

# NGC Fraction Collector

## Instrument Guide

Version 2.0





# **NGC Fraction Collector**

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# Safety and Regulatory Compliance


For safe operation of the NGC Fraction Collector (known as NGC FC), Bio-Rad strongly recommends that you follow the safety specifications listed in this section and throughout the guide.

## Safety Warning Labels

Warning labels posted on the instrument and **WARNING** and **Caution** notes listed in this guide warn you about sources of injury or harm. Review the meaning of each safety warning label.

**Table 1. Meanings of safety warning labels**

Icon	Meaning
	<b>Shock hazard!</b> This symbol identifies a possible injury or danger to life if the associated directions are not followed correctly. Only qualified, trained technicians should carry out service work on electronic components, due to potential shock hazard.
	<b>Risk of danger!</b> This symbol identifies components that pose a risk of personal injury or damage to the instrument if improperly handled. Electronic components are sensitive to electrostatic charges and can be destroyed by a discharge. Wherever this symbol appears, consult the manual for further information before proceeding.

Icon	Meaning
	<p><b>Biohazard!</b> This symbol identifies components that may become contaminated with biohazardous material. When handling biohazardous samples or the NGC FC's waste container, adhere to the recommended precautions and guidelines in this manual, and comply with any local guidelines specific to your laboratory and location.</p>

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## Safe Use Specifications and Compliance



**WARNING!** Use of controls, adjustments, or procedures other than those specified herein may result in hazardous chemical exposure.

## Electrical Safety Information and Classification

The NGC FC conforms to international regulations encompassing the accessibility of high voltages by the user. Use all protective housings as specified in this guide. Further information about specific electrical hazards is listed in the hardware description.

### AC Power Cord Requirements

Power cord must be IEC 60320-1 compliant with a C13 plug on the instrument end. The power cord must be rated at minimum AC250V, 10A at 60°C minimum. In the U.S. and Canada, the power cord must be rated at minimum AC125V, 10A at 60°C minimum.

Position the instrument for easy access to the power switch and the power cord.

## Safety and Regulatory Compliance

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

- IEC/EN 61010-1:2010 (3<sup>rd</sup> Ed.), Safety requirements for electrical equipment for measurement, control, and laboratory use — Part 1: General requirements
- UL 61010-1:2012 R4.16, CAN/CSA-C22.2 NO. 61010-1-12 + Gil + GI2, Safety requirements for electrical equipment for measurement, control, and laboratory use — Part 1: General requirements (USA, Canada, NRTL)
- IEC/EN 61010-2-081:2015 (2<sup>nd</sup> Ed.), Safety requirements for electrical equipment for measurement, control, and laboratory use — Part 2-081: Particular requirements for automatic and semiautomatic laboratory equipment for analysis and other purposes (includes Amendment 1)
- UL 61010-2-081:2015, CAN/CSA-C22.2 NO. 61010-2-081:15, Safety requirements for electrical equipment for measurement, control, and laboratory use — Part 2-081: Safety requirements for electrical equipment for measurement, control, and laboratory use
- IEC/EN 61326-1:2013 (Class A), EN/IEC 55011, FCC Part 15, ICES-003, Electrical equipment for measurement, control and laboratory use. EMC requirements, Part 1: General requirements
- IEC/EN 61000-3-2:2014, Electromagnetic compatibility (EMC) - Part 3-2: Limits for harmonic current emissions
- IEC/EN 61000-3-3:2013, Electromagnetic compatibility (EMC) - Part 3-3: Limitation of voltage changes, voltage fluctuations and flicker

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is

likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.



**Caution:** Do not use other 3rd party AC power supplies or USB cables. Use only AC power supply and USB cable provided with the instrument.

## Hazards

The NGC FC is designed to operate safely when used in the manner prescribed by the manufacturer. If the NGC FC or any associated component is used in a manner other than prescribed, or if modifications to the instrument are not performed by a Bio-Rad or other authorized agent, then the warranty on the system will be voided. Service of the NGC FC should be performed only by Bio-Rad personnel.

**Important:** Keep the benchtop area and gantry free and clear of objects that may interfere with the gantry and other moving parts. Do not reach into the gantry area while the gantry is in motion.

## General Precautions

**Important:** Route all cables away from the instrument to prevent the moving gantry from damaging the cables. Damaged cables could result in electrical shock

- Keep hair and clothing away from the instrument.
- Keep your hands, fingers, and hair away from moving parts of the instrument.
- Tighten tubing properly.
- Use only the recommended fittings.
- Do not place the drip tray on the instrument while instrument is running.
- Adjust dispense head height properly prior to running the instrument.
- Take care when lifting the instrument to avoid back injury.
- There are no user serviceable parts inside the instrument. Do not open the instrument.

## Biohazards

The NGC FC 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.

### Biohazard Precautions

- Use common laboratory safety equipment to prevent exposure to biohazardous reagents reaching eyes or mouth. For example, use a face shield when operating the equipment.
- Always wear laboratory gloves, coats, 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.
- Remove wristwatches and jewelry before working at the bench.
- 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 the operation involving biohazardous material, decontaminate the work area with an appropriate disinfectant (for example, a 1:10 dilution of household bleach).



**WARNING!** No biohazardous substances are exhausted during normal operations of this instrument. Consult your local safety officer or review local, state, and federal regulations to ensure proper handling and disposal of biohazardous substances including samples, sorted fractions, and waste.

### Disposal of Biohazardous Material

The NGC FC includes waste tubing, which may potentially contain hazardous biological materials, depending on the sample used. Dispose of the following potentially contaminated materials in accordance with laboratory, local, regional, and national regulations:

- Content in waste tubing
- Reagents
- Used reaction vessels or other consumables that may be contaminated

### Chemical Hazards

The NGC FC includes waste tubing, which may potentially contain hazardous chemical materials, depending on the sample used.

### Explosive or Flammability Hazards

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

### Electrical Hazards

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

specification.

## Transport

Moving the NGC FC is not recommended after installation. If you must move the instrument, perform a basic system test after relocating the instrument to ensure proper operation.



**Caution:** Keep instrument level and handle the instrument gently. Do not lift the NGC FC by its gantry. Take care not to move or reposition the gantry while lifting.

## Storage

Store the NGC FC under the following conditions:

- Storage temperature range –13 to 140°F; –25 to 60°C
- Relative humidity 5–80%, noncondensing

## Disposal

The NGC FC contains electronic or electrical materials; they should be disposed of as unsorted waste and must be collected separately, according to European Union Directive 2002/96/CE on waste and electronic equipment — WEEE Directive. Before disposal, contact your local Bio-Rad representative for country-specific instructions.

