



NGC™ Chromatography Systems

Module Selection Guide



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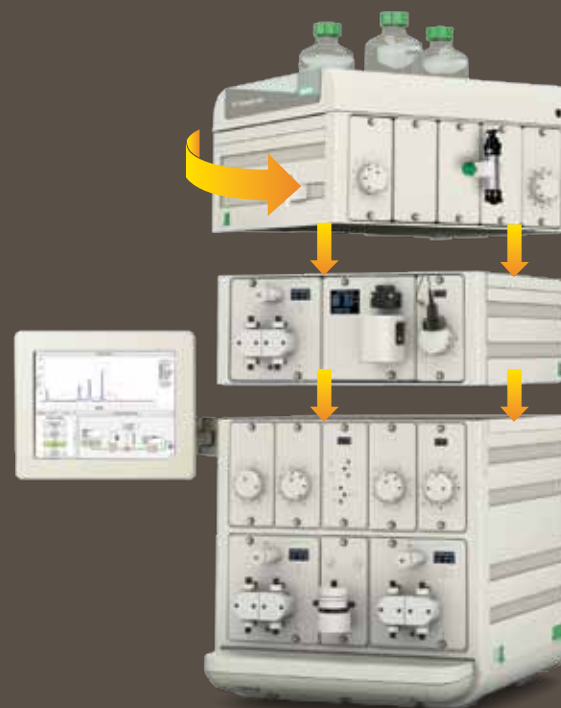
TRULY MODULAR AND CUSTOMIZABLE

The forward-facing modules provide easy access plumbing of the system. Each system is completely open to redesign with plug-and-play modules, allowing individual customization to meet your needs and application requirements.



EXPANDABLE

Expand your system capabilities with the addition of tiers and modules. Modules can be moved and tiers can be rotated, letting you position all components for maximum convenience and efficiency.



