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# **BioLogic™ LP Starter Kit**

## **Instruction Manual**

**Catalog Number  
731-8350**



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For Technical Support, Call Your Local Bio-Rad Office, or in the US,  
Call **1-800-4BIORAD** (1-800-424-6723)



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# Section 1

## Introduction

This manual guides you through the installation of your new BioLogic LP chromatography system. You will perform an actual chromatographic separation, demonstrating the simplicity and excellent performance of the BioLogic LP.

# Section 2

## Starter Kit Components

This starter kit contains:

- One Bio-Scale™ Mini Macro-Prep® High Q anion exchange cartridge, 1 ml
- Buffer A, 10x concentrate, 50 ml (when diluted: 25 mM Tris-HCl, pH 8.1)
- Buffer B, 10x concentrate, 50 ml (when diluted: Buffer “A” with 0.5 M NaCl)
- One vial of anion exchange protein standards—equine myoglobin, conalbumin, chicken ovalbumin, and soybean trypsin inhibitor. Total 9 mg of protein per vial
- One disposable syringe (for injecting sample)
- Instruction manual

For the first-time user, system setup will require 3 to 4 hours; the demonstration chromatography run requires approximately 30 minutes. The starter kit contains enough buffer and sample for two separations.

### Other Materials You Will Need:

- Degassed deionized water, 1 L
- One 500 ml graduated cylinder
- Two 500 ml bottles for buffers
- Bottle or drain for waste fluid
- 13 collection tubes for fraction collector
- Scissors or blade to cut tubing
- BioLogic LP fittings kit

## **Section 3**

### **Buffer and Sample Preparation**

#### **Buffer “A”**

1. Empty the contents of the bottle labeled “Buffer A” into a 500 ml graduated cylinder.
2. Add degassed, deionized water to 500 ml total volume.
3. Place contents in bottle.
4. Stir briefly and gently on stir plate.
5. Label container as buffer “A”. (Pull label off buffer “A” bottle and place on container.)

#### **Buffer “B”**

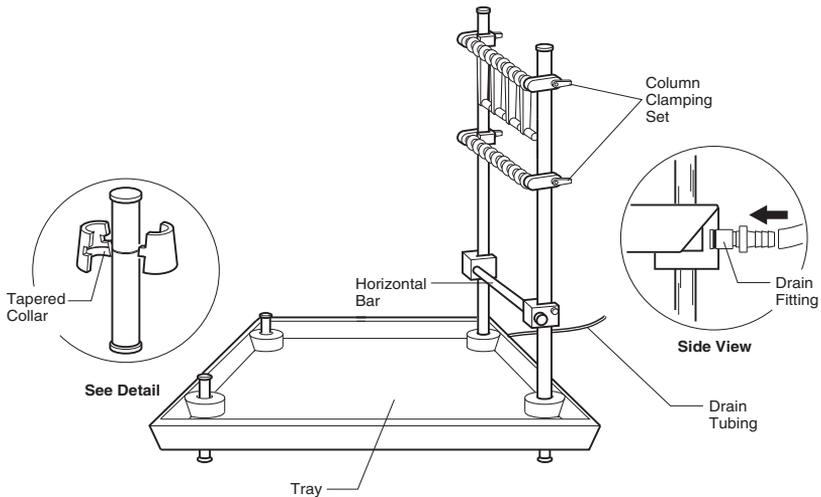
1. Empty the contents of the bottle labeled buffer “B” into a 500 ml graduated cylinder.
2. Add degassed deionized water to 500 ml total volume.
3. Place contents in bottle.
4. Stir briefly and gently on stir plate.
5. Label container as buffer “B”. (Pull label off buffer “B” bottle and place on container.)

#### **Protein Sample**

1. Dissolve the anion exchange standards in buffer “A”
2. Use the syringe or a pipet to measure 4 ml of buffer “A” into the bottle of protein standards.
3. Replace the stopper and shake gently to dissolve.

## Section 4 System Setup

1. Assemble the rack as shown in Figure 1. Be sure to install the rack tray drain fitting, and provide a drain tube in case of spills.



**Fig. 1.**

2. Position the UV monitor optics module, proportioning valve/mixer, conductivity flow cell/column holder, etc. on the rack. The plumbing diagram shown in Figure 5 will help you determine the best positions for components. Lead all cables toward the rear of the unit.
3. Connect cables from UV optics module, conductivity flow cell, proportioning valve/mixer, and valves to the appropriate receptacles on the rear panel of the BioLogic LP as shown in Figure 2.

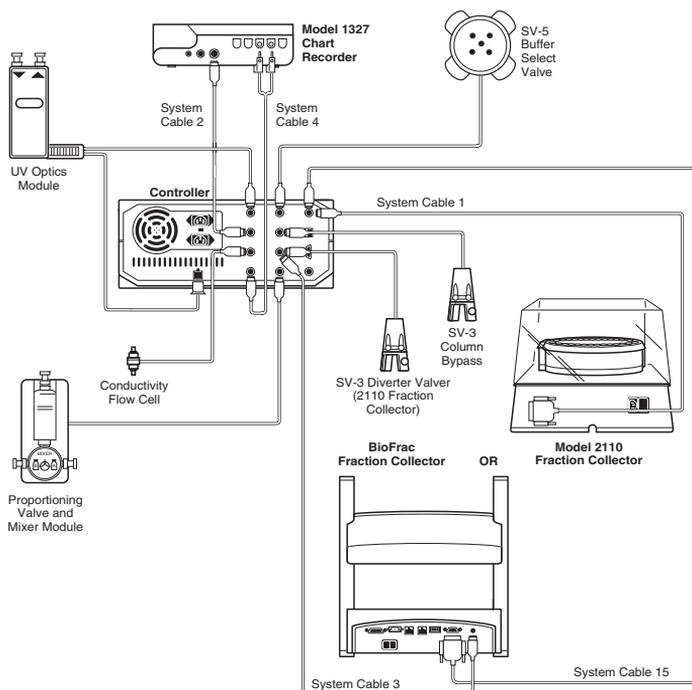


Fig. 2.

