GE Healthcare

ÄKTAFPLC

User Manual

ÄKTA

Important user information

All users must read this entire manual to fully understand the safe use of ÄKTAFPLC.

Important!

ÄKTAFPLC is intended for research use only, and should not be used in any clinical or in vitro procedures for diagnostic purposes.

ÄKTAFPLC should not be used in any clinical or in vitro procedures for diagnostic purposes.

Safety notices

This manual contains warnings and cautions concerning the safe use of the product. See definitions below.

WARNING! The WARNING symbol and notice highlight instructions that must be followed to avoid personal injury. Do not proceed until all stated conditions are clearly understood and met.

CAUTION! The CAUTION notice highlights instructions that must be followed to avoid damage to the product or other equipment. Do not proceed until all stated conditions are met and clearly understood.

Notes

Note: *A Note is used to indicate information that is important for trouble-free and optimal use of the product.*

Recycling

This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of equipment.

WARNING! This is a Class A product. In a domestic environment, it might cause radio interference, in which case the user might be required to take appropriate measures.

WARNING! All repairs should be done by personnel authorized by GE Healthcare. Do not open any covers or replace parts unless specifically stated in the instructions.

CE-certification

This product complies with the European directives listed below, by fulfilling corresponding standards. A copy of the Declaration of Conformity is available on request.

- 73/23/EEC, Low Voltage Directive
- 89/336/EEC, EMC Directive

The **CE** logo and corresponding declaration of conformity, is valid for the instrument when it is:

- used as a stand-alone unit, or
- connected to other CE-marked GE Healthcare instruments, or
- connected to other products recommended or described in this manual, and
- used in the same state as it was delivered from GE Healthcare except for alterations described in this manual.

Note: *The Declaration of conformity is valid only for systems that are marked with the **CE** logo:*

CE

Contents

1 About this installation guide

ÄKTAFPLC™ is assembled and fully tested before shipping.

For safe transportation, however, some components have been secured and need to be released from their strapping.

Extra capillaries, accessories, column holders, etc. are enclosed in separate paper boxes.

This guide describes how to install ÄKTAFPLC. It is divided into two parts; one describing the installation and one describing how to run the installation test. After the installation procedure has been performed, your ÄKTAFPLC is ready for purification work.

For full details of specifications, methods, maintenance, etc. refer to the respective User Manuals and Instructions.

2 Safety

- The system is designed for indoor use only.
- Do not use in a dusty atmosphere or close to spraying water.

Refer to Technical Specifications in the System Manual for detailed environmental pre-requisites.

WARNING! The individual instruments must not be opened by the user. They contain high voltage circuits that can give a lethal electric shock.

WARNING! Monitor UPC-900 uses high intensity ultra-violet light. Do not disconnect the optical unit while the lamp is ON.

WARNING! ÄKTAFPLC must be connected to a grounded mains socket.

WARNING! There must always be a sample loop or Superloop™ connected to ports 2 and 6 of the injection valve. This prevents liquid spraying out of the ports when switching the valve, which is especially dangerous if hazardous chemicals are being used.

WARNING! Two people are required to lift the system.

WARNING! Only spare parts approved or supplied by GE Healthcare may be used for maintaining and servicing the system.

WARNING! If the system is turned around or the fraction collector removed, the external capillaries and other tubing may become entangled in nearby objects and be pulled from their connections causing leakage.

WARNING! Never place waste containers on the top of the system. If they become full and overflow, liquid may penetrate the system causing a short-circuit.

Safety precautions

1 Read the user manuals before using the product.

2 This instrument is designed for indoor use only.

3 Do not use the equipment where aerosol sprays are being used, nor where oxygen is being administered.

4 Check that the voltage setting matches the supply voltage of your house.

5 The instrument must always be used with the protective earth lead of the power cord correctly grounded to earth at the main outlet.

6 To permit sufficient cooling, ensure that the vents at the top, rear and bottom of the instrument are not covered.

7 Keep air openings free from lint, hair, fluff etc.

8 Do not place anything on top of the equipment.

9 Unless specifically instructed to do so by this manual, do not drop or put anything into any opening in the equipment, nor into any hose or coupling.

10 Do not operate the instrument in extreme humidity (above 95%). Avoid condensation by letting the unit equilibrate to ambient temperature.

11 Do not place the equipment in liquid, nor put it where it could fall into liquid. If the equipment becomes wet, unplug it before touching it.

