: Do not disassemble the cartridges or store them in areas exposed to dust or debris.

To load the cartridges

1. Remove the plastic wrapping from the cartridges.
2. Place each cartridge onto a block, ensuring the green gaskets are on the right.



As each cartridge is correctly placed, the corresponding light on the instrument deck and button on the touch screen change to green.



Loading New Pipet Tips and Waste Bin

AutoDG pipet tips are loaded along the center row of the instrument, with the bin on the left.

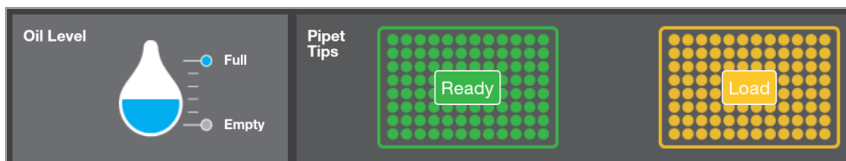


To replace the waste bin and insert new pipet tips

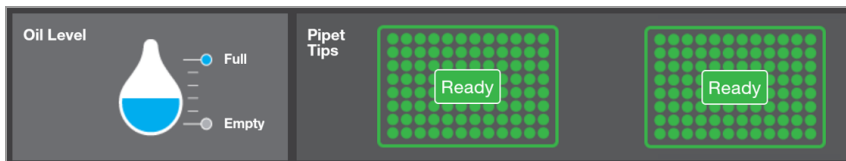
1. Remove the old waste bin and dispose of tips.
2. Insert an empty waste bin.
3. Remove the plastic wrapping and lids from the tip holders and place the holders onto the blocks next to the waste bin.

Important: You can use partially full tip holders or load only one box, but you must ensure the number required for the experiment does not exceed the number in the holder.

After the used tip holders and waste bin are removed, the lights on the instrument deck are yellow and the yellow Load icon appears.



When the tip holders are loaded correctly, the corresponding lights on the instrument interior change to green and the icons on the touch screen change to green.

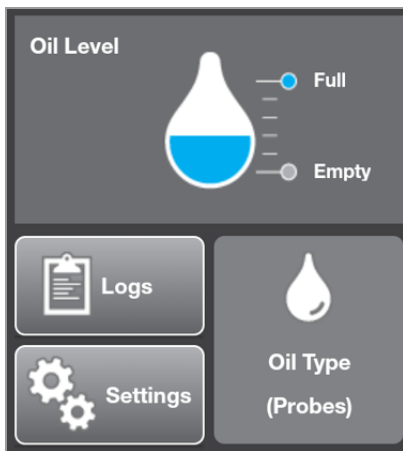


Replacing the Oil or Changing the Oil Type

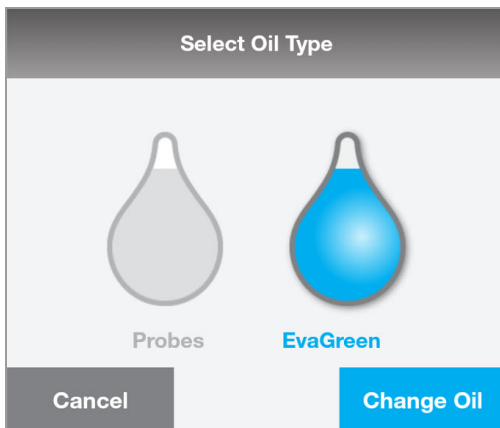
The Automated Droplet Generator indicates if you have enough of the correct oil for your run or if you must install a new bottle or change the oil type. When an oil bottle is installed, the touch screen indicates the level of oil available and the type of oil installed.

To replace the oil bottle or change the oil type

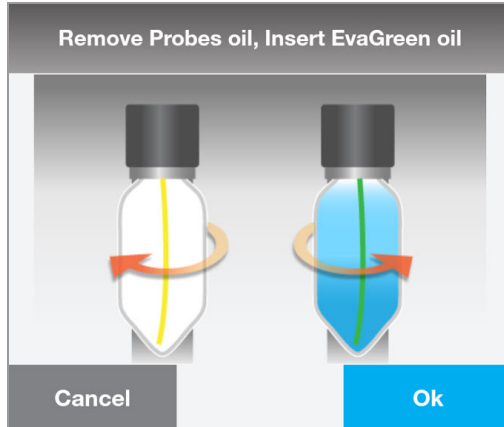
1. Tap the Oil Type button.



2. Tap the applicable bottle icon, and then tap Change Oil.



3. When prompted by the system, remove the bottle currently installed.



Note: The straw in the center of the graphic is colored yellow for the Probes oil and green for the EvaGreen® oil.