## Warranty

The NGC FC and associated accessories are covered by a standard Bio-Rad warranty. See [Warranty Information on page 57](#) for details of the warranty.





# Chapter 1 Introduction

## Overview

The NGC Fraction Collector (NGC FC) provides automated collection options for analytical and preparative chromatography applications. As Bio-Rad's premier fraction collector, the NGC FC is capable of performing basic to complex fraction collection schemes and can be used at flow rates up to 200 ml/min. The NGC FC supports numerous rack and tray combinations, from microtiter plates to tubes, bottles, and carboys.

## Key Features

**Tip:** You can connect up to two NGC FCs to the NGC instrument to double your collection capacity.

Operated by ChromLab Software 5.0 or later, Bio-Rad's NGC FC

- Accommodates a variety of collection vessels on the fraction collection tray, including:
  - 1.5–2 ml capless tubes
  - 13, 16, and 18 mm tubes
  - 15 and 50 ml conical tubes
  - 24, 48, and 96 deep-well microtiter plates
  - 250 ml bottles
- Accommodates the use of multiple rack types in a single method
- Accommodates tube heights up to 150 mm

- Collects up to 384 fractions in tubes or 768 fractions in 96 deep-well microtiter plates
- Accommodates fraction collection in up to sixteen 250 ml bottles
- Accommodates optional mounts for two Prep-20 preparative racks to collect up to 40 large-volume fractions (from ml to L)
- Accommodates temperature controlled fractions at subambient temperatures and 4°C for microtiter plates and tubes either using the optional Peltier cooling racks or by placing the NGC FC in a chromatography refrigerator or coldroom
- Ships factory calibrated, no need to recalibrate when used under normal operating conditions
- Collects fractions from queued methods by either overlaying or appending fractions
- Enables easy access to fractions during a run without pausing or stopping the separation

## Site Requirements

This section lists the site requirements to install and run the NGC FC.

### Power Considerations

**Note:** The power supply to the NGC FC must be stable and within specifications at all times to ensure optimal operation.

**Table 2. Power requirements for the NGC FC**

Parameter	Description
Input voltage	100–240 VAC, $\pm 10\%$ , 50/60 Hz, single phase
Input current	1.2 A (max.); fuse rating inside the power supply is 2 A
Power usage	60 W
Fusing	No external fusing

### Environment Specifications

**Table 3. Environmental requirements**

Parameter	Temperature Range
Operating temperature	35–104°F; 4–40°C
Storage temperature	–13 to 140°F; –25 to 60°C
Humidity	0–80% RH, noncondensing

## Bench Space

Place the NGC FC in close proximity to the NGC system on a level surface.

**Note:** Ensure that the bench or rack on which you place the NGC FC is designed to support the weight of the NGC system as well as the NGC FC. For bench space requirements for the NGC system, see the NGC Chromatography Systems and ChromLab Software Installation Guide.

**Table 4. Specifications for the NGC FC**

Parameter	Specification
Weight	28.7 lb; 13 kg
Dimensions	Length: 23.6 in; 60 cm Width: 16.5 in; 42 cm Height: 21.5 in; 54.5 cm (with dispense head in highest position)

## Fractionation Considerations

**Table 5. NGC FC specifications**

<b>Fractionation</b>	<b>Description</b>
Tube change time	~200 ms with 13 mm rack
Dispense head components	<b>Divert valve</b> — internal volume 67 $\mu$ l Directs NGC effluent to either waste or sample collection. <b>Dispense tip</b> — droplet size ~30 $\mu$ l
Wetted parts	<b>Valve</b> — PEEK, EPDM <b>Tubing</b> — PEEK, FEP

## Unpacking the NGC FC

**Important:** When unpacking the NGC FC, carefully inspect its container for any damage that might have occurred in shipping. Severe damage to a container can indicate damage to its contents. If you suspect damage to the contents might have occurred, file a claim immediately with the carrier in accordance with their instructions before contacting Bio-Rad Laboratories, Inc.



**Caution:** Never lift the NGC FC by its gantry. Take care not to move or reposition the gantry while lifting the fraction collector.

### To unpack the NGC FC instrument

1. Open the shipping box and remove the foam packaging.

**Tip:** Store the box and all packaging material in a safe place in the event you need to return the NGC FC.

2. Grasp the base of the NGC FC by the sides and carefully lift it straight up and out of the box, taking care not to hit the dispense head.

**Important:** Never lift the fraction collector by its gantry.

3. Place the NGC FC on the lab bench close to the NGC system.
4. Remove and verify the contents of the components box:
  - Rack insert
  - AC power supply
  - NGC FC tubing kit ( lists the contents of the tubing kit)
  - USB cable
  - NGC Fraction Collector Installation Quick Guide



**Caution:** To move or reposition the NGC FC, always grip the base of the instrument by its sides to prevent the accidental movement of the gantry.

## Contents of the NGC FC Tubing Kit

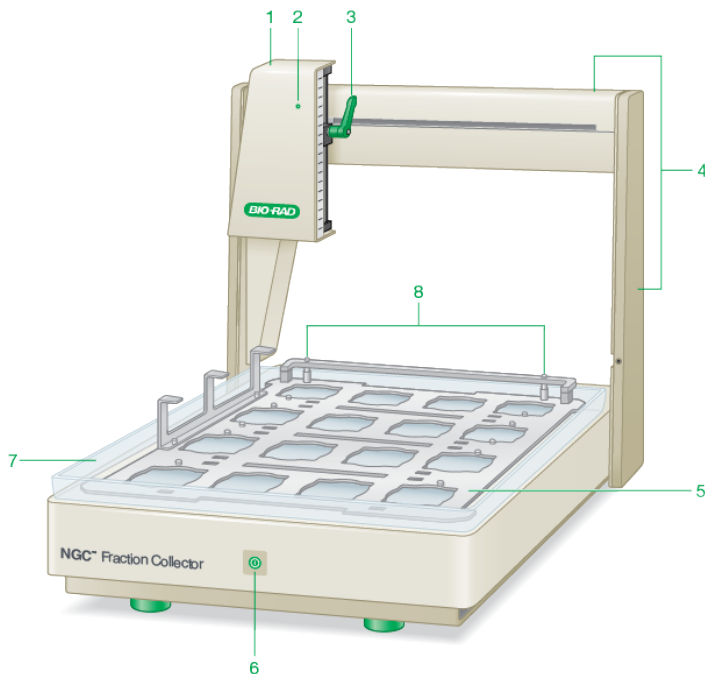
**Table 6. Contents of the NGC FC tubing kit**

Item	Description	Quantity
Orange PEEK tubing 92 cm; 36"	For use with F10 NGC systems 1/16" OD, 0.020" ID, with two 1/4-28 fittings labeled Frac. Collect	1
Green PEEK tubing 92 cm; 36"	For use with F100 NGC systems 1/16" OD, 0.030" ID, with two 1/4-28 fittings labeled Frac. Collect	1
Clear FEP tubing 92 cm; 36"	1/8" OD, 0.062" ID, with two 1/4-28 fittings labeled Frac. Collect/Waste	2
Clear PEEK tubing 150 cm; 60"	1/8" OD, 0.062" ID, with one 1/4-28 fitting labeled Waste	1
Black magnetic union	Union for 1/4-28 fitting connections	1

## The NGC Fraction Collector Illustrated

The illustrations in this section display the main components of the NGC FC.