THE NGC LIQUID CHROMATOGRAPHY FAMILY — DESIGNED TO MEET YOUR SPECIFIC PURIFICATION NEEDS

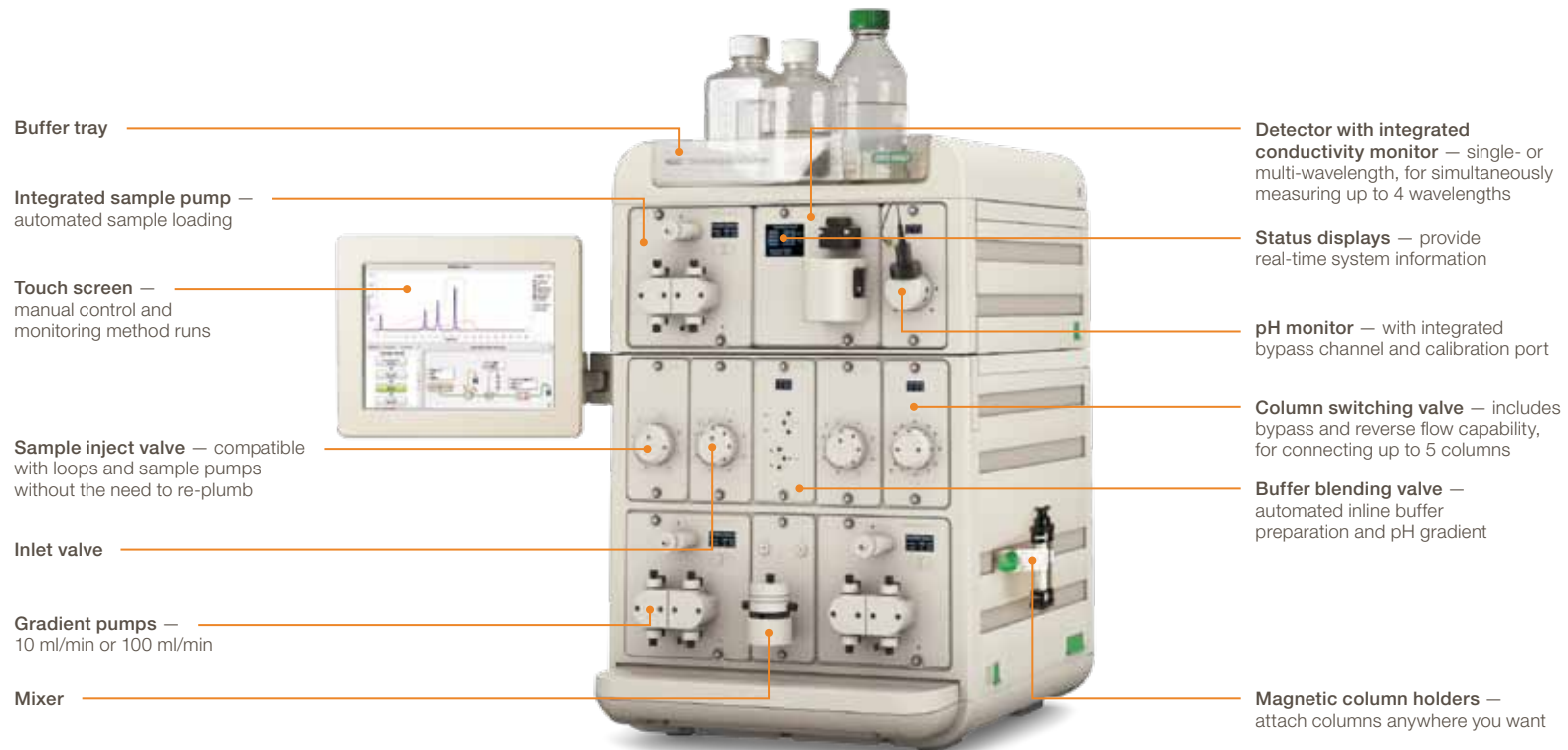


Fig. 1. NGC Discover™ System.

The NGC family of medium-pressure chromatography systems offers a single solution that scales to fit your purification requirements.

The NGC system's truly modular design provides multiple configurations to align with the requirements of every individual scientist.

The NGC instrument's small footprint means it can be used on a lab bench, in a laboratory refrigerator, or in a cold room.

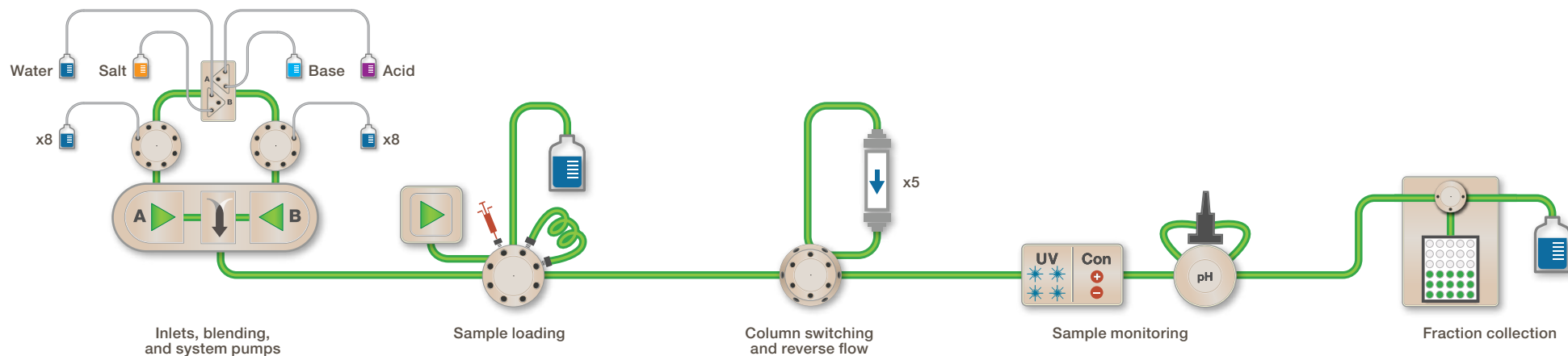
Each system comes with a touch screen providing instant status updates and manual control of system functions.

The 10 ml/min and 100 ml/min preconfigured instruments — available as the NGC Quest™, NGC™ Quest Plus, NGC Scout™, NGC™ Scout Plus and NGC™ Discover systems — are designed with increasing automation and throughput capabilities to serve a wide range of laboratory needs.

The magnetic column clamps allow you to mount the columns exactly where you want them. This minimizes the bench space needed for traditional column holders and simultaneously reduces long tubing connections.

The pumps, detectors, and pH monitor all have LED displays to show real-time status and module performance.