4. Obtain a new oil bottle or a bottle containing a different oil type and remove the cap.

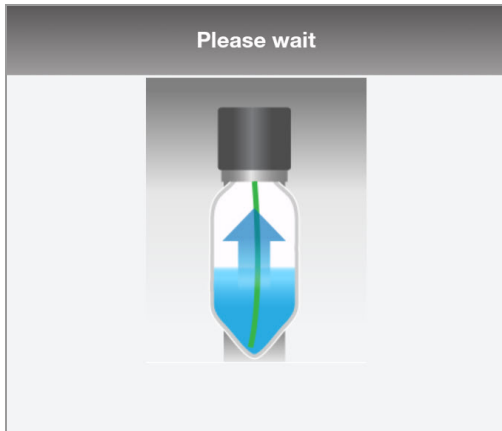
Tip: The physical bottles have different colored labels. The Probes oil bottle has a yellow label and the EvaGreen® oil bottle has a green label.

5. Insert the bottle into the tower of the oil delivery system at the front left corner of the instrument.



If you do not insert the bottle completely, the instrument displays a prompt to reload the bottle. Remove and reinsert the bottle.

The touch screen verifies the new oil level or oil type, and then performs a flush and prime routine through the delivery system and into the oil waste reservoir for several minutes.



Tip: Optionally, you can follow this procedure to load the appropriate droplet generation oil ahead of time so you don't have to wait for the prime and flush procedures to finish.

When the sequence is finished, the following screen appears.



6. Tap OK to return to the Home screen.

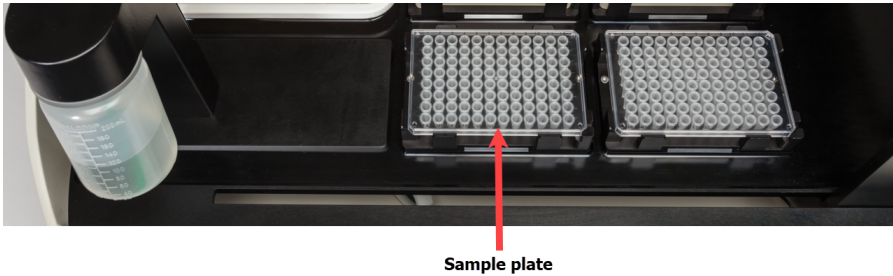
The Oil Type icon reflects the type of oil loaded and primed and the Oil Level icon shows the amount of oil in the bottle.

Loading the Sample Plate

Important: A 96-well sample plate, which contains prepared ddPCR reactions or buffer, is required for every run, regardless of the number of columns selected.

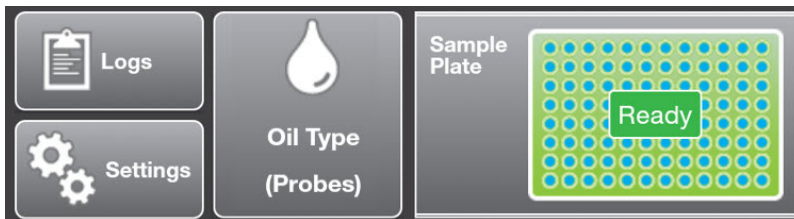
To load the sample plate into the front row of the instrument

- ▶ Place the plate into the front left plate holder, labeled on the screen as Sample Plate.



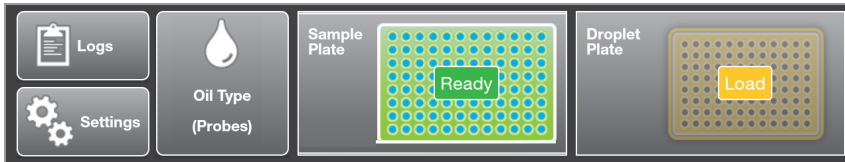
The holder is designed for proper orientation and contains plate clips to support sealed plates. When the plate is inserted correctly, the corresponding light in the instrument changes to green.

As the light turns green on the deck, the Sample Plate indicator on the touch screen changes to green.



Loading the Cooling Block and Droplet Plate

A clean droplet plate is required for every run, regardless of the number of columns selected when you identified the plate layout.



To load the droplet plate assembly (cooling block and plate)

1. Remove the cooling block from the freezer and place it into the front-right plate holder.

Note the following:

- Ensure the cooling block is cold and does not have liquid sloshing inside. The cooled block should be a dark purple color to indicate the proper temperature. If the block is pink, do not use it until you have properly cooled it again. See [Preparing the Cooling Block on page 38](#) for information.
- Ensure there is no ice on the outside of the block that would prevent the plate from sitting flat.
- The holder is keyed for proper orientation of the cooling block. Ensure the cooling block is properly in place and flush in its holder.

2. Place the droplet plate into the cooling block (front right plate holder), labeled on the screen as Droplet Plate.

Note: Press the plate firmly into the cooling block.