### Front View



#### LEGEND

- |  |                              |
|--|------------------------------|
| 1. Dispense head                         | 2. NGC FC Point-to-Plumb LED |
| 3. Dispense head height adjustment lever | 4. Gantry                    |
| 5. Rack insert                           | 6. Power button              |



## LEGEND

7. Drip tray

8. Rack guide pins

## Details

**Dispense head** — contains the diverter valve.

The NGC FC divert valve eliminates the risk of spillage during dispense head movement and the risk of carryover from tube to tube. It is designed to have low internal volume and is flushed to maintain purification integrity.

**Point-to-Plumb LED** — indicates the status of the fraction collector (in use or not in use).

**Dispense head height adjustment lever** — adjusts the height of the dispense head.

**Gantry** — moves the dispense head in x and y directions according to the method parameters and the racks used in the method. The gantry and dispense head are factory calibrated to ensure accurate and precise positioning for all supported rack formats.

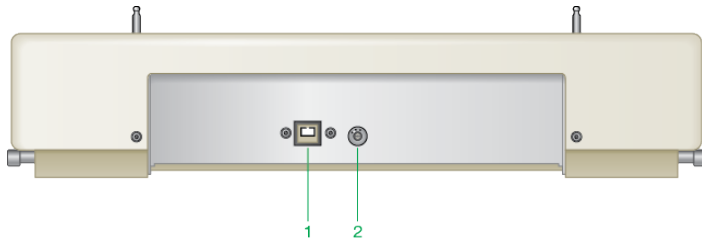
**Rack insert** — positions the racks for accurate dispensing; positioning pins on the insert assure correct alignment of all supported racks. The rack insert is also designed to improve the cooling efficiency of the Peltier cooling rack modules.

**Power button** — powers on and off the NGC FC.

**Drip tray** — collects spillage. The drip tray can be easily removed for cleaning.

**Rack guide pins** — used to position the rack insert securely and accurately on the NGC FC. The rack insert is inserted into the drip tray.

## Back View



### LEGEND

1. USB Type B port

2. Power port

### Details

**USB Type B port** — used to connect the NGC FC to the NGC system.

**Power port** — used to connect the NGC FC to the power outlet.



**WARNING!** Use only the USB and power cables that ship with the NGC FC.

## Finding Out More

After you install the NGC FC and the NGC Chromatography Systems and ChromLab Software documentation from the NGC Chromatography Systems Software USB drive, you can access installed NGC guides and tutorials on the Help menu in any ChromLab view.

More information about the NGC chromatography systems and ChromLab software is available from the following sources.

- The NGC Chromatography Systems and ChromLab Software Installation Guide is available on the NGC Chromatography Systems Software USB drive. This document explains how to set up your environment, set up and install the NGC instrument in the lab, and install ChromLab software and connect ChromLab to the NGC system.
- The NGC Chromatography Systems and ChromLab Software Instrument Guide is available on the NGC Chromatography Systems Software USB drive. This document details the modules that comprise the NGC instrument and includes information about priming, plumbing, troubleshooting, and maintaining the NGC system.
- The NGC Chromatography Systems and ChromLab Software User Guide is available on the NGC Chromatography Systems Software USB drive. This document explains how to use ChromLab software to control the NGC instrument, run protein separations and other operations manually, program methods to automate purification runs, evaluate the results, and print experiment reports.

Information about supported racks and the Peltier cooling system is available from the following sources.

- NGC Fraction Collector Standard Rack Guide
- NGC Fraction Collector with Peltier Cooling Quick Guide

**Note:** Click the Bio-Rad logo in the upper right corner of any ChromLab window to launch the Bio-Rad website.



# Chapter 2 System Configuration and Plumbing

The NGC Fraction Collector (NGC FC) ships preassembled and requires minimal setup and plumbing to prepare it for use. This chapter explains how to set up the NGC FC and how to connect it to the NGC system.

## Setting Up the NGC FC

**Important:** Before proceeding, verify that power to both the NGC FC and the NGC system is turned off. Connect the NGC FC to the same grounded, surge-protected outlet to which the NGC instrument is connected.

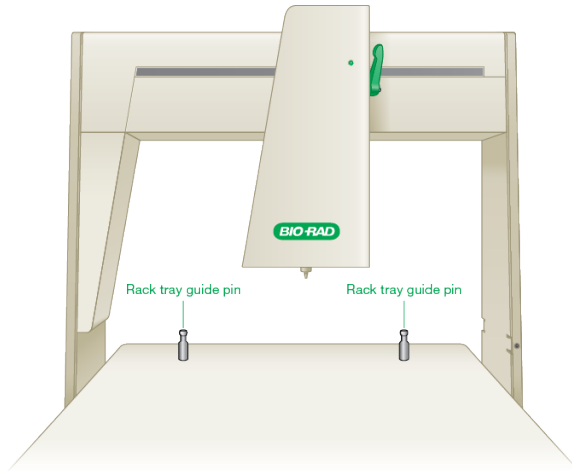
### To set up the NGC FC

1. Place the NGC FC on a level surface on a laboratory or coldroom bench or in a chromatography refrigerator, in close proximity to the NGC system.
2. Insert the connector end of the supplied power cord into the power port on the back of the NGC FC.
3. Insert the other end of the power cord into an available grounded, surge-protected outlet.

**Important:** You must use the same grounded, surge-protected outlet to which the NGC instrument is connected.

4. Insert the square (male) end of the supplied USB Type B cable into the USB Type B port on the back of NGC FC and the other (port) end into an available USB port on the NGC system.

5. Locate the magnetic union in the NGC FC tubing kit and attach it to the NGC instrument on the side closest to the NGC FC.
6. Note the guide pins on the back of the NGC FC.