## Section 5 Connecting a Chart Recorder

1. If you will be recording data with a Bio-Rad 1327 chart recorder (discontinued item), set all chart recorder switches to the position marked in green. For non-Bio-Rad chart recorders, set the chart recorder to indicate full scale at 1 V.
2. Set a chart speed of 12 cm per hour.
3. Connect the cables for the chart recorder to the appropriate receptacles on the rear panel.
4. Install the chart paper and pens in the chart recorder.
5. Note that two signal cables connect to the chart recorder.
  - a. System cable 2 (Mini-DIN/Large DIN) connects between UV CHART on the BioLogic LP and the single large DIN receptacle on the 1327 chart recorder. This cable carries the UV signal for channel 1, also the “paper stop” and “pen lift” signals. (For non-Bio-Rad chart recorders, use system cable 4, and connect to channel 1 of the chart recorder.)

- b. System Cable 4 (Mini-DIN/Banana Plugs) connects between COND CHART and the channel 2 banana plug receptacles on the 1327. The red banana plug connects to the “mV, V” terminal, the black to the ground terminal. This cable carries the conductivity signal to the chart recorder channel 2.

**Note:** Be sure to plug the banana plugs into the channel 2 receptacles

## **Section 6**

### **Connecting a Computer Running LP Data View Software**

1. Connect one end of the serial cable supplied with the LP Data View software to the COMM port on the BioLogic LP controller.
2. Connect the other end of the serial cable to the COM port on the computer running LP Data View. A 9-pin male to 25-pin adaptor is included for connecting to 25-pin serial ports.
3. Computers that only have USB ports will require a USB-serial port adaptor.
4. Start the LP Data View software and select COM port under the Collect Data menu. From the dialog that appears, select the appropriate COM port. See the online manual for additional information about setting up and running LP Data View.
5. LP Data View can be used on any computer that is running Microsoft Windows 95, Windows 98, Windows ME, Windows NT 4.0, Windows 2000, or Windows XP operating system.

## **Section 7**

### **Connecting a BioFrac™ Fraction Collector**

To connect the BioFrac fraction collector to the BioLogic LP system, you will need system cables 3 and 15. System cable 15 relays the fraction advance signal to the BioFrac, and system cable 3 is used to control the BioFrac diverter valve.

1. Connect the fraction collector to the BioLogic LP system using system cable 15 as shown in Figure 3.
  - a. Connect the cable's 15-pin D connector to the port labeled I/O on the fraction collector.
  - b. Connect the mini-DIN connector to the port labeled Fraction Collector on the BioLogic LP system.

2. Connect the fraction collector to the BioLogic LP system using system cable 3 as shown in Figure 3. **Note:** Both ends of cable 3 are identical.
  - a. Connect one of the cable's mini-DIN connector to the REC port on the fraction collector.
  - b. Connect the other mini-DIN connector to the port labeled Diverter Valve on the BioLogic LP system.

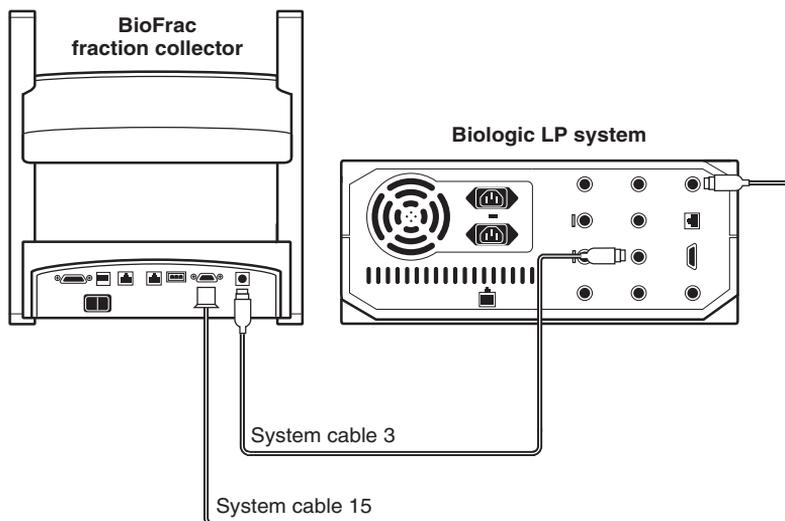


Fig. 3.

## Section 8

### Connecting a Model 2110 Fraction Collector

To connect the Model 2110 fraction collector to the BioLogic LP system, you will need an SVT 3-2 diverter valve and system cable 1.