Droplet plate

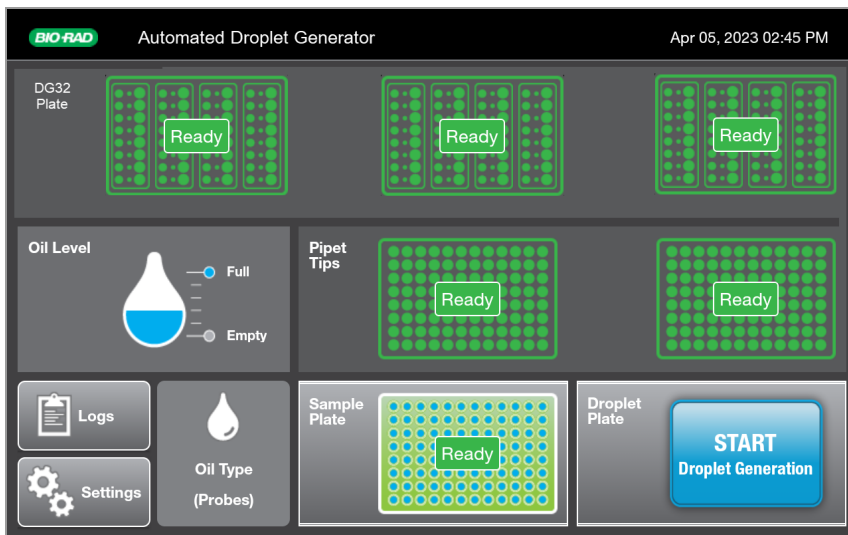
The instrument light changes from yellow to green when the block is inserted correctly. As the light turns green on the deck, the icon on the touch screen changes from blinking yellow to solid green and Ready appears.

As with the sample plate, the droplet plate is designed for proper orientation. When the plate is inserted correctly, the corresponding light in the instrument changes to green.

3. To recool the block and save prep time on future runs, place the cooling block, upside down, into the freezer.

Important: The cooling block requires at least two hours to cool to the proper temperature.

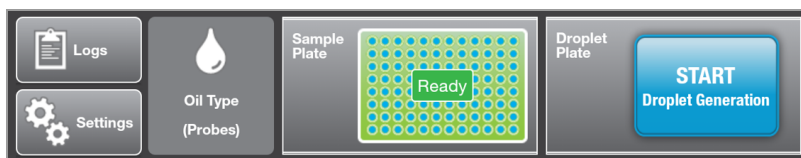
When all requirements are satisfied, the START Droplet Generation button is enabled.



Continue to [Generating Droplets on page 51](#).

Chapter 6 Generating Droplets

After all consumables are loaded, waste is removed, and the corresponding lights on the deck and touch screen are green, a blue start button appears in the lower bottom-right corner of the screen.



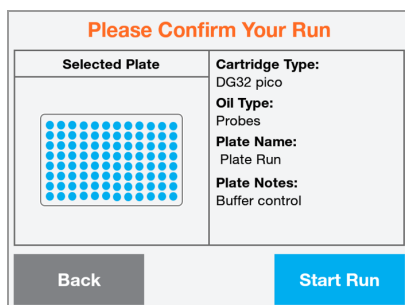
Note the following:

- Ensure the Automated Droplet Generator is situated on a level, sturdy bench that is free from vibration.
- Operate the instrument with the room temperature range (between 18° C and 30° C). The ideal room temperature is 23° C.
- To avoid static electricity, remove latex gloves before touching the plate and instrument.

To confirm the settings and start the run

1. Tap Start Droplet Generation.

A confirmation screen appears, showing the plate layout you specified.



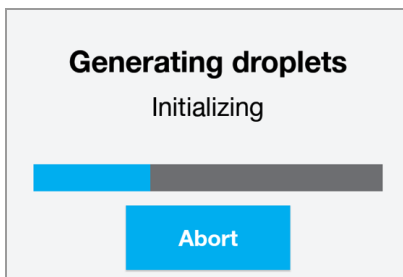
2. If the layout and information displayed matches your plate, tap Start Run.

The door automatically closes and the following message appears.



Important: Do not open the door before the Droplets Ready message appears, or the run might be terminated and your samples lost.

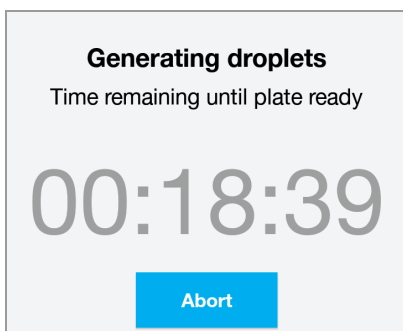
An initialization message appears.



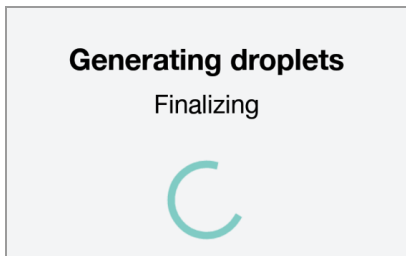
The initialization takes up to 5 min longer if you have just changed the oil type.