NGC SYSTEM CAPABILITIES SCHEMATIC



PUMP INLETS AND AUTOMATED BUFFER BLENDING

System Pumps

A chromatography system with multiple users, applications, and purification requirements often uses a variety of column types and sizes. The NGC chromatography system enables you to swap out pump modules to meet your specific requirements.

The NGC family of systems can house up to three high-precision pumps: two system (gradient) pumps and one sample pump all integrated within the instrument.

The system pump modules include a display for real-time monitoring of pump status, flow rate, and pressure readings.

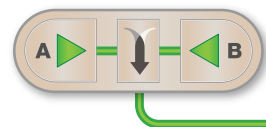


Fig. 2. System pumps.

F10 Reciprocating Piston Pump

- Flow rate: 0.001–10 ml/min at 3,650 psi (25.2 MPa)
- Ideal for small-scale preparative purifications
- Can also be used for HPLC separations

F100 Reciprocating Piston Pump

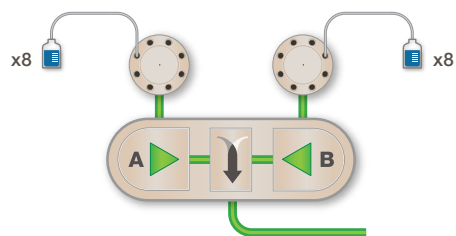
- Flow rate: 0.01–100 ml/min at 1,450 psi (10 MPa)
- Flexible flow rate range
- Ideal for scale-up applications

Catalog #	Description
788-4002	NGC F10 pump module
788-4003	NGC F100 pump module

Buffer Inlet Valves

Optimizing separation conditions can be a time-consuming process, especially if you have to switch out bottles and tubing each time.

The NGC buffer inlet valve module enables automated switching between buffers to accelerate method development, column cleaning, and regeneration.



- No need to re-plumb between runs
- 8 buffer inlets per valve
- Inlets can be labeled within the software
- Inlets can be dedicated to cleaning and storage solutions
- Each system pump can have an 8-port inlet valve

Fig. 3. System pumps with inlet valves.

Catalog #	Description
788-4006	NGC inlet valve module

Buffer Mixer Module

The NGC mixer module homogenizes buffers from the two system pumps (A and B) and includes a mixer motor assembly as well as an integrated system pressure sensor.

Gradient flow rate range

- F10 pump: 0.001–20 ml/min
- F100 pump: 0.01–200 ml/min

Gradient composition accuracy

- F10 pump: $\pm 0.5\%$ (3–97% B, 0.25–10 ml/min up to 3,650 psi)
- F100 pump: $\pm 0.5\%$ (3–97% B, 0.25–100 ml/min up to 1,450 psi)

Mixer Volume

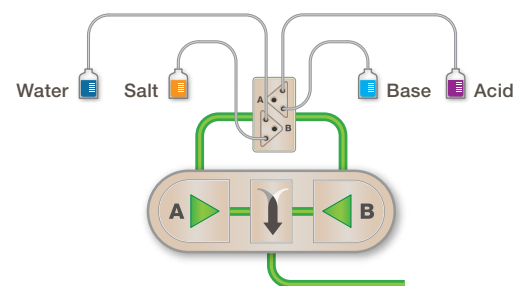
- 263 μl and 750 μl included with the F10 pump
- 750 μl and 2 ml included with the F100 pump

Catalog #	Description
788-4018	NGC mixer module

Buffer Blending Valve

Achieving the correct pH required to perform most separations can be challenging. The NGC buffer blending valve speeds up buffer preparation and enables pH scouting by automating inline buffer preparation.

Using acid, base, water, and salt stock solutions, the system can generate specific pH buffers over a linear salt gradient or a pH gradient at a specific salt concentration.



- Enables inline buffer preparation
- Enables pH scouting
- Multiple preprogrammed buffer recipes
- Buffer pH range: 2.7–10.3
- Maintains full gradient capability
- Double flow capability
 - F10 pump: 20 ml/min
 - F100 pump: 200 ml/min

Fig. 4. System pumps with buffer blending valve.