3. Connect the fraction collector to the BioLogic LP system using system cable 1.
  - a. Connect the cable's DB-9 connector to the port on the fraction collector.
  - b. Connect the mini-DIN connector to the port labeled Fraction Collector on the BioLogic LP system.
4. The diverter valve port diverts flow from the fraction collector during non-collection periods

- a. An SV-3 solenoid valve is used with the Model 2110 fraction collector.
- b. Plug the SV-3 valve directly into the diverter valve receptacle on the back of the BioLogic LP instrument.

## Section 9 Power Connections

1. Plug the line power cords into the rear panel of the BioLogic LP and the fraction collector.
2. Power for the 1327 chart recorder is supplied from the 12 volt outlet on the rear panel of the BioLogic LP (next to the power connection for the UV optics module). Locate the thin black power cable, and connect this between the BioLogic LP and the power inlet for the 1327 (next to the DIN socket, chart recorder rear panel). The 1327 chart recorder may also be powered by a separate AC adaptor.

## Section 10 Pump Setup

1. Adjust platen pressure screw (on pump head) as shown in Figure 4.
2. Using a screwdriver or coin, turn the screw counterclockwise as far as it will go, then turn clockwise three full turns.

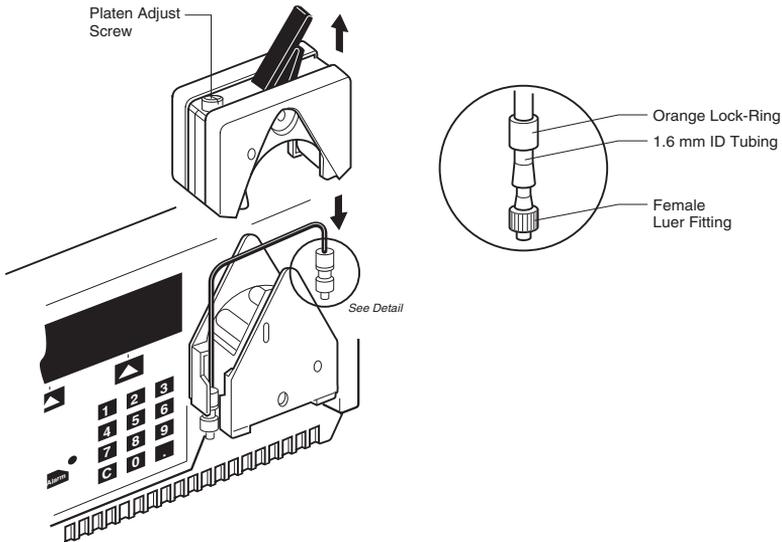


Fig. 4.

3. Install tubing in pump as shown above.
4. PharMed tubing, 1.6 mm ID (furnished with the BioLogic LP system), is recommended for use with the starter kit.
5. Assemble with fittings and lock rings as shown in Figure 4. (Use orange lock rings and “medium” size barb fittings with 1.6 mm tubing.)

## Section 11 System Tubing

Cut tubing and install fittings to make plumbing connections as shown in Figure 5. Tygon tubing, 1.6 mm ID (furnished with the BioLogic LP system), is recommended for system connections when using the starter kit.

1. Note inlet and outlet arrows on top of UV optics module—observe this flow direction when connecting tubing.
2. Use of the SV-3 column bypass valve and SV-5 buffer selector are optional.
3. If the buffer selector valve is not used, connect the mixer outlet directly to the pump.
4. If the column bypass valve is not used, connect the bottom port of the MV-6 inject valve directly to the column inlet.
5. Before making connections to the MV-6 inject valve, turn its knob counterclockwise as far as it will go.

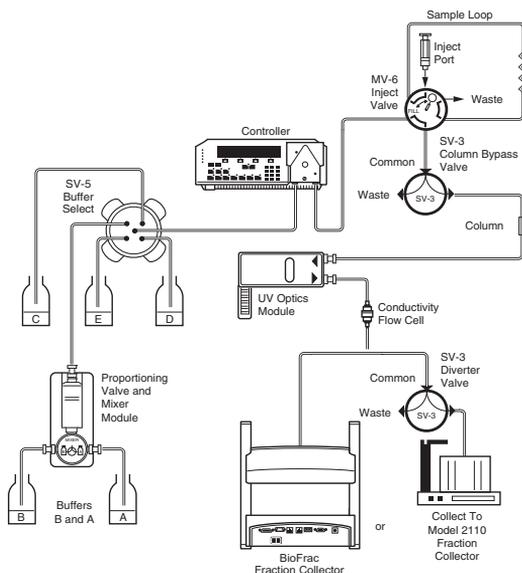


Fig. 5.

Below are the recommended tubing lengths when installing the instrument:

- SV-3 to Waste [31 inches (78 cm)]
- Pump Outlet to MV-6 [22 inches (57 cm)]
- SV-3 to Fraction Collector -or- Conductivity Cell to BioFrac [25 inches (63 cm)]
- MV-6 to Waste [33 inches (84 cm)]
- Sample Loop [23 inches (59 cm)]
- Mixer to Buffer A [26 inches (67 cm)]
- Mixer to Buffer B [26 inches (67 cm)]
- MV-6 to Column Inlet [8 inches (21 cm)]
- Mixer to Pump Inlet [22 inches (55 cm)]
- Conductivity Cell to SV-3 [8 inches (20 cm)]
- Column Outlet to UV [9 inches (23 cm)]
- UV to Conductivity Cell [8 inches (20 cm)]

## Section 12

### Connecting Cartridge and Sample Loop

1. Bio-Scale™ Mini cartridges **CAN** be installed in the same holder that supports the conductivity flow cell (shown in Figure 6).