12 Keep the instrument dry and clean. Wipe regularly with a soft damp tissue. Let the instrument dry completely before use.

13 Never place waste containers on the top of the instruments. If they become full and overflow, liquid may penetrate the instrument causing a short-circuit. If there is a risk that large volumes of spilled liquid may penetrate the casing of the instruments and come into contact with the electrical components, immediately switch off the system and contact an authorised service technician.

14 Do not leave the equipment unattended while it is plugged in.

15 Any equipment connected to the instrument should meet the requirements of the EN 61 010-1 or other international safety standards. In Europe, connected equipment must also be CE-labelled.

16 Do not operate the product Hardware or Software in any other way than described in the product user manuals.

17 Do not use any accessories, which are not supplied or recommended by the manufacturer.

18 Do not use the equipment if it is not working properly, nor if it has suffered any damage. Examples of damage include.

- damage to the flexible supply cord or its plug
- damage caused by dropping the equipment
- damage caused by dropping the equipment into water or splashing water onto it.

19 Do not let the equipment or its flexible cord come into contact with surfaces, which are too hot to touch.

3 Pre-requisites

WARNING! ÄKTAFPLC must be connected to a grounded mains socket.

- Two people are required to lift ÄKTAFPLC onto the working bench.
- To install ÄKTAFPLC, a working area of about 200 x 80 cm is required.
- ÄKTAFPLC requires 100-120/220-240 V~, 50/60 Hz electrical supply with safety grounding.
- Cutting pliers are recommended for cutting plastic straps.
- A waste flask is needed.
- The installation test requires the following solutions:

  - 200 ml of distilled water.

  - 200 ml of 0.4% acetone in distilled water.

4 Installation overview

- Unpack ÄKTAFPLC *page 11*
- Detach packing material and unstrap items *page 12*
- Unpack and install the computer *page 14*
- Connect mains power cabling *page 14*
- Connect UniNet-1 data communication chain cabling *page 15*
- Complete the first two sections of the installation record *page 24*
- Prepare ÄKTAFPLC for the installation test *page 16*
- Run the installation test method *page 17*
- Evaluate the gradient *page 21*
- Evaluate the step response *page 21*
- Complete the test record *page 23*
- Complete the registration form *page 25*
- Complete the final section of the installation record *page 24*
- Store photocopies of all records and forms in the System Logbook.
- Store the Installation Guide in the User Manual box.

5 Installation of ÄKTAFPLC

Begin by creating a clean and dry working area of 200 x 80 cm that allows easy access. Then follow the step-by-step instructions below and fill in the Installation record as you go along, see *page 24*.

Note: *Some items are packed in separate boxes delivered with the system.*

Note: *Some packing lists are included in the boxes.*

1 After removing the cardboard hood and other packing material check the contents against the enclosed packing list. Also check all enclosed boxes. Store all the boxes and plastic bags in a convenient nearby place.

2 Put aside the fraction collector to unpack later.

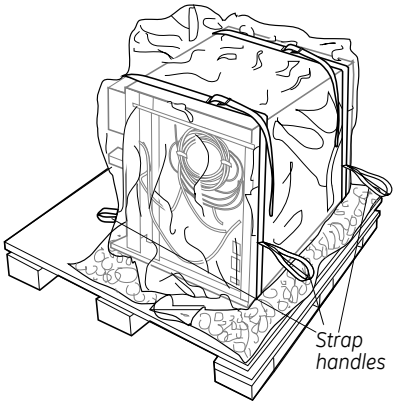
Note: *The installation of the fraction collector is described in detail in the ÄKTAFPLC Optional Configuration User Manual supplied. Refer to the section that describes your fraction collector.*

WARNING! Two people are required to lift the system.

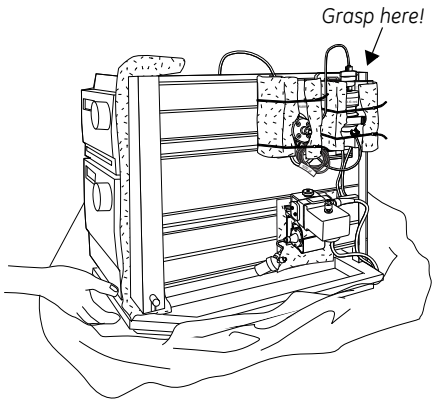
3 Lift ÄKTAFPLC onto the work area using the four red strap handles.