7. Place the drip tray on the NGC FC with the angled corner positioned in close proximity to the left guide pin.

8. Slide the guide holes on the rack insert over the guide pins and place the insert into the drip tray.



9. Proceed to the section [Plumbing the NGC FC on page 30](#).

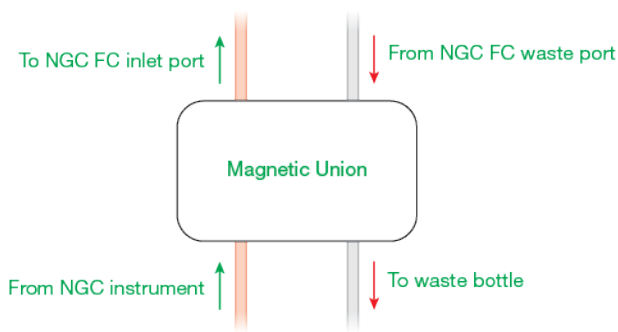
## Plumbing the NGC FC

The dispense head contains the divert valve, the dispense head lever, and a Point-to-Plumb LED, which indicates when the fraction collector is in use. The dispense head compartment door provides access to two ports on the divert valve to which you connect the inlet and waste tubing. The dispense tip is connected to the third port, located on the underside of the dispense head.

**Note:** The divert valve is rated to a maximum pressure of 30 psi.

### Flow Direction

Sample and waste are directed through the dispense head by way of the magnetic union, which you attach to the side of the NGC system closest to the NGC FC.



### Sample Flow

Sample flows from the NGC system to the lower inlet port on the magnetic union, upward through the upper back port on the union, and out to the NGC FC's inlet port at the back of the dispense head.



## NGC Outlet Flow

Outlet from the NGC system depends on the modules on the instrument:

- If your NGC system includes an outlet valve, connect sample tubing from port 1 on the NGC's outlet valve (OV Port 1) to the lower port on the inlet side of the magnetic union.

**Tip:** If the NGC system includes two outlet valves, connect the tubing to Outlet Valve 1 port 1 (OV1 Port 1). If you are connecting a second NGC FC to the NGC instrument, connect the tubing to port 2 on the outlet valve (OV Port 2 or OV1 Port 2).

- If your NGC system does not include an outlet valve but includes a pH valve, connect the sample tubing from the outlet port on the pH valve to the lower port on the inlet side of the magnetic union.
- If your NGC system NGC has neither an outlet valve nor a pH valve, connect the sample tubing from the 20 psi backpressure regulator to the lower port on the inlet side of the magnetic union.

## Waste Flow

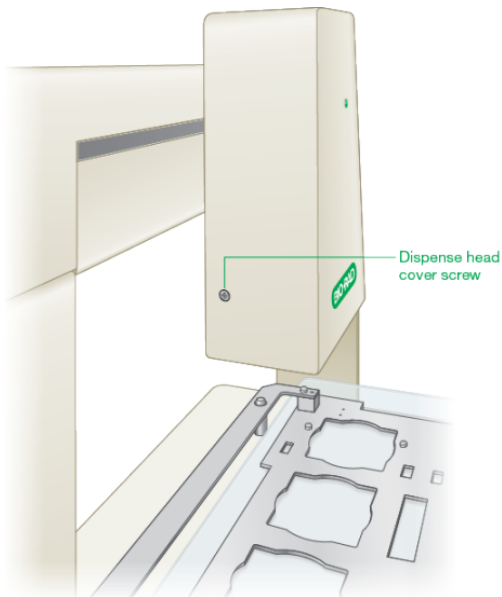
Waste flows from the NGC FC waste port on the dispense head to the upper outlet port on the magnetic union, downward through the lower outlet port on the union, and out to the waste container.

## Accessing the Dispense Head Components

**Note:** The height adjustment lever must be in the vertical (locked) position before opening the compartment door.

### To access the dispense head interior components

1. If you have not yet done so, rotate the height adjustment lever to the vertical position to lock it in place.
2. Locate the Philips screwdriver that ships with the NGC system. This might be in the NGC instrument fittings kit.
3. Insert the screwdriver into the single screw on the left side of the dispense head cover and remove the screw.



4. Store the screw in a safe location near the NGC FC. You will reinsert this screw after completing the plumbing procedure.

5. Open the dispense head compartment door to reveal the interior components:

- The Point-to-Plumb LED is located near the top of the compartment.
- The divert valve is located near the bottom of the compartment.
- The inlet port is on the back of the divert valve.
- The waste port is on the top of the divert valve.
- The dispense tip is on the bottom of the divert valve.

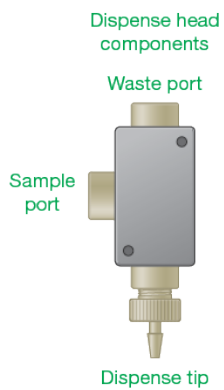
The image on [page 34](#) displays the components in the dispense head compartment.

The image on [page 35](#) displays the specific ports on the dispense head.

### NGC FC Dispense Head Compartment Components



### NGC FC Dispense Head Ports



## Plumbing the NGC FC

**Note:** If you must use tubing other than that provided in the NGC FC's tubing kit to plumb the fraction collector, ensure that all tubing lengths are kept to a minimum. This reduces the delay volume and backpressure.

Tubing choice is dependent on the flow rate and pressure characteristics of the column media and hardware type. [Table 7](#) lists recommended tubing sizes for different flow rates.

**Table 7. Recommended tubing size for flow rates**

Flow rate	Tube ID
0.001–20 ml/min	0.02" (0.5 mm), orange
0.01–80 ml/min	0.03" (0.76 mm), green
50–200 ml/min	0.062" (1.6 mm), clear

### To plumb the NGC FC

1. Locate the required sample tubing in the NGC FC tubing kit.

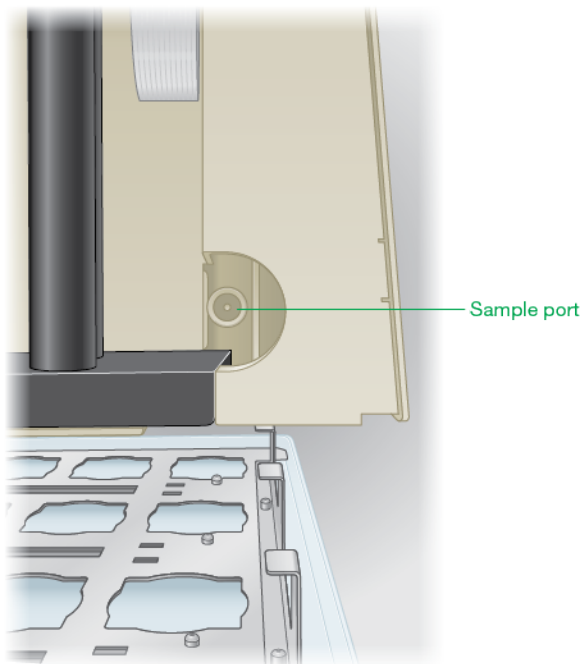
Refer to [Table 7](#) for the recommended tubing size.