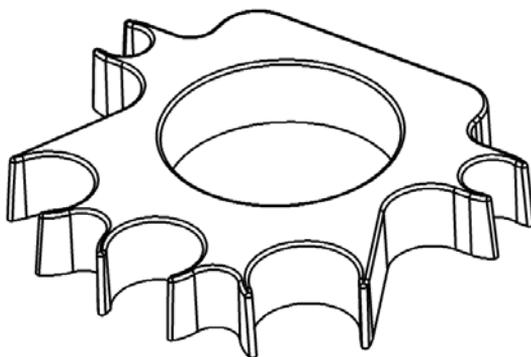


Fig. 6.

2. Connect the cartridge between the injector valve outlet and the UV monitor flow cell, as shown in the system plumbing diagram (Fig. 5).
3. Install 50 cm of 1.6 mm ID tubing for a 1.0 ml sample loop. The male luer fittings on each end of the tubing are used to connect to the injector valve.

## Section 13

### Purging the System

1. Place the inlet tubes for “A” and “B” buffers in their respective buffer containers.
2. Turn the system power on—you will see the “manual” screen. **Note:** that the conductivity and UV absorbance values are displayed on the manual screen.
3. Press the PUMP instrument soft key.
4. Press PURGE soft key.

**Note:** if a column bypass valve is connected to your system switch it to bypass, otherwise, remove the column from the flow path during the purge.

5. Press the BUFFER soft key, use the Previous/Next keys to select buffer “B”, press OK—purge the system with “B” buffer until air is expelled, and the conductivity reading stabilizes. Note the conductivity of “B” buffer here: \_\_\_\_\_ mS. (You will use this information later.)
6. Press the BUFFER soft key, use the Previous/Next keys to select buffer “A”, press OK—purge the system with “A” buffer until air is expelled, and the conductivity reading stabilizes. Note the conductivity of “A” buffer here: \_\_\_\_\_ mS. (You will use this information later.)
7. Press the STOP soft key.
8. If the column was removed, reconnect the column to the system.

## Section 14

### Conductivity Monitor Calibration and Setting Minimum and Maximum Range

1. Calibrate the conductivity flow cell by:
  - a. Press the COND soft key on the BioLogic LP instrument front panel.

- b. Press the soft key for CALIBRATE.
  - c. Enter the Conductivity Cell Constant displayed on the conductivity flow cell cable.
2. In Manual mode:
- b. Press the COND soft key.
  - c. Select Min/Max.
  - d. In the Min field, enter the conductivity of “A” buffer (determined above in Step 6 of Section 13).
  - e. Press SETMAX.
  - f. Enter the conductivity of “B” buffer (determined above in Step 5 of Section 13).
  - g. Press OK.

## **Section 15**

### **Calibrating the Pump**

You must tell the system which tubing is installed in the pump head.

#### **In Manual mode:**

1. Press the PUMP soft key.
2. Select Flow, then Calibrate.
3. Select the tubing size you are using (1.6 mm ID).
4. Select Nominal.
5. The pump is now calibrated, using the Nominal flow rate factor for 1.6 mm ID tubing.

## **Section 16**

### **Setting Up Your Fraction Collector**

If you are using a BioFrac fraction collector, you must program both the BioLogic LP workstation and the BioFrac fraction collector to use them together.

1. On the BioLogic LP system, select the appropriate fraction collector.
  - a. Press the FRAC COLL button on the BioLogic LP system’s front panel.
  - b. Press the MODEL soft key.

- c. Select “BioFrac” as your fraction collector. If your BioLogic LP system does not list the BioFrac, select 2128. The BioFrac communicates with the BioLogic LP using the same communication protocols and cabling as the Model 2128 fraction collector.
- d. The following question will appear: “Current Model: 2128 with valve Cable, External diverter valve cable connected?” Press the soft key corresponding to YES.
- e. On the BioFrac fraction collector, select the appropriate settings for use with the BioLogic LP system.
- f. Be sure the fraction collector’s power switch is ON.
- g. From the BioFrac Start-Up screen, move the cursor to the mode field using the arrow keys. Press ENTER, select the LP/Econo option and then press ENTER again.
- h. Press RACK and SELECT the rack that will be used, then press DONE.
- i. Check the Start and End tube numbers to ensure that the BioFrac will fill at least 13 tubes.
- j. Press the ENGAGE soft key.

If you are using a Model 2110 fraction collector, you must program the BioLogic LP workstation to communicate with the fraction collector.

2. On the BioLogic LP system select the appropriate fraction collector.
  - a. Press the FRAC COLL soft key on the BioLogic LP system’s front panel.
  - b. Press the MODEL soft key.
  - c. Select “2110” as your fraction collector.

## **Section 17**

### **Setting Up the UV Monitor**

1. Look on the bottom of the UV optics module—the rectangular filter holder has 254 and 280 markings.
2. The arrow should be pointing to 280.
3. If this is not the case, loosen the thumbscrew, remove and rotate the filter holder, and reinstall.
4. Set the UV Monitor range, and zero the UV monitor.