Catalog #	Description
788-4010	NGC buffer blending valve module

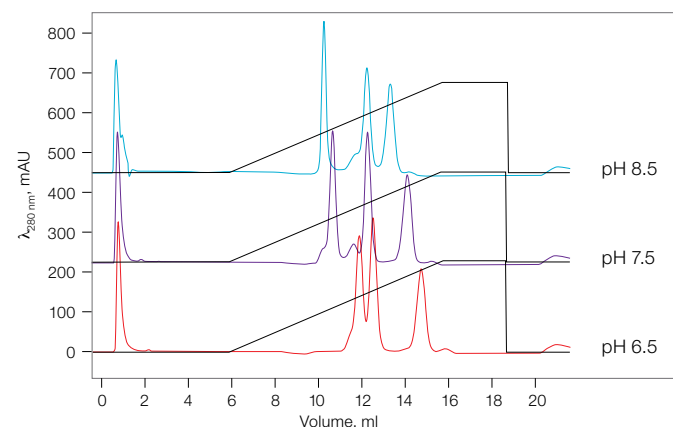


Fig. 5. pH scouting with a cation exchange standard containing α -lactalbumin, ribonuclease A, cytochrome C, and lysozyme in a simple buffer mixture automatically titrated to different pHs.

SAMPLE LOADING OPTIONS

Whether you are loading a few microliters using a static loop or liters using a dedicated sample pump, the NGC system offers a complete range of options to minimize the risk of sample loss, to automate sample loading, and to prevent the introduction of air into your system.

Sample Injection Valve

- Accurate sample loading
- Compatible with fixed volume loops, variable volume DynaLoop™ sample loops, sample pump, and autosampler
 - No need to re-plumb
 - Sample volumes: μl to L

Catalog #	Description
788-4007	NGC sample inject valve module

Sample Pump Module

Automated sample application can be achieved using the NGC sample pump module.

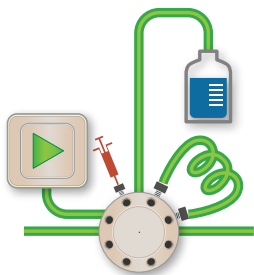


Fig. 6. Sample inject valve with sample pump.

- Dedicated pump eliminates contamination of system pumps
- Ideal for automated large volume sample loading directly to the column
- Repetitive accurate sample loading via a fixed volume loop
- Connects directly to sample inject valve without re-plumbing
- Flow rate: 0.01–100 ml/min at 1,450 psi
- Flow rate accuracy: $\pm 2\%$
- Sample viscosity range: 0.35–10 cP
- Integrated pressure sensor

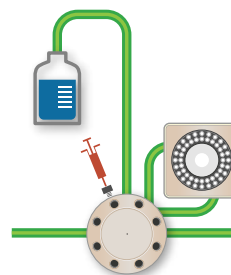
Catalog #	Description
788-4004	NGC sample pump module

C-96 Autosampler

Purifying multiple samples with consistently accurate and reproducible injections can be very time consuming if done manually. The C-96 autosampler enhances the NGC system by enabling you to load up to 96 samples ranging in volume from 5 μl to 5 ml.

The PEEK fluid path ensures biocompatibility with the most sensitive biomolecules.

Three dispenser syringes combined with three sample trays and a variety of sample loops allow for three injection modes in addition to programmable sample and reagent mixing.



- Automated, accurate, and reproducible sample injections
- Injection volume range of 5 μl to 5 ml
- Available Peltier cooling option
- Biocompatible PEEK tubing
- Programmable sample and reagent mixing

Fig. 7. Sample inject valve with autosampler.

Catalog #	Description
760-5010	C-96 autosampler (with cooling)
760-5011	C-96 autosampler

Air Sensor

Introducing air into your system can damage columns and waste precious samples.

The NGC air sensor module enables the detection of end of buffer and sample, thus protecting your system and saving you time.

- Module accepts up to four air sensors
- Compatible with large- and small-bore sensors
- Air sensor extension module available for additional sensors

Catalog #	Description
788-5017	NGC air sensor module

COLUMN SWITCHING AND REVERSE FLOW

Column Switching Valve

Manual column scouting to determine optimal purification conditions is complicated and time consuming. The NGC column switching valve enables automated column scouting.

Up to five columns can be connected without the need to re-plumb the system. The valve also includes an internal bypass function for priming or cleaning your system.

When undertaking affinity chromatography, it is desirable to shorten run times and elute concentrated products. The NGC column switching valve has a reverse flow function ideal for rapid elution and sample concentration from affinity columns. This feature also enhances column cleaning and can increase a column's lifetime.