2. From the NGC chromatography system, connect sample tubing to the lower port on the inlet side of the magnetic union, as indicated in the section [Flow Direction on page 30](#).

**Note:** See the NGC Chromatography Systems and ChromLab Software Instrument Guide for information about plumbing the system.

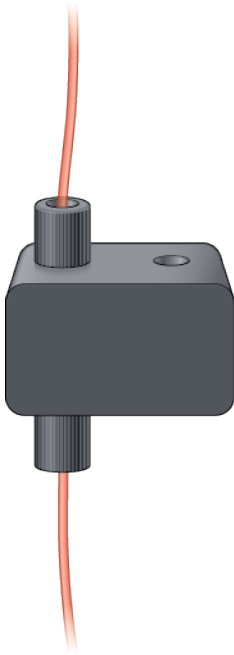
3. On the NGC FC, connect one end of sample tubing, supplied in the NGC FC's fittings kit, to the sample port located at the back of the dispense head.

**Important:** Ensure you use the same size tubing for this connection as the tubing used on the NGC system.



4. Using the fittings tightener supplied in the NGC fittings kit, tighten the tubing ferrule to finger tight.
5. Route the sample tubing through the rubber tubing grommet at the top of the dispense head.
6. Connect the other end of the sample tubing to the upper port on inlet side of the magnetic union.

The following image displays the magnetic union plumbed with sample tubing.



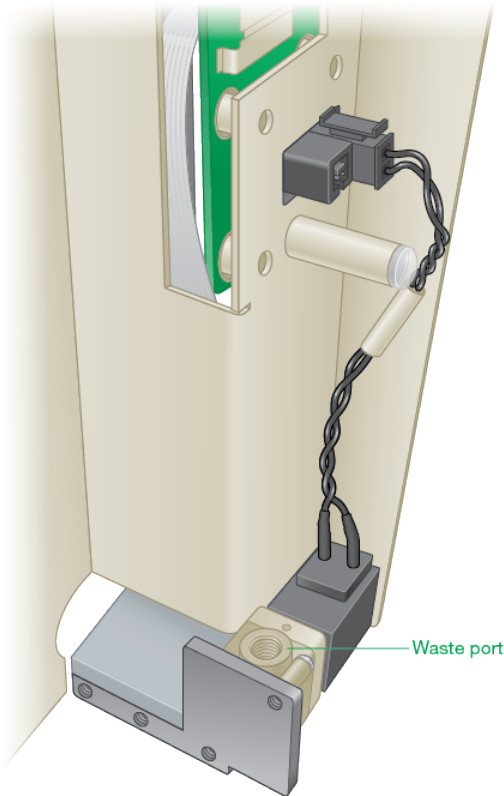
7. Locate the waste (clear) tubing in the NGC FC tubing kit.

**Tip:** The kit contains two lengths of waste tubing:

- The 92 cm (36") tubing connects the waste port to the magnetic union.
- The 150 cm (60") tubing directs the flow from the union to the waste container.

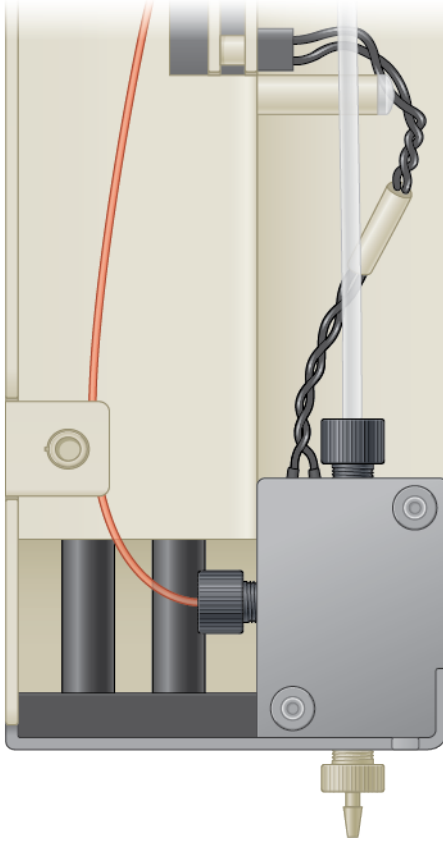


8. Attach the 92 cm waste tubing to the waste port inside the dispense head compartment.



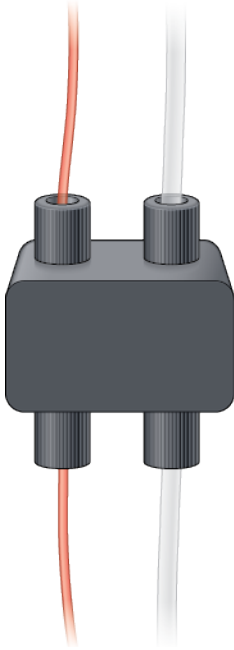
9. Use the fittings tightener to tighten the tubing ferrule to finger tight.
10. Route the waste tubing through the rubber tubing grommet and attach the other end to the upper outlet port on the magnetic union.

The following image displays the plumbed dispense head.



11. Before attaching the 150 cm waste tubing, measure the length needed to connect the tubing from the magnetic union to the waste container.
12. Using a tubing cutter supplied in the NGC's fittings kit, cut the tubing to the determined length.

13. Attach the waste tubing to the lower outlet port on the magnetic union.



14. Insert the other end of waste tubing into a waste collection vessel.
15. Close the dispense head compartment door and secure it in place with the screw that you previously removed and stored.
16. Proceed to the section [Starting the NGC FC](#), which follows.

## Starting the NGC FC

**Note:** Start the NGC FC *after* you set up and plumb the instrument.

### To start the NGC FC

1. Press and hold the power button on the front of the NGC FC to power on the instrument.
2. Press the soft power switch on the side of the NGC instrument to power on the system.

The gantry and dispense head move to the home position when the NGC instrument is powered on and detects the NGC FC.

3. Start ChromLab software on the ChromLab computer.

## Setting Up the NGC FC Racks and Trays

The NGC FC accommodates a variety of collection configurations:

- 1.5–2 ml capless tubes
- 13, 16, and 18 mm tubes
- 15 and 50 ml conical tubes
- 24, 48, and 96 deep-well microtiter plates
- 250 ml bottles
- Peltier cooling rack modules
- Prep-20 preparative racks

The NGC FC also accommodates the use of multiple rack types in a single method.