Note: If you need to cancel the run, you can tap the Abort at any time during the droplet generation process.

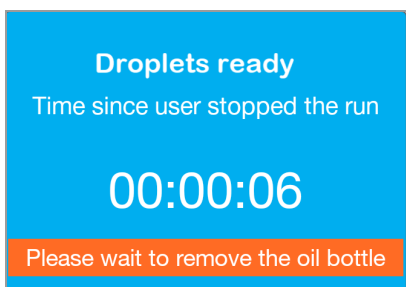
After initialization, the instrument displays a countdown timer on the screen, showing the time remaining until the plate of droplets is ready.



When the run is ready to conclude, the following message appears.



When the run is finished, the following blue pulsing screen appears and the timer begins counting forward to show the time elapsed since the run concluded.



Messages to the user appear below the timer.

Important: Do not remove the oil bottle until the unused oils are returned and the highlighted message disappears.

3. When the door on the instrument unlocks, remove the droplet plate from the instrument.
4. Remove and discard used or empty single-use consumables, such as cartridges, pipet tips, and plates.
5. Seal the plate for thermal cycling and droplet reading. For information, refer to the user guides for sealing, thermal cycling, and droplet reading instruments.

Appendix A Errors and Logs

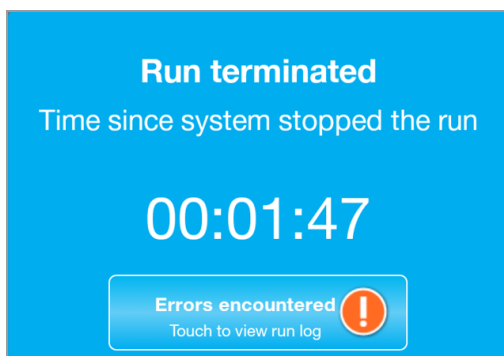
The Automated Droplet Generator displays error messages when there is an instrument or run failure that must be resolved before continuing. Continue to the following sections for specific information and instructions to resolve common errors and review log files.

Resolving System and Run Errors

Errors are indicated by the following icon:



When the icon appears, follow the instructions in the troubleshooting guidance messages that display on the touch screen.



You can also view logs on the touch screen to see more information regarding an error. If a resolution is either unavailable or doesn't fix the issue, the instrument advises you to export the logs to a USB drive and send them to Bio-Rad Technical Support. For information, see [Exporting All Logs on page 59](#).

The AutoDG might experience one of the following error types:

- System error, such as a power loss (identified as System Error on the touch screen).
- Run error, such as an obstruction or consumables error (identified as Error on the touch screen)

Resolving a Power Loss

If consumables (cartridges, pipet tips, and so forth) were loaded in the instrument when power was lost or disconnected, a message prompting you to check the consumables appears on the touch screen.

If power was lost and the condition of any items loaded onto the instrument deck is questionable, complete the following steps:

1. Remove and discard the current consumables.
2. Load new consumables.

Resolving System Errors and Restarting the Run

If the instrument encounters a system error during the run, it stops the run and displays an error message appears that advises you to power cycle the instrument.

To power cycle the instrument

1. Unplug the AutoDG power supply.
2. Wait 30 sec and plug in the power supply.
3. After the instrument self-check, manually confirm the status of the consumables.

To restart the run

1. On the Home screen, tap Configure Sample Plate.
2. Select the columns of samples remaining to be processed, and then tap OK.
3. Tap Start Droplet Generation to resume the run.
4. If you need additional assistance, contact Bio-Rad Technical Support.

Resolving Run Errors and Restarting the Run

If the AutoDG encounters a problem while the run is in progress, such as an obstruction or consumables issue, the instrument stops the run and displays an error message.

To resolve the issue

1. Open the door and follow the instructions on the touch screen.

You might be prompted to display additional messages and information to resolve the issue. If so, tap the screen to proceed.

2. Close the door, and then tap OK on the touch screen.

To restart the run

1. On the Home screen, tap Configure Sample Plate.

The instrument remembers the status of all consumables, as long as it remains connected to a power supply. If power was lost, see [Resolving a Power Loss on page 56](#).

2. Select the columns of samples remaining to be processed, and then tap OK.
3. Tap Start Droplet Generation to resume the run.
4. If you need additional assistance, contact Bio-Rad Technical Support.

Reviewing the Logs

The Automated Droplet Generator stores information about each run, including consumables used, rows of reactions processed, and any errors that may have occurred. You can view run history and details, and export all logs for a particular run to a USB drive.

Accessing Run Logs

To access a run log

1. Tap the Run Log button on the Home screen.



The Run Log screen appears.