4 Release the two red straps with the strap handles and remove.

5 Open the plastic cover from the top and fold down to uncover the system. Take care not to damage any capillaries or components while doing this.



6 Remove the plastic cover from the system by gently tilting the system backwards and grasping it below the system rack. Pull out the plastic cover as far as possible. Then gently tilt the system forwards grasping it at the top rear and pull away the plastic cover completely.

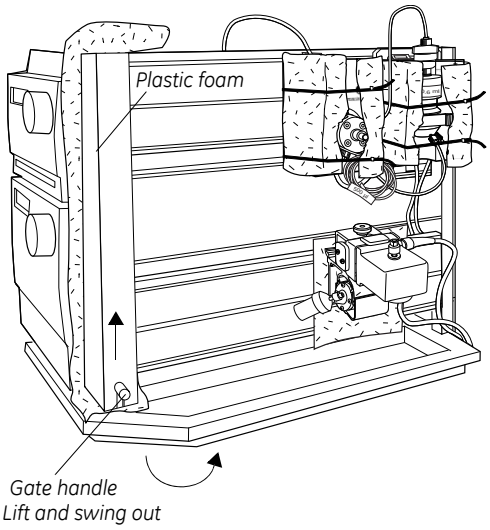


7 Save all the original packing material. If the equipment has to be re-packed, for transportation or otherwise, it is important that the system can be safely packed using the original packing material.

8 Open the system rack by lifting the gate handle and swinging out.

9 Remove the plastic foam packing.

10 Close the system rack.

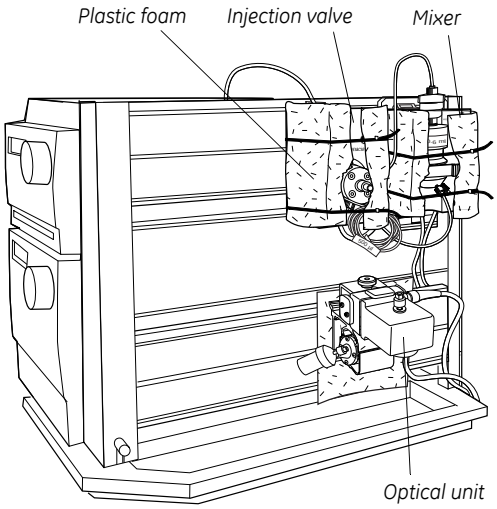


11 Turn the system so that the component side is facing you.

12 Lift the optical unit gently to remove the plastic foam packing.

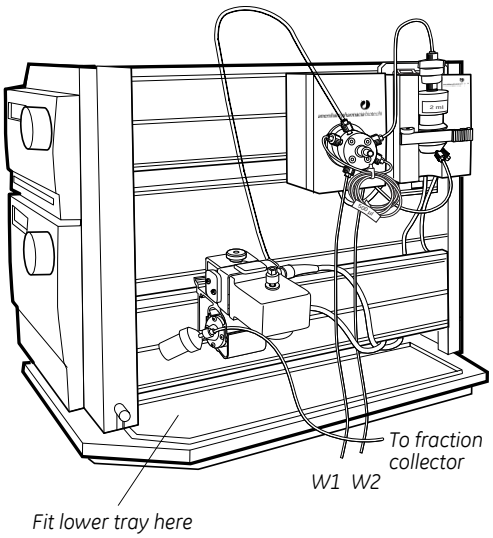
13 Cut and remove the plastic straps holding the mixer and the injection valve.

14 Lift off the mixer and the injection valve, one at a time, to remove the plastic foam packing behind them, and then refit.



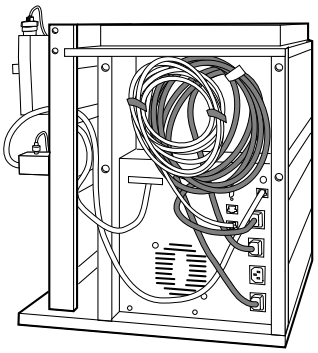
15 Position the mixer, injection valve and optical unit as illustrated, by pushing them sideways in their mounting rails.

16 Remove all red tape holding capillaries. Place the waste capillaries marked W1 and W2 in a waste bottle and place the bottle in a convenient location. Not on top of the system!



17 Take out the inlet tubings with filters from the plastic bag on top of the system.

18 Take the lower tray stored on top of the system. Open the system rack using the gate handle and fit the lower tray in its recess.