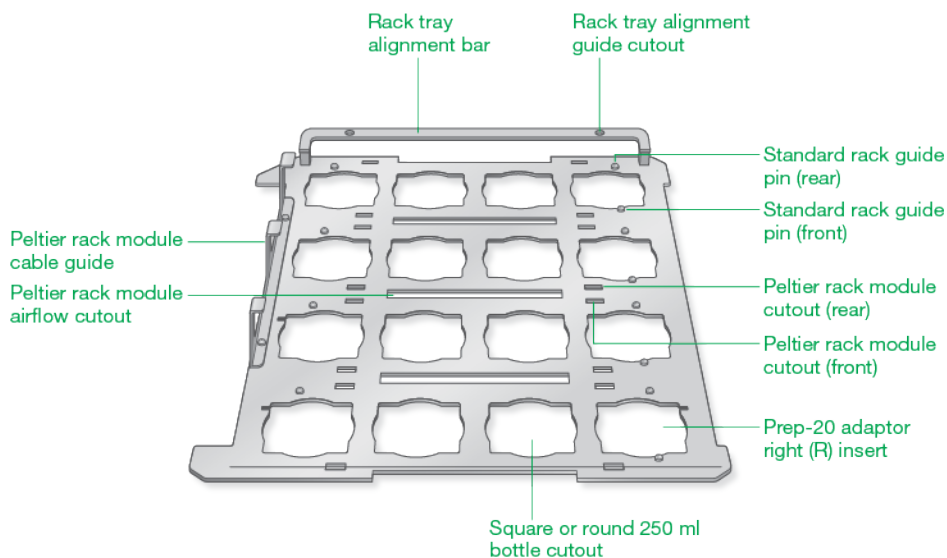
This section explains how to set up the racks, Peltier cooling rack modules, and Prep-20 preparative racks.

### NGC FC Rack Tray Configuration

The NGC FC rack tray is designed to hold

- 4 standard racks of tubes or plates
- 16 round or square 250 ml bottles
- 4 Peltier rack modules
- 2 Prep-20 rack adaptors

The tray can also hold a combination of standard racks or bottles.



## Inserting Standard Racks or Bottles into the NGC FC Rack Tray

**Important:** After positioning racks or bottles in the tray, adjust the dispense head height to ensure the dispense tip does not hit the tallest vessel. See [Adjusting Dispense Head Height on page 48](#).

### To insert standard racks into the tray

- Position the standard racks on top of the rack positioning pins with the rack label facing toward the right.

**Important:** The rack label must face toward the right side of the rack tray for proper positioning.

**Tip:** For best performance when using 96-well plates on standard racks, install the plates on the rack and then gently push the plates to the upper left corner of the placement area.

### To insert square or round bottles into the tray

- ▶ Position the bottles in the bottle cutouts on the rack tray.

## Inserting Peltier Rack Modules

The NGC FC rack tray can accommodate up to four Peltier rack modules. For information about installing the Peltier cooling apparatus, see the NGC Fraction Collector with Peltier Cooling Quick Guide.

**Important:** After positioning a Peltier rack module in the tray, adjust the dispense head height to ensure the dispense tip does not hit the tallest vessel. See [Adjusting Dispense Head Height on page 48](#).

**Tip:** You can precool your Peltier racks in a refrigerator before placing them on the Peltier cooling module for faster cool-down time.

### To insert Peltier rack modules into the tray

1. Insert the Peltier rack module into the small rectangular cutout with the LEDs facing the right side and the power port on the left.
2. Insert the right-angled end of the power cable into the power port on the left side of the module.
3. Run the power cable along the left side of the tray between the module and the cable guides.
4. Insert the other end of the power cable into one of the power ports on the Peltier rack power supply, which ships with the Peltier cooling kit (#12005789).

**Tip:** You can also purchase individual units of the Peltier rack power supply (#12003748).

5. Connect the power supply to a nearby outlet.

6. Press the power switch on the front of the power supply to start the cooling process.
7. Position plates or racks on the Peltier rack module.

**Note:** The Peltier cooling system does not support large bottles.

## Inserting Prep-20 Rack Clamps into the Rack Tray

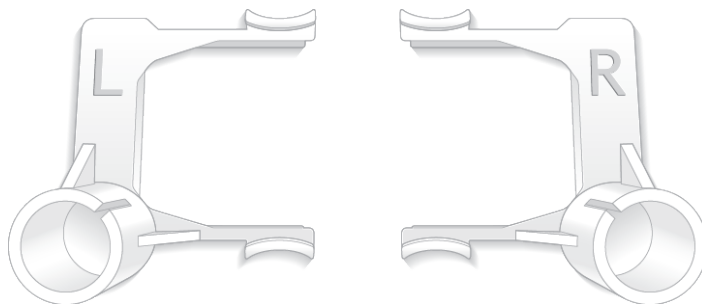
The NGC FC rack tray can accommodate up to two Prep-20 preparative racks. Each Prep-20 preparative rack is rated for use with flow rates up to 200 ml/min.

**Tip:** The Prep-20 racks are sold separately. See [Peltier Racks and Accessories on page 61](#) for ordering information.

**Important:** After positioning Prep-20 preparative racks in the tray, adjust the dispense head height to ensure the dispense tip does not hit the tallest vessel. See [Adjusting Dispense Head Height on page 48](#).

### To insert Prep-20 adaptors

1. Locate the two Prep-20 rack clamps. These are labeled L for left and R for right.



2. Squeeze the finger grips at the end of the right clamp and insert it into the far right cutout in the first or second row in the rack tray.

**Tip:** Use the figure in [NGC FC Rack Tray Configuration on page 43](#) to locate the cutouts in which to insert the Prep-20 rack clamps.





3. Squeeze and insert the left clamp into the left bottle cutout on the same row.
4. Insert the Prep-20 preparative rack into the mounts on each clamp.

**Important:** To properly fit the Prep-20 preparative rack into the mounts, position rack funnel 1 on the left side of the rack tray.

5. Position the tubing to run down the front of the NGC FC rack tray.

To attach tubing to the funnel rack, refer to the documentation supplied with the Prep-20 preparative racks.

## Adjusting Dispense Head Height

The NGC FC accommodates collection vessel heights up to 150 mm. To ensure the dispense tip does not touch the tallest vessel as the gantry moves forward and back, adjust the dispense head height such that the dispense tip is 10 mm (1 cm) above the top of the tallest collection vessel.