The screenshot shows the 'Run Logs' screen. At the top, it says 'BIO-RAD Automated Droplet Generator' and 'Apr 05, 2023 02:45 PM'. The screen is divided into two main sections: 'Summary' and 'Details'. The 'Summary' section lists several runs with their dates, times, and statuses. The 'Details' section provides specific information for a selected run. At the bottom, there are 'Export All' and 'Ok' buttons.

Summary		Details	
Mar 23, 2022 03:00 PM	Completed	Start Date:	Mar 16, 2022 12:20 PM
Mar 23, 2022 02:27 PM	Power loss during run	End Date:	Mar 16, 2022 12:46 PM
Mar 21, 2022 03:29 PM	Completed	Status:	Terminated by system
Mar 21, 2022 03:13 PM	Terminated by user with	Cartridge Type:	DG32
Mar 21, 2022 03:08 PM	Terminated by user	Oil Type:	Probes
Mar 21, 2022 02:59 PM	Terminated by system	Plate Name:	low bottle run
Mar 21, 2022 02:16 PM	Terminated by user	Errors:	6 More Info
Mar 18, 2022 03:45 PM	Completed	# DG8 Used:	4
Mar 16, 2022 03:43 PM	Completed with errors	# Tips Used:	8
Mar 16, 2022 03:16 PM	Terminated by user with	# Sample Columns:	5
Mar 16, 2022 01:49 PM	Terminated by user with	# Droplet Columns:	4
Mar 16, 2022 01:19 PM	Terminated by user with	Plate Notes:	test
Mar 16, 2022 12:46 PM	Terminated by system	Instrument Serial #:	773BRP3-3

2. Tap a run in the left panel to display additional details.
3. When you are done, tap OK and then OK again.

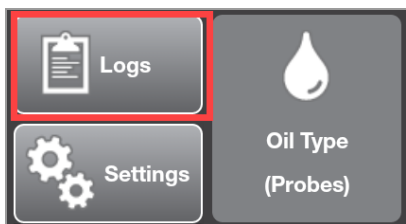
Exporting All Logs

Important: No sample data are transferred during the export process.

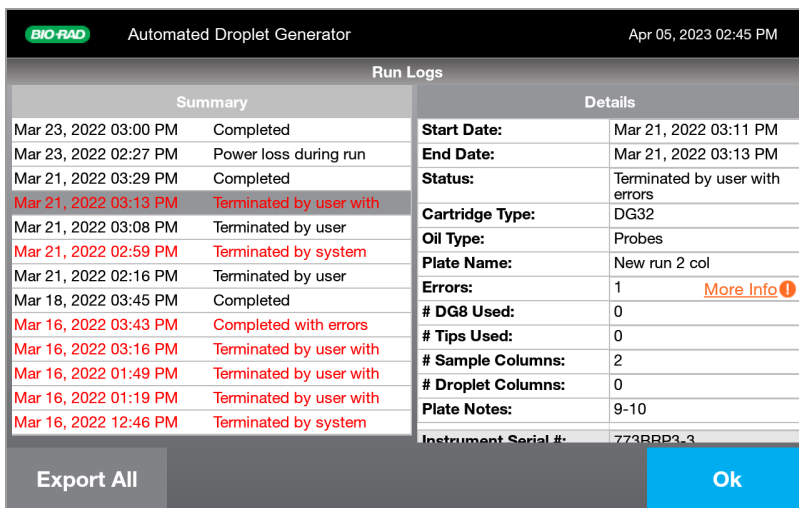
You can export the logs to a USB for your own information, or to provide to Bio-Rad Technical Support.

To export all logs

1. On the Home screen, tap Logs.



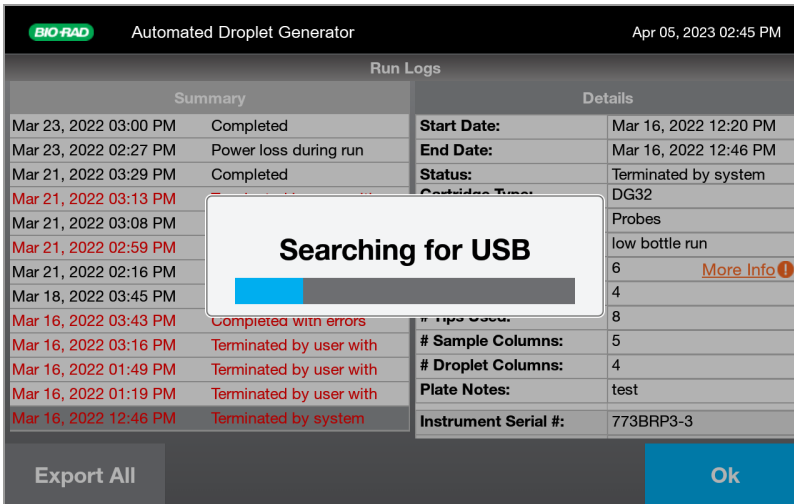
The Run Logs screen appears.