Avoiding column media damage from compression is an important concern of researchers. The NGC column switching valve has integrated pressure sensors that measure pre-column and delta-column pressures. This protects the column and media from compression by triggering the pumps to pause or reduce the flow rate.

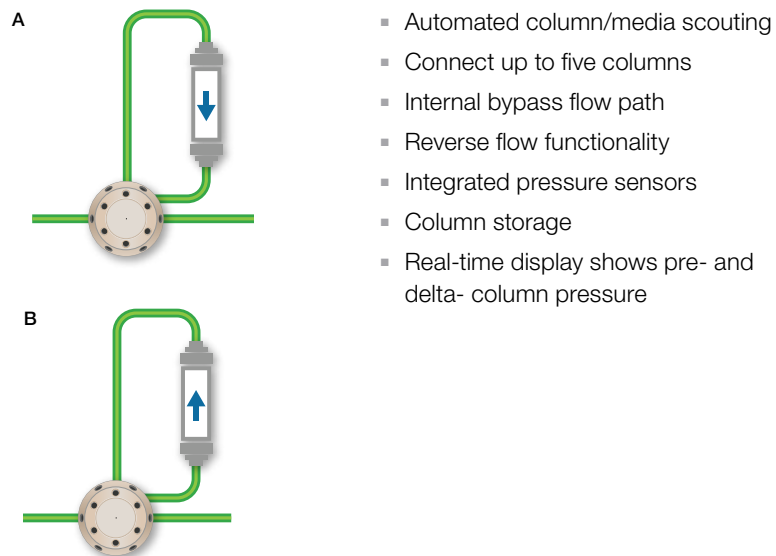


Fig. 8. A, column switching valve. B, column switching valve reverse flow.