### **In Manual mode:**

- a. Press the PUMP soft key, then press FLOW.
- b. Set flow rate to 1.5 ml/minute, press OK. Press START.
- c. Press the UV soft key, press SET RANGE.
- d. Using the INCREASE and DECREASE soft keys, set UV monitor range to 0.05 AUFS.
- e. Press OK.
- f. Press ZERO—the system will set the UV reading to zero.
- g. Press the PUMP soft key.
- h. Press the STOP soft key.

## **Section 18**

### **Programming the Pump Method**

The BioLogic LP starter kit allows you to separate a standard mixture containing equine myoglobin, conalbumin, chicken ovalbumin, and soybean trypsin inhibitor, using a Bio-Scale Mini Macro-Prep High Q cartridge. Buffer “A” is 25 mM Tris HCl, pH 8.1; buffer “B” is buffer “A” with 0.5 M NaCl. Equine myoglobin is not retained on the column—it elutes in the void volume (first peak). The remaining three proteins bind to the column, and elute separately as the salt concentration increases.

1. Press the PROGRAM soft key, select NEW METHOD.
2. Select Time programming mode.
3. Enter the pump program.
4. Press ADD.
5. Select buffer “A” with the Previous/Next keys, press OK.
6. Enter step length of 3 minutes, press OK.
7. Enter flow rate of 1.5 ml/minute, press OK.
8. You have now entered the first step of the method (Buffer “A”, step length 3 minutes, flow rate 1.5 ml/minute).
9. Enter the remaining steps:
  - Step 2. Gradient 0% to 50% “B”, step length 10 minutes, flow rate 1.5 ml/minute.
  - Step 3. Buffer “B”, step length 6 minutes, flow rate 1.5 ml/minute.
  - Step 4. Buffer “A”, step length 6 minutes, flow rate 1.5 ml/minute.
10. After entering Step 4, press OK.

## **Section 19**

### **Setting the Alarm**

The alarm sounds after 3 minutes to remind you to turn the valve back to the load position. (Proper technique is to switch the sample loop out of the flow path during gradient elution; the starter kit separation will be successful either way.)

1. Press the ALARM soft key.
2. Press ADD.
3. Enter a time of 3 minutes for Alarm 1 and check that Hold Methods is set to NO.
4. Press OK twice.

## **Section 20**

### **Entering the Fraction Collector Program**

1. Press the FRAC COLL soft key on the front panel of the BioLogic LP workstation.
2. Select ALL.
3. Enter a fraction size of 2 minutes (2 ml if your method is based on volume).
4. Press OK twice, then select DONE..
5. Press SAVE, name method "DEMO 1", press DONE.

## **Section 21**

### **Loading the Sample Loop**

1. Turn the MV-6 injector valve knob counterclockwise as far as it will go as shown in Figure 7.
2. Draw 1.5 ml of the protein standard mixture into the syringe making sure to push out as much air from the syringe before inserting in to the injector valve.
3. Insert the syringe in the top port of the MV-6 injector valve and fill the sample loop.
4. **Leave the syringe in the port after you have injected the sample** as this prevents the sample from siphoning out of the loop to waste.

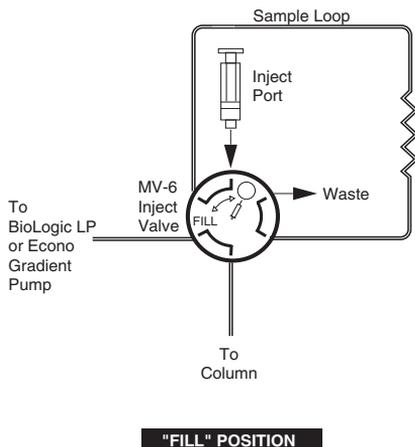


Fig. 7.

## Section 22

### Final Check Before Starting Method

1. Press the MANUAL soft key, then press the START soft key to start the pump.
2. Make sure that "A" buffer is selected.
3. Check the plumbing connections for leaks, check for air in the lines and purge if necessary.
4. Press the instrument keys to check settings.
  - a. UV monitor: Range 0.05 AUFS. Rezero the UV monitor if necessary. (Only zero the monitor if fluid is moving through the flow cell.)
  - b. Conductivity: Minimum and maximum values match the values for "A" and "B" buffers that were determined when purging the system.
  - c. Method: Press Program, then View Method — Review gradient and fraction collector program.
  - d. LP Data View software: Open the LP Data View software and press the Record button. Zero the UV monitor on the BioLogic LP workstation, making sure that the UV trace flatlines at zero. Press the Stop button, then the Clear button. Do not save this trace. The software is now ready for the sample run to begin.

- e. Chart Recorder: After zeroing the UV monitor, use the thumbwheels to set both pens near the bottom of the chart recorder paper. Set paper speed (12 cm/hour suggested). Confirm that all switch settings are in the position marked in green.
- f. Fraction Collector: Confirm that the fraction collector is connected, then place tubes in the fraction collector rack. Check that the drop head is over collection tube #1. On the BioFrac, press Engage.

## Section 23

### Starting the Method

1. Press the RUN soft key — the system will count down 10 seconds and then start the method.
2. When the method starts, turn the injector valve knob to the right as far as it will go as shown in Figure 8 on the left. When the alarm sounds, turn the valve knob to the left as shown in Figure 8 on the right.