2. On the right side of the instrument, slide the magnetic panel down to release it, and then pull straight out to remove the panel. Insert a USB drive into the USB port and tap Logs.

3. Insert a USB drive into the USB port.

The Searching for USB screen appears.



4. When the system recognizes the USB drive, tap Export All.



Note: If the instrument does not recognize the USB drive, a message appears on the touch screen. If this occurs, remove and reinsert the USB drive, and then tap Retry.

The system exports the run, history, debug, and About info logs to the USB drive. When the export is finished, a success message appears on the touch screen.

5. Tap OK to return to the Home screen.
6. Remove the USB drive and replace the panel on the right side.
7. Send the USB drive, along with the error number and instrument serial number from the Run Details screen to Bio-Rad Technical Support.

Additional Troubleshooting Suggestions

Use the following table to help you troubleshoot issues with your AutoDG instrument. If you have additional questions or if the recommended action does not resolve the problem, please contact Bio-Rad Technical Support.

Issue	Possible Cause	Action
No screen display or no response when you power on the instrument	The instrument is not connected to a power source.	Ensure the power cord is securely connected.
Screen display is missing characters, is illegible, or is not responsive to touch	An LCD screen failure occurred.	Request service from Bio-Rad.
Door won't open, or is difficult to open	The instrument is running.	Wait for droplet generation to complete or touch Abort to terminate the run early. Once movement inside the instrument has stopped, the door unlocks and can be opened easily.
	The instrument is disconnected from a power supply.	Connect the instrument to a power supply and wait for initialization to complete; the door will unlock and can be opened easily.
The light under a consumable remains yellow	Consumable is not completely inserted or is in wrong orientation.	Reposition the consumable.
Oil level icon changes to red	The automated droplet generator oil bottle does not contain enough oil to run a full plate, and requires additional oil to complete the next run.	Be prepared to insert a new bottle of oil during the setup process for the next plate.

Appendix A Errors and Logs

Appendix B Instrument Maintenance

During the installation and qualification of the Automated Droplet Generator, a Bio-Rad service engineer verifies the instrument functions in accordance with manufacturer specifications. To ensure the instrument continues to function according to specifications, Bio-Rad recommends that a Bio-Rad service engineer perform yearly preventive maintenance. For day-to-day maintenance, see the information in the following sections.

General Care

For general care of the instrument, do the following:

- To wipe down instrument surfaces, use deionized/distilled water on a slightly dampened cloth. *For decontamination*, use 10% bleach, followed by 70% ethanol and/or deionized/ distilled water, to clean all surfaces except the door. *Do not use acetone or tap water.*
- Inspect the instrument regularly to check for damaged external components or wiring. *Do not use if damaged.*
- Do not use the AutoDG with biohazardous material.
- Do not replace detachable power cord with an uncertified or inadequately rated cord.

Managing Waste

You must apply standard Material Safety Data Sheet (MSDS) and OSHA practices when handling and disposing of generated waste. A typical waste profile should contain the following:

Table 14. Managing Waste

Chemical name	Weight %
Fluorinated fluids	>50%
Water	<50%
Bleach	<10%
Other materials (proteins, nucleic acids, fluorescent dye)	<10%

Note: The chemical identities and exact percentages in the above table are withheld as trade secrets.

Bio-Rad droplet generation and reader fluids are based on fluorinated hydrocarbon chemistry, and should be disposed of in accordance with institutional, state and local regulations. Avoid release to the environment and prevent entry into sewer systems or bodies of water. As a disposal alternative, incinerate in a permitted high-temperature waste incineration facility.

These nonflammable fluids are inert and have low environmental impact and low toxicity.

Toxicological Information

Chemical name: (mixture)

Oral LD50: >5000 mg/kg (Rat)

Dermal LC50: >5000 mg/kg (Rabbit)

Inhalation LD50: >8838 ppm (Rat/8-hr)

Ecological Information

Acute aquatic hazard: LC50 > 500 mg/l (96-hr./static; Pimephales promelas/Fathead minnow)

Chronic aquatic hazard: No information available (GHS Chronic 4)

Cleaning the Oil Purge Reservoir

The oil purge reservoir collects the oil during the flush and prime routines. Bio-Rad recommends cleaning the oil purge reservoir on a quarterly basis, at a minimum. You should clean the oil purge reservoir more often if you are frequently switching between Probes and EvaGreen® automated droplet generation oil chemistries.

Note: The oil collected in the reservoir is unused and does not come into contact with a ddPCR reaction.

To access the oil purge reservoir

1. On the Home screen, tap Settings.
2. Under System Maintenance, tap Remove Oil Purge Reservoir.

Note: If the door is open, it closes automatically and a message appears.

3. Tap OK to continue.

The droplet generation head slides out of the way, exposing the small oil purge reservoir, and the screen displays a Moving droplet generation head advisory message. Once complete, the onscreen instructions prompt you to remove, clean, and replace the oil purge reservoir.