When collecting in test tubes with different heights, use the plate rack riser (# 12003760) to raise racks of microtiter plates, microtubes, and 100 mm tubes to nearly the same height as racks containing 150 mm tubes. See [Table 8 on page 48](#) for recommended dispense head heights.



**Caution:** When collection includes a variety of tubes and plates, ensure the dispense head is set to a height such that it will avoid contact with any of the collection vessels. Failure to do so might damage the dispense tip.

[Table 8](#) lists the recommended dispense head position for different vessel types. Values in the table refer to the position on the dispense head ruler.

**Table 8. Recommended dispense head positions**

Vessel type	Standard rack, cm	Standard rack plus riser, cm	Peltier rack, cm
13 x 100 mm tubes	4.0	9.0	
16 x 100 mm tubes	4.0	9.0	
16 x 125 mm tubes			15.5
16 x 150 mm tubes	9.0		
18 x 150 mm tubes	9.0		

**Table 8. Recommended dispense head positions, continued**

<b>Vessel type</b>	<b>Standard rack, cm</b>	<b>Standard rack plus riser, cm</b>	<b>Peltier rack, cm</b>
2.0 ml capless microtubes	4.0	9.0	
Deep-well microplates	5.0	10.0	5.5
15 ml tubes	6.5		15.5
50 ml tubes	5.0		15.0
Prep-20 rack adaptor	12.5		
250 ml bottles	6.0		

## Adjusting the Dispense Head Height



**Caution:** Support the dispense head housing with one hand when locking or unlocking the height adjustment lever to prevent it from dropping.

**Note:** The dispense head lever points upward when the dispense head is locked into place. To unlock the dispense head, turn the lever so that it points downward.

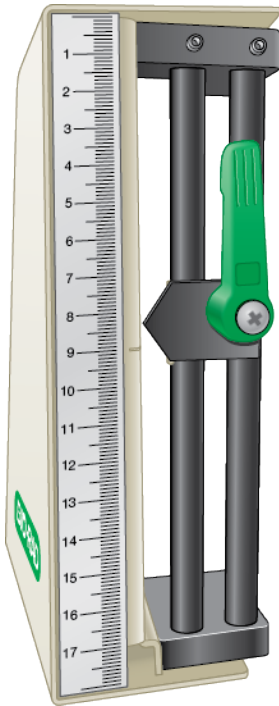
### To adjust the dispense head height

1. Turn the dispense head height adjustment lever to the downward position to unlock the dispense head.
2. Using the scale on the side of the dispense head case, raise or lower the dispense head to the target position.
3. When the dispense head is set at the target position, turn the lever upward to lock the dispense head in place.

**Important:** Do not overtighten the lever.

**Tip:** The image on [page 51](#) displays the dispense head height adjustment lever in the locked position.

**Dispense Head Height Adjustment Lever Locked**





## Chapter 3 Maintenance and Troubleshooting

The NGC Fraction Collector (NGC FC) requires minimal maintenance to operate reliably. Regular cleaning ensures optimal performance. This appendix explains proper care for the NGC FC.



**Caution:** Disconnect power to the NGC FC before servicing. Do not attempt to service any component on the NGC FC unless noted in this manual. Contact Bio-Rad for service requests

### Cleaning the NGC FC Outer Surface

During normal operation, spills and splashes can cause salt buildup and residue to form on the NGC FC surface and fluidic lines.

When cleaning the outer surface:

- Unplug the NGC FC from its power source before cleaning.
- Wipe surfaces with a nonscouring wipe dampened with deionized water. Avoid using excessive moisture around the power switch, located on the front, and connector outlets, located on the back of the unit.
- Rinse away any salt buildup or residue with water and a clean damp cloth or towel.

## NGC FC Cleaning Recommendations

- Do not spray water directly on the dispense head, gantry, or electrical connection areas.
- Use 0.1% bleach or 20% alcohol to disinfect outer surfaces. Wipe all residues after cleaning. Remove residual cleaning agent with a clean cloth.

**Note:** The use of harsh detergents is not recommended.

- Ensure that all surface areas are dry before powering on the NGC FC.

## Cleaning Standard Racks

**Note:** The standard NGC FC racks are autoclavable and dishwasher safe if using mild detergents. Harsh detergents may cause laser-etched numbering to fade.

### Cleaning Recommendations

- Promptly clean if in contact with strong acids or bases.
- Use mild dish washing soap (or 0.1% bleach) for disinfecting.
- Use only soft (nonscouring) cloths.



## Troubleshooting

Table 9 lists some common issues you might encounter using the NGC FC, their causes, and possible solutions.

**Table 9. Issues, causes, and solutions**

Issue	Possible Cause	Solution
Drops miss tube	<ul style="list-style-type: none"> <li>■ Rack type is incorrect.</li> <li>■ Tube rack is misaligned.</li> <li>■ Dispense tip is missing.</li> <li>■ Unit is not level.</li> <li>■ Dispense tip is misaligned.</li> <li>■ Dispense tip is damaged.</li> </ul>	<ul style="list-style-type: none"> <li>■ Select the correct rack type.</li> <li>■ Reposition the tube rack.</li> <li>■ Insert a dispense tip.</li> <li>■ Place the NGC FC on a level surface.</li> <li>■ Turn the NGC FC off and on to reset the arm to the home position.</li> <li>■ Remove, inspect, and reinsert the dispense tip.</li> <li>■ Replace the dispense tip.</li> </ul>
Fluid drips into the waste container during collection	Tubing connected incorrectly. The sample (inlet) tubing is attached to the waste port at the top of the dispense head and the waste tubing is connected to the sample inlet port in the back of the dispense head.	Reconnect the tubing correctly. See <a href="#">Plumbing the NGC FC on page 36</a> .