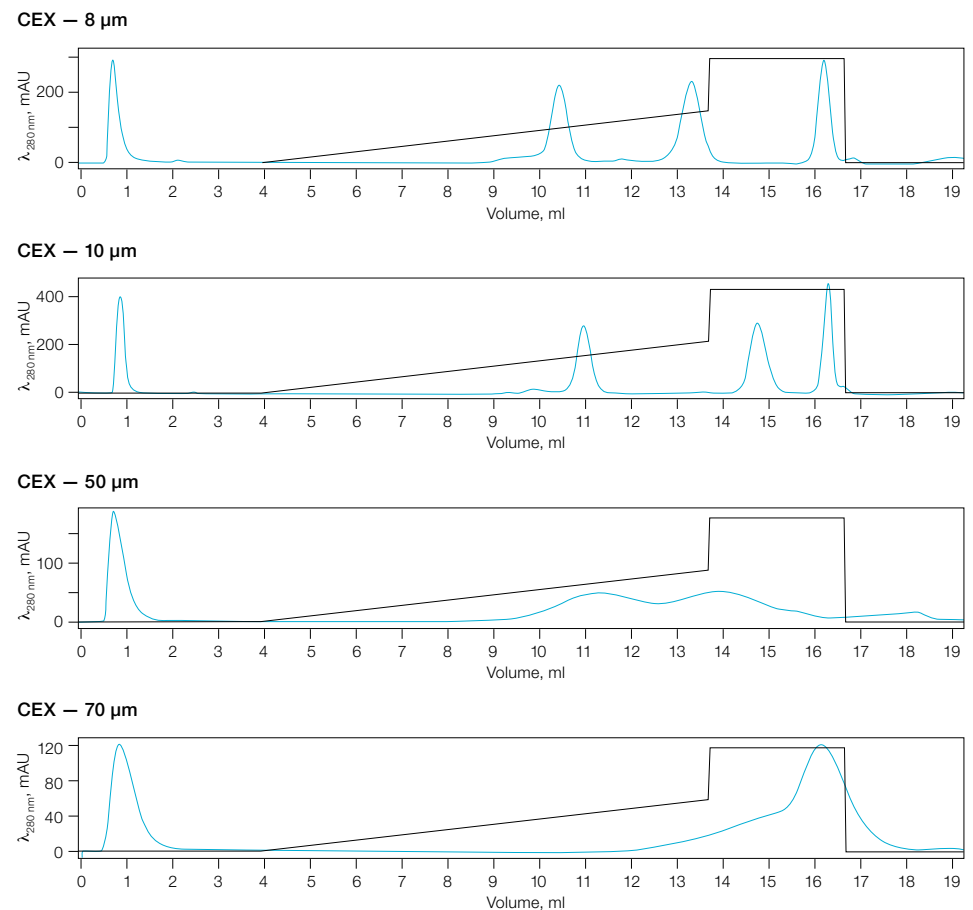


Fig. 9. Automated column scouting using the column switching valve with a cation exchange standard containing α -lactalbumin, ribonuclease A, cytochrome C, and lysozyme in phosphate buffer pH 6.5 separated over four cation exchange (CEX) resin columns of various particle sizes.

Catalog #	Description
788-4012	NGC column switching valve module, 10 ml
788-4026	NGC column switching valve module, 100 ml

SAMPLE MONITORING AND FRACTION COLLECTION

Single- and Multi-Wavelength Detectors

Whether you are running simple protein separations or purifying complex biological samples, you need accurate detection and buffer conductivity monitoring.

The NGC single- (UV) and multi-wavelength (UV/Vis) detector modules provide highly accurate detection of biomolecules. Both are combined with an integrated conductivity monitor (0.01 to 999 mS/cm).

The single-wavelength UV detector contains an LED UV light source, with filters for 255 and 280 nm that enable the monitoring of nucleic acids or proteins.

The multi-wavelength UV/Vis detector adds flexibility to your chromatography system by simultaneously monitoring four wavelengths between 190 and 800 nm in a single module and achieving greater sensitivity and the detection of proteins, peptides, nucleic acids, and chromophores.

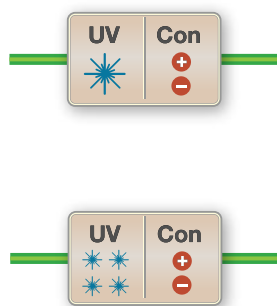


Fig. 10. Single- and multi-wavelength detectors.

Catalog #	Description
788-4008	NGC single-wavelength detector module
788-4009	NGC multi-wavelength detector module

- Integrated conductivity monitor (0.01–999 mS/cm)
- Interchangeable flow cells with 2 mm (preparative), 5 mm (standard analytical), and 10 mm (analytical) path lengths
- Single-wavelength detector (255 or 280 nm)
- Multi-wavelength detector (190–800 nm)

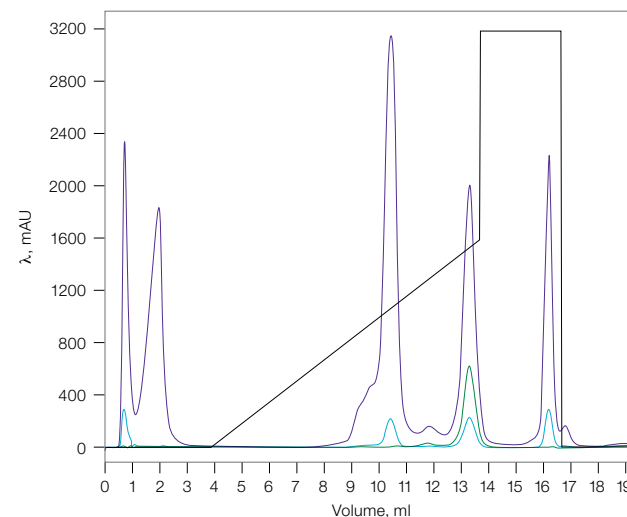


Fig. 11. A cation exchange standard containing α -lactalbumin, ribonuclease A, cytochrome C, and lysozyme was run on an ENrich™ S 1 ml column at pH 6.5. The NGC multi-wavelength detector was used to simultaneously monitor peptide bonds at 215 nm (—), aromatic rings within protein structures at 280 nm (—), and chromophores at 420 nm (—). This single run provided confirmation of the presence or absence of these compounds before any post-run analysis was performed.

pH Valve Module

The ability to determine and monitor pH is essential for method development and for most purification applications.

The NGC pH valve module has an integrated flow cell and pH electrode for accurate inline pH monitoring. It has a bypass mode to take the probe offline without the need for any re-plumbing.



Fig. 12. pH valve.