4. Open the door and remove the reservoir from the back left corner of the instrument deck.

The reservoir is magnetic and can be lifted easily.

5. Wash the oil purge reservoir with distilled water.
6. Dry the reservoir completely, and put it back on the inside deck.
7. To close the door and move the droplet generation head back into place, tap OK.

The Moving droplet generation head message appears as it moves back into place. When complete, a message appears confirming the process is finished.

8. Tap OK to return to the Settings menu.

Software and Firmware Updates

Important: Only a Bio-Rad service engineer is authorized to perform software and firmware updates on the Automated Droplet Generator. The engineer should follow the steps described below.

To update the software and firmware on the instrument

1. To remove the side panel on the right, slide the magnetic panel down to release, then pull straight out.
2. Insert the USB drive containing the software and firmware installation executables into the USB port on the side of the instrument.
3. On the Home screen, tap the Settings button on the home screen.
4. Scroll down to the Update section of the menu and tap Update Software and Firmware.
5. Tap Update and wait while the system completes the upgrade.

When finished, a message appears indicating it is safe to remove the USB drive.

6. Replace the side panel.
7. Turn off the instrument, and then turn it back on.

Appendix C Ordering Information

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

ddPCR System and Instrument Packages

Table 15. ddPCR system and instrument packages

Product	Description	Catalog Number
QX200 AutoDG Droplet Digital PCR System	Includes the AutoDG, QX200 Droplet Reader, computer, and QX Manager Software Standard Edition	1864100
QX600 AutoDG Droplet Digital PCR System	Includes the AutoDG, QX600 Droplet Reader, computer, QX Manager Software Standard Edition, and consumables	17008371
Automated Droplet Generator	Includes the AutoDG (1), cooling block accessory (1), oil purge reservoir (1), and power cord (1)	1864101
QX200 Droplet Reader	Includes the droplet reader, two plate holders, USB cable, and power cord	1864003
QX600 Droplet Reader	Includes the droplet reader, two plate holders, USB cable, and power cord	12013328

Thermal Cyclers and Plate Sealer

Table 16. Thermal cyclers and plate sealer

Product	Description	Catalog Number
C1000 Touch Thermal Cycler with 96-Deepwell Reaction Module	Includes the C1000 Touch Thermal Cycler chassis, 96-deepwell reaction module, USB flash drive	1851197
PTC Tempo Deepwell Thermal Cycler	Includes the thermal cycler, power cord, USB cable, and Ethernet cable	12015392

Table 16. Thermal cyclers and plate sealer, continued

Product	Description	Catalog Number
PX1 PCR Plate Sealer	PCR plate sealer, includes heat sealing instrument, plate support block that holds 96-well and 384-well plates, sealing frame, power cord	1814000
Pierceable Foil Heat Seal	Heat seal for the PX1 PCR Plate Sealer	1814040

AutoDG Accessories

Table 17. Automated Droplet Generator accessories

Product	Description	Catalog Number
Cooling block accessory	Prevents evaporation during droplet generation	12002819
Oil purge reservoir	Collects oil waste from priming and flushing Note: Contact Bio-Rad Technical Support for replacement information.	N/A
Power cord	Connects the AutoDG to the power source Note: Contact Bio-Rad Technical Support for replacement information.	N/A

QX600 Droplet Reader Accessories

Table 18. QX600 Droplet Reader accessories

Product	Description	Catalog Number
Computer	Computer that connects to the QX600 Droplet Reader for data collection and analysis	12017458
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

Table 18. QX600 Droplet Reader accessories, continued

Product	Description	Catalog Number
Droplet reader plate holders (2)	Used to position the 96-well plate in the droplet reader plate compartment	12006834

QX200 Droplet Reader Accessories

Table 19. QX200 Droplet Reader accessories

Product	Description	Catalog Number
Computer	Computer that connects to the QX200 Droplet Reader for data collection and analysis	12017458
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	12006834

ddPCR Consumables and Other Materials

Table 20. Consumables and other materials

Product	Description	Catalog Number
ddPCR 96-Well Plates	Clear well/clear shell semi-skirted plates	12001925 (pkg of 25)
DG32 Droplet Generation Cartridges	Microfluidic cartridge with gasket for the AutoDG	1864108 (pkg of 30) 1864109 (pkg of 60)
Pipet Tips	Pipet tips for the AutoDG	1864120 (pkg of 20) 1864121 (pkg of 40)
Pipet Tip Bins	Pipet tip waste bins for the AutoDG	1864125
Automated Droplet Generation Oils	Automated droplet generation oils for the AutoDG: <ul style="list-style-type: none"> ■ Automated Droplet Generation Oil for Probes ■ Automated Droplet Generation Oil for EvaGreen® 	1864110 1864112
Rainin Pipets	<ul style="list-style-type: none"> ■ 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 for PX1	Pierceable foil plate seals for PX1 Plate Sealer	1814040
ddPCR Droplet Reader Oil	Droplet reader oil for the QX600 Droplet Reader and QX200 Droplet Reader	1863004
Droplet reader waste bottle	You can use an empty droplet reader oil bottle to collect the waste from droplet reading.	N/A