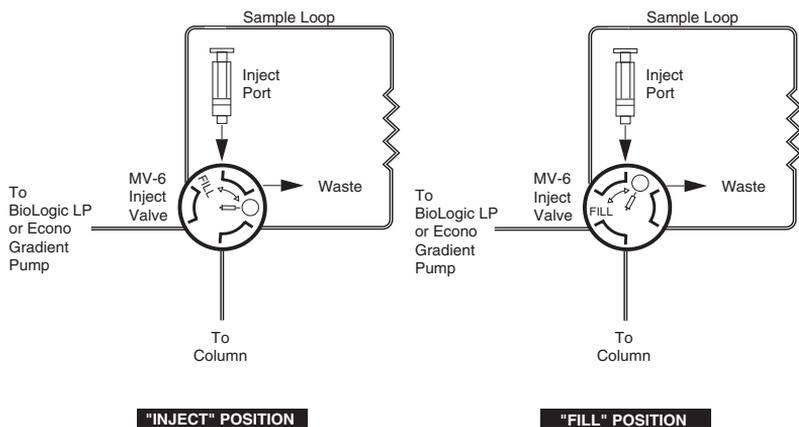
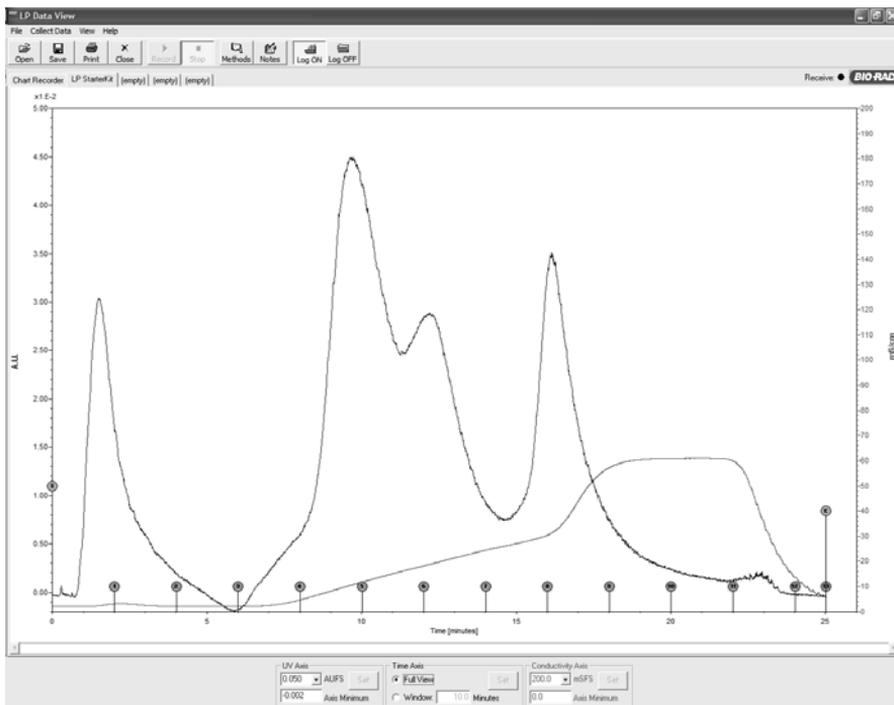


Fig. 8.

## Example LP Data View Chromatogram



Example of chromatogram when running the BioLogic LP starter kit.

## Section 24 Advanced Users: Automatic Sample Injection

If your system is equipped with an SV-5 buffer select valve, you may use it to inject the sample. This feature is important when you have a large sample, or wish to do multiple runs automatically. To demonstrate this feature:

1. Use the syringe to dilute a 2 ml aliquot of sample (as prepared above) to a total volume of 6 ml; place the diluted sample in a centrifuge tube or other small container.
2. Attach a short length of 0.8 mm ID tubing to port “C” of the SV-5 buffer select valve; place the other end of the tube in the container of diluted sample. Bleed the air from the tubing by selecting buffer “C”, and running at 1.5 ml/minute until the air is removed from the tubing. Flush the air from the system. (If installed, use the column bypass valve to avoid pumping air into the column.)

3. Enter a pump program as described above—you may wish to recall your earlier method and edit.
  - Step 1. Buffer “A”, step Length 1 minute, flow rate 1.5 ml/minute
  - Step 2. Buffer “C”, step length 3.5 minutes, flow rate 1.5 ml/minute
  - Step 3. Buffer “A”, step length 1 minute, flow rate 1.5 ml/minute
  - Step 4. Gradient 0% to 50% “B”, step length 10 minutes, flow rate 1.5 ml/minute
  - Step 5. Buffer “B”, step length 6 minutes, flow rate 1.5 ml/minute
  - Step 6. Buffer “A”, step length 6 minutes, flow rate 1.5 ml/minute
4. For fraction collection, use “Collect All” with a fraction size of 2 minutes. 14 tubes will be required.
5. Perform final checks and run method as described above.

**Note:** The first peak (“void” peak) from this run will be broader than the first run, because sample is being applied at lower concentration over a longer period of time.