- Accurate inline pH monitoring (pH 1–14)
- Calibration port for in situ calibration
- Integrated bypass valve
- Reference and pH electrodes sealed in a single body to avoid damage from drying
- Temperature-compensated pH determination

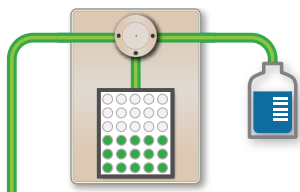
Catalog #	Description
788-4011	NGC pH valve module

BIOFRAC™ FRACTION COLLECTOR

Researchers require a versatile and easy-to-use fraction collector for their purification needs.

The BioFrac fraction collector is compatible with all NGC chromatography systems and is ideal for both small- and large-scale preparative chromatography applications.

It offers flexible collection rack options including 4 x 96-well plates, 0.5–2.0 ml microtubes, larger volume tubes ranging in diameter from 12 to 20 mm, and preparative racks for collection in bottles.



- Compatible with all NGC systems
- Ideal for small- and large-scale preparations
- Versatile sample collection capability from 96-well plate to 20 mm diameter tubes
- Stand-alone operation

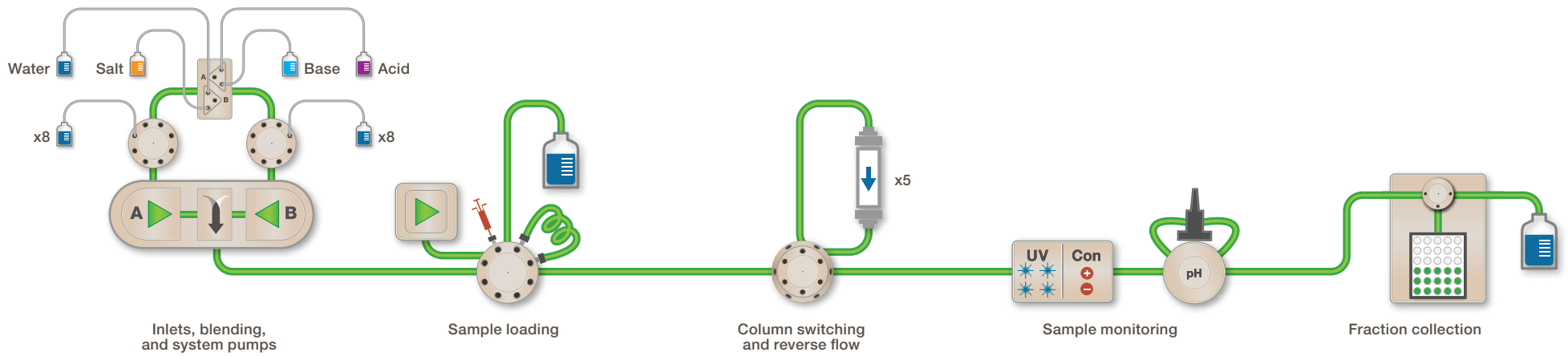
Fig. 13. BioFrac fraction collector.

Scalable and reliable fraction collection options to meet your purification needs.

Catalog #	Description
741-0002	BioFrac fraction collector



CONFIGURE YOUR NGC SYSTEM



Inlets, blending, and system pumps	Sample loading	Column switching and reverse flow	Sample monitoring	Fraction collection
<input type="checkbox"/> 10 ml/min pumps <input type="checkbox"/> 100 ml/min pumps	<input type="checkbox"/> Sample pump module	<input type="checkbox"/> Column switching module Quantity _____	<input type="checkbox"/> Single-wavelength detector	<input type="checkbox"/> BioFrac fraction collector
<input type="checkbox"/> Buffer inlet module Quantity _____	<input type="checkbox"/> Autosampler		<input type="checkbox"/> Multi-wavelength detector	
<input type="checkbox"/> Buffer blending module			<input type="checkbox"/> pH valve module	

Module Selection Table

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The image features a minimalist design with several overlapping colored bars. A thick blue horizontal bar spans the width of the page. A vertical orange bar is positioned on the right side. A vertical cyan bar is also on the right, overlapping the orange bar. A light green horizontal bar is on the right, overlapping the cyan bar. A dark green circle is located at the intersection of the blue bar and the orange bar. The text 'DESIGNED BY YOU. BUILT BY BIO-RAD.' is centered in the lower half of the image.

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