ddPCR Supermixes

Table 21. ddPCR supermixes

Supermix	Description	Catalog number	
ddPCR EvaGreen® Supermix	2x supermix, for use in nucleic acid sample preparation with the QX600 and QX200 ddPCR systems	1864033	2ml (2 x 1ml)
		1864034	5ml (5 x 1ml)
		1864035	25ml (25 x 1ml)
		1864036	50ml (50 x 1ml)
ddPCR Supermix for Probes (no dUTP)	2x supermix, for use in nucleic acid sample preparation with the QX600 and QX200 ddPCR systems	1863023	2ml (2 x 1ml)
		1863024	5ml (5 x 1ml)
		1863025	25ml (25 x 1)
ddPCR Supermix for Probes	2x supermix, for use in sample preparation with the QX600 and QX200 ddPCR systems	1863026	2ml (2 x 1ml)
		1863010	5ml (5 x 1ml)
		1863027	25ml (25 x 1ml)
		1863028	50ml (50 x 1ml)
ddPCR Multiplex Supermix	4x supermix especially suited for probe-based detection of multiple targets in DNA samples using the QX600 and QX200 ddPCR systems	12005909	1.2ml (2 x 0.6ml)
		12005910	3 ml (5 x 0.6 ml)
		12005911	12.5 ml (5 x 2.5 ml),
ddPCR Supermix for Residual DNA Quantification	2x supermix, for use in residual DNA detection with the QX600 and QX200 ddPCR systems	1864037	2ml (2 x 1ml)
		1864038	5ml (5 x 1ml)
		1864039	25ml (25 x 1ml)
		1864040	50ml (50 x 1ml)
One-step RT- ddPCR Advanced Kit for Probes	200 or 500x 20 µl reaction kit, for absolute quantification of target RNA in a one-step format with the QX600 and QX200 ddPCR systems	1864021	2ml (2 x 1ml)
		1864022	5ml (5 x 1ml)

Buffer Controls

Table 22. Buffer controls

Buffer	Catalog Number
ddPCR Buffer Control Kit for Probes	1863052
QX200 Buffer Control Kit for EvaGreen®	1864052

ddPCR Kits

Table 23. ddPCR Kits

Product	Description	Catalog number
ddPCR Mutation Screening Kits		
ddPCR KRAS G12/G13 Screening Kit		1863506
ddPCR KRAS Q61 Screening Kit		12001626
ddPCR BRAF V600 Screening Kit		12001037
ddPCR NRAS Q61 Screening Kit		12001006
ddPCR NRAS G12 Screening Kit		12001094
ddPCR NRAS G12/G13 Screening Kit		12001627
ddPCR EGFR Exon 19 Deletions Screening Kit		12002392
All kits include 20x multiplex assay and 2x ddPCR supermix for probes (no dUTP).		
ddPCR Residual DNA Quantification Kits		
ddPCR CHO Residual DNA Quantification Kit		17000031
ddPCR E.coli Residual DNA Quantification Kit		17000032
200x 20 µl reactions, includes 20x CHO or E.coli RDQ assay and 2x ddPCR Supermix for Residual DNA Quantification.		
ddPCR Copy Number Determination Kits		
ddPCR SMN1 Copy Number Determination Kit		1863500
ddPCR SMN2 Copy Number Determination Kit		1863503
200x 20 µl reactions, includes assay at 20x concentration, 2x ddPCR Supermix for Probes (no dUTP) and positive controls		
ddPCR Library Quantification Kit		
ddPCR Library Quantification Kit for Illumina TruSeq		1863040
200x 20 µl reactions, includes 1 vial of primers and probes at 20x concentration, 2x ddPCR Supermix for Probes (no dUTP) and positive controls		

ddPCR Assays

Table 24. ddPCR Assays

Product	Catalog number	
ddPCR HDR Gene Edit Assay	12002312	100 rxns
ddPCR HDR Gene Edit Assay	12002313	500 rxns
ddPCR HDR Gene Edit Package	12003796	1,000 rxns
ddPCR HDR Ref Assay, Predesigned	12003805	100 rxns
ddPCR HDR Ref Assay, Predesigned	12003806	500 rxns
ddPCR HDR Ref Package, Predesigned	12003793	1,000 rxns
ddPCR NHEJ Gene Edit Assay	12002314	100 rxns
ddPCR NHEJ Gene Edit Assay	12002315	500 rxns
ddPCR NHEJ Gene Edit Package	12003794	1,000 rxns



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