## Section 25

### Product Information

Catalog #	Description
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#### *BioLogic LP Systems*

731-8300	<b>Standard BioLogic LP System</b> , 100/120 V, includes BioLogic LP controller, BioLogic rack, accessory kit with inject valve (MV-6), proportioning valve/mixer, UV optics, conductivity cell, tubing and fittings kit, column and conductivity cell holder, starter kit, instructions
731-8301	<b>Standard BioLogic LP System</b> , 220/240 V
731-8302	<b>BioLogic LP System, With Model 2110 Fraction Collector</b> , 100/120 V, includes standard BioLogic LP system, SV-3 diverter/bypass valve, system cable 1
731-8303	<b>BioLogic LP System, With Model 2110 Fraction Collector</b> , 220/240 V
731-8336	<b>BioLogic LP System, With Model 2110 Fraction Collector and LP Data View Software</b> , 100/120 V, includes SV-3 diverter/bypass valve system cable 1, 25' serial cable
731-8337	<b>BioLogic LP System, With Model 2110 Fraction Collector and LP Data View Software</b> , 220/240 V

<b>Catalog #</b>	<b>Description</b>
731-8338	<b>BioLogic LP System with BioFrac Fraction Collector and LP Data View Software</b> , 110/120 V, includes system cables 3 and 15, 25' serial cable
731-8339	<b>BioLogic LP System with BioFrac Fraction Collector and LP Data View Software</b> , 220/240 V

***BioLogic LP Fraction Collectors***

741-0002	<b>BioFrac Fraction Collector</b> , input voltage 100–240 V, includes power cord, rack set F1 (2 x flatpack, 13 mm), BioFrac diverter valve, fittings kit, instructions
731-8122	<b>Model 2110 Fraction Collector</b> , 110 V
731-8120	<b>Model 2110 Fraction Collector</b> , 220 V
741-0010	<b>Rack Set F1</b> , 2x flatpack, with numbered tube positions, each holds 90 tubes, 12–13 diameter, for total of up to 180-tube collection
741-0011	<b>Rack Set F2</b> , 2 x flatpack, each holds 60 tubes, 15–16 mm diameter, for total of up to 120-tube collection
741-0012	<b>Rack Set F3</b> , 2 x flatpack, each holds 40 tubes, 18–20 mm diameter, for total of up to 80-tube collection
741-0013	<b>Rack Set H1</b> , 4 x flatpack, each holds 42 capless 1.5 ml Eppendorf/microtubes for total of up to 168-microtube collection
741-0014	<b>Rack Set H2</b> , 4 x flatpack, each holds 63 capless 0.5 ml Eppendorf/microtubes for total of up to 252-microtube collection
741-0015	<b>Rack Set H3</b> , 4 x flatpack, each holds 30 reduced volume scintillation vials, 16 mm diameter, for total of up to 120-vial collection
741-0016	<b>Rack Set H4</b> , 4 x flatpack, each holds 6 scintillation vials, 30 mm diameter, for total of up to 24-vial collection
741-0020	<b>BioFrac H4-High Rack Set</b> , 4 x flatpack, each holds 6 centrifuge tubes, 30 mm diameter, for total of up to 24-vial collection
741-0017	<b>BioFrac Ice Bath/Microplate Rack</b> , holds 120 tubes, 12–13 mm diameter with the following capabilities: cup to 4 SBS-format microplates in 96- 48-, 24-, or 12-well configurations; Titertube microtube collection 8 x 12, 96-tube configuration

<b>Catalog Number</b>	<b>Product Information</b>
741-0018	<b>BioFrac Prep-20 Preparative Rack</b>
741-0007	<b>BioFrac Fraction Collector Fittings Kit</b> , includes replacement fittings and tubing for setup of the fraction collector to the BioLogic LP or DuoFlow chromatography systems
741-0088	<b>BioFrac Microplate Drophead Kit</b> , includes preassembled drophead nut with 0.020 ID Tefzel tubing; delivers approximately 25 µl per drop
223-9750	<b>Clear Polystyrene Tubes</b> , 13 x 100 mm, 9 ml nominal capacity, 1,000
223-9751	<b>Natural Polypropylene Tubes</b> , 13 x 100 mm, 9 ml nominal capacity, 1,000
223-9500	<b>Micro Test Tubes</b> , capless, 1.5 ml, polypropylene, natural, graduated, 500

### ***BioLogic LP Valves***

731-8320	<b>MV-6 Sample Inject Valve</b> , 6 ports
731-8321	<b>SV-5 Buffer Select Valve</b> , 5-port, 4-position solenoid valve, 30 psi (2 bar) limit
731-8322	<b>SV-3 Diverter/Bypass Valve</b> , 3-way valve

### ***BioLogic LP Accessories and Replacement Parts***

731-8323	<b>Gradient Mixer</b>
731-8324	<b>BioLogic LP Optics Module</b>
731-8165	<b>UV Flow Cell</b> , replacement
731-8166	<b>Lamp</b> , replacement
731-8167	<b>Filter Assembly</b> , 280 and 254 nm
731-8155	<b>Conductivity Flow Cell</b>
731-8350	<b>BioLogic LP Starter Kit</b> , includes buffers, standard, anion exchange cartridge, instructions

### ***BioLogic LP Software***

731-8365	<b>LP Data View Software for the BioLogic LP System</b> , includes software CD, 25' serial cable, port adaptor
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### ***BioLogic Rack***

750-0251	<b>BioLogic Rack</b> , includes rack tray, 8 sleeves, 2 short vertical bars, 2 long vertical bars, column clamp set, 5 bar clamps, 4 cable organizers
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<b>Catalog #</b>	<b>Description</b>
750-0268	<b>BioLogic Rack Expansion Kit</b> , includes 2 trays, 2 vertical bars, 16 sleeves
750-0261	<b>BioLogic Rack Tray</b> , includes 1 rack tray, 8 sleeves
750-0262	<b>Vertical Bars</b> , long, 64 cm, 2
750-0263	<b>Vertical Bars</b> , short, 10 cm, 2
750-0264	<b>Horizontal Bar Kit</b> , includes 2 tie bars, 4 bar clamps
750-0260	<b>Column Clamp Set</b> , includes 1 column clamp assembly
750-0265	<b>Bar Clamps</b> , 5

### ***Systems Cabling***

731-8261	<b>System Cable 1</b> , 8-pin mini-DIN to DB-9 connector
731-8262	<b>System Cable 2</b> , 8-pin mini-DIN to 8-pin standard DIN
731-8263	<b>System Cable 3</b> , 8-pin mini-DIN to 8-pin mini-DIN
731-8264	<b>System Cable 4</b> , 8-pin mini-DIN to banana plug cable
731-8267	<b>System Cable 7</b> , 8-pin mini-DIN to bare wires
731-8269	<b>System Cable 9</b> , 8-pin mini-DIN to Amersham FRAC-100
731-8283	<b>System Cable 12</b> , 8-pin mini-DIN to Isco DB-15 connector
731-8285	<b>System Cable 14</b> , 8-pin mini-DIN to Gilson connector
731-8286	<b>System Cable 15</b> , 15-pin D to mini-DIN

### ***BioLogic LP System Fittings***

731-8220	<b>System Fittings Kit</b> , polycarbonate/polypropylene 250 pieces
731-8221	<b>0.8 mm Barb to Female Luer</b> , 25
731-8222	<b>1.6 mm Barb to Female Luer</b> , 25
731-8223	<b>3.2 mm Barb to Female Luer</b> , 25
731-8224	<b>0.8 mm Barb to Male Luer</b> , 25
731-8225	<b>1.6 mm Barb to Male Luer</b> , 25
731-8226	<b>3.2 mm Barb to Male Luer</b> , 25
731-8228	<b>Female Luer to Female Luer</b> , 10
731-8230	<b>Male Luer to Male Luer</b> , 10
731-8232	<b>Female Luer Plugs</b> , 25

<b>Catalog #</b>	<b>Description</b>
731-8233	<b>Male Luer Plugs</b> , 25
731-8229	<b>Female Luer T-Connector</b> , 10
732-8302	<b>0.8 mm Barb T-Connector</b> , recommended for minimal dead-volume connection, 25
732-8300	<b>0.8 mm Barb to Barb Connector</b> , recommended for minimal dead volume connection, 25
732-8103	<b>3-Way Stopcock</b> , 2 female luer to male luer, 10
732-8107	<b>3-Way Stopcock</b> , nylon, solvent resistant, 10
732-8102	<b>2-Way Stopcock</b> , female luer to male luer, 10
732-3245	<b>Luer Tubing Adaptor</b> , with 5 of 0.8 mm ID PTFE tubing, 5
732-8202	<b>Double Luer Tubing Adaptor</b> , with 5 of 0.8 mm ID PTFE tubing

### ***BioLogic LP System Tubing***

731-8210	<b>Silicone Tubing</b> , 0.8 mm ID/ 0.8 mm wall, 10 m
731-8211	<b>Silicone Tubing</b> , 1.6 mm ID/ 0.8 mm wall, 10 m
731-8212	<b>Silicone Tubing</b> , 3.2 mm ID/ 0.8 mm wall, 10 m
731-8213	<b>Tygon Tubing</b> , 0.51 mm ID/ 0.8 mm wall, 10 m
731-8214	<b>Tygon Tubing</b> , 0.8 mm ID/ 0.8 mm wall, 10 m
731-8215	<b>Tygon Tubing</b> , 1.6 mm ID/ 0.8 mm wall, 10 m
731-8207	<b>PharMed Tubing</b> , 0.8 mm ID/ 1.0 mm wall, 10 m
731-8208	<b>PharMed Tubing</b> , 1.6 mm ID/ 1.0 mm wall, 10 m
731-8209	<b>PharMed Tubing</b> , 3.2 mm ID/ 1.0 mm wall, 10 m
731-8240	<b>Pump Tubing Kit</b> , 0.8 mm ID silicone, 20 precut lengths and 4 sets of fittings
731-8241	<b>Pump Tubing Kit</b> , 1.6 mm ID silicone, 20 precut lengths and 4 sets of fittings
731-8242	<b>Pump Tubing Kit</b> , 3.2 mm ID silicone, 20 precut lengths and 4 sets of fittings
731-8247	<b>Pump Tubing Kit</b> , 0.8 mm ID PharMed, 20 precut lengths and 4 sets of fittings
731-8248	<b>Pump Tubing Kit</b> , 1.6 mm ID PharMed, 20 precut lengths and 4 sets of fittings
731-8249	<b>Pump Tubing Kit</b> , 3.2 mm ID PharMed, 20 precut lengths and 4 sets of fittings

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