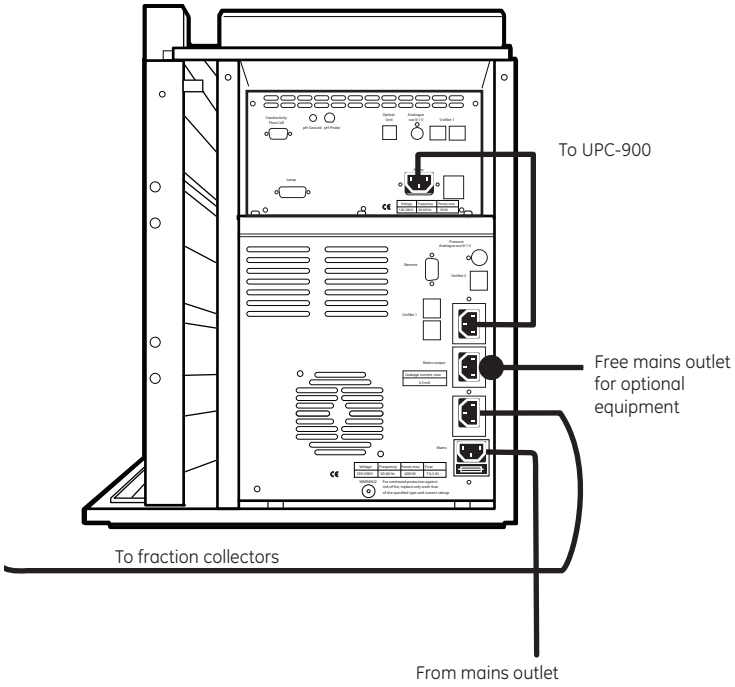
19 Remove all red tape holding the cables.

- Black cables are mains cables.

- Grey cables are UniNet-1 communication cables.

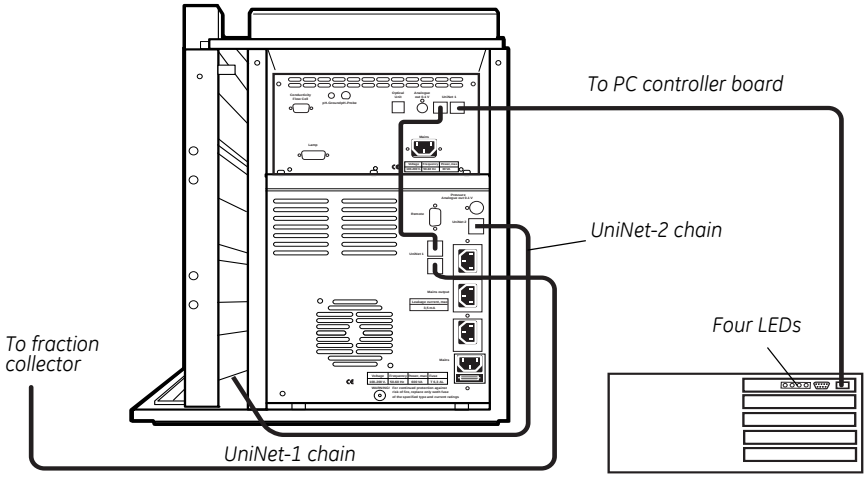
20 Connect the mains cable from the system mains outlet to the fraction collector mains inlet.

21 Unpack and install the computer and printer according to the manufacturer's instructions. Place them to the left of the system. Do not switch them on!



CAUTION! The mains power to ÄKTAFPLC must be switched OFF before the UniNet-1 cabling is installed.

22 Connect the shorter UniNet-1 cable to the fraction collector.



CAUTION! The UniNet-1 connection to the computer MUST be made to the board with four LEDs.

23 Connect the longer UniNet-1 cable to the controller board installed in the computer.

WARNING! ÄKTAFPLC must be connected to a grounded mains socket.

24 Connect the system mains cable from the mains inlet to a properly grounded mains socket.

25 All other cables are connected at delivery.

26 Check all cable connections.

27 Turn ÄKTAFPLC so that the front is facing forward.

28 Complete the first two sections of the Installation record on *page 24*.

29 The installation phase of ÄKTAFPLC is now completed.

6 Installation test

The installation test checks the function of the liquid delivery and the UV monitoring system of ÄKTAFPLC. The installation test can also be used at any time to check the condition of the system, e.g., after a prolonged stop.

Correct gradient formation is tested by producing a linear gradient and a series of concentration steps of acetone.