**Table 9. Issues, causes, and solutions, continued**

Issue	Possible Cause	Solution
Fraction collector causes a high backpressure	<ul style="list-style-type: none"><li data-bbox="474 285 794 318">■ Tubing is kinked.</li><li data-bbox="474 326 794 391">■ Wrong tubing is being used.</li><li data-bbox="474 399 794 464">■ Divert valve or tubing is plugged.</li></ul>	<ul style="list-style-type: none"><li data-bbox="801 285 1182 318">■ Replace tubing.</li><li data-bbox="801 326 1182 391">■ Connect the appropriate size tubing for the method's flow rate.</li><li data-bbox="801 399 1182 496">■ Rinse the divert valve with water to remove salt crystals or other particulate matter.</li></ul>

## Appendix A Warranty Information

The NGC FC is warranted for one year against defects in materials and workmanship. If any defects should occur during this warranty period, Bio-Rad Laboratories, Inc. will replace the defective parts without charge. However, the following defects are specifically excluded:

- Defects caused by improper operation
- Repair or modification done by anyone other than Bio-Rad or its authorized agent
- Defects caused by use with fittings or other spare parts not specified by Bio-Rad
- Damage caused by deliberate or accidental misuse
- Damage caused by disaster
- Damage due to use of improper solvent or sample
- Tubing and fittings

## Warranty Information

Model \_\_\_\_\_

Serial Number \_\_\_\_\_

Date of Delivery \_\_\_\_\_

Warranty Period \_\_\_\_\_

## Appendix B NGC Fraction Collector Accessories

This appendix lists the accessories to use with the NGC Fraction Collector (NGC FC):

- [Table 10 on page 60](#) lists NGC FC standard rack options compatible with the NGC FC.
- [Table 11 on page 61](#) lists the Peltier racks and accessories compatible with the NGC FC.
- [Table 12 on page 62](#) lists NGC FC accessories.
- [Table 13 on page 63](#) lists recommended tubes, plates, and bottles.

## NGC FC Rack Options and Accessories

This section details the rack options and accessories available for the NGC FC.

### Standard Rack Options

**Table 10. NGC FC compatible racks**

Catalog #	Description
12003752	13 mm tubes, 96 x 13 mm tubes
12003755	16 mm tubes, 75 x 16 mm tubes
12003756	18 mm/15 ml tubes, 70 x 18 mm tubes
12003757	50 ml tubes, 27 x 29 mm tubes
12003754	Deep well microtiter plates, 2 x 24-, 48-, or 96-well plates
10223753	1.5–2 ml capless microtubes, 96 tubes
12003760	Plate rack riser

## Peltier Racks and Accessories

**Table 11. Peltier racks and accessories**

<b>Catalog #</b>	<b>Description</b>
12005799	Peltier cooling kit
12003747	Microplate rack adaptor
12003748	Peltier rack power supply, 4 channels
12003749	Peltier rack module
12003751	Insulated rack, 15 ml tubes
12003759	Insulated rack, 50 ml tubes

## NGC FC Accessories

**Table 12. NGC FC accessories**

<b>Catalog #</b>	<b>Description</b>
17002942	Prep-20 preparative rack kit The kit includes the following items: <ul style="list-style-type: none"><li>■ Prep-20 funnel</li><li>■ Prep-20 tubing</li><li>■ Prep-20 clamps</li></ul>
12005822	Dispense tip replacement
12008668	NGC Fraction Collector Enclosure Protects fractions from environmental particulates



## Recommended Tubes, Plates, and Bottles

Table 13 lists the tubes, plates, and bottles recommended for use with the NGC FC.

**Table 13. Recommended tubes, plates, and bottles**

<b>NGC Rack Name</b>	<b>NGC Description</b>	<b>Product Description</b>	<b>Brand</b>	<b>Volume Capacity, ml</b>	
13 mm	13 x 100 mm tubes	Polypropylene tubes, natural	Bio-Rad	9	
		Borosilicate glass culture tubes, disposable	VWR	9	
16 mm	16 x 100 mm test tubes	Borosilicate glass culture tubes, disposable	VWR	14	
		16 x 150 mm test tubes	Borosilicate glass culture tubes, disposable	VWR	22
		16 x 125 mm test tubes	Borosilicate glass culture tubes, disposable	VWR	18
18 mm	18 x 150 mm tubes	Borosilicate glass culture tubes, disposable	VWR	28	

**Table 13. Recommended tubes, plates, and bottles, continued**

<b>NGC Rack Name</b>	<b>NGC Description</b>	<b>Product Description</b>	<b>Brand</b>	<b>Volume Capacity, ml</b>
Microtubes	1.5–2.0 ml microtubes	EZ Micro test tubes	Bio-Rad	1.5
		Microcentrifuge tubes without caps, graduated	Corning Incorporated, Axygen Scientific, Inc.	2
15 ml tubes	15 ml centrifuge tubes	High-performance polypropylene centrifuge tubes with flat or plug caps	VWR	15
		Falcon polypropylene centrifuge tubes	Corning Incorporated	15
		Polypropylene centrifuge tubes	Greiner Bio-One	15
15 ml tubes cooled	15 ml centrifuge tubes	High-performance polypropylene centrifuge tubes with flat or plug caps	VWR	15

**Table 13. Recommended tubes, plates, and bottles, continued**

<b>NGC Rack Name</b>	<b>NGC Description</b>	<b>Product Description</b>	<b>Brand</b>	<b>Volume Capacity, ml</b>
		Polypropylene centrifuge tubes	Greiner Bio-One	15
50 ml tubes	50 ml centrifuge tubes	High-performance polypropylene centrifuge tubes with flat or plug caps	VWR	50
		Falcon polypropylene centrifuge tubes	Corning Incorporated	50
		Polypropylene centrifuge tubes	Greiner Bio-One	50
50 ml tubes cooled	50 ml centrifuge tubes	High-performance polypropylene centrifuge tubes with flat or plug caps	VWR	50
		Polypropylene centrifuge tubes	Greiner Bio-One	50
MicroP 96-well MicroP 96-well cooled	96-well deep well microtiter plates(square well)	Eppendorf LoBind 96-well deep well plates	Eppendorf	2

**Table 13. Recommended tubes, plates, and bottles, continued**

<b>NGC Rack Name</b>	<b>NGC Description</b>	<b>Product Description</b>	<b>Brand</b>	<b>Volume Capacity, ml</b>
		96-well deep well microtiter plates	VWR	2
		96-well deep well plates, square wells	Corning Incorporated, Axygen Scientific Inc.	2.2
		ProteOn deep-well microtiter plates	Bio-Rad	2
MicroP 48-well MicroP 48-well cooled	48-well deep well microtiter plates (rectangular well)	48-well deep well microtiter plates	VWR	5
		48-well deep well plates	Corning Incorporated, Axygen Scientific Inc.	4.6

**Table 13. Recommended tubes, plates, and bottles, continued**

<b>NGC Rack Name</b>	<b>NGC Description</b>	<b>Product Description</b>	<b>Brand</b>	<b>Volume Capacity, ml</b>
MicroP 24-well MicroP 24-well cooled	24-well deep well microtiter plates (rectangular well)	24-well deep well microtiter plates, rectangular wells	Corning Incorporated, Axygen Scientific Inc.	10
Bottles	250 ml bottles	Storage/media bottles (round)	VWR	250
		Pyrex square bottles, graduated	Corning Incorporated	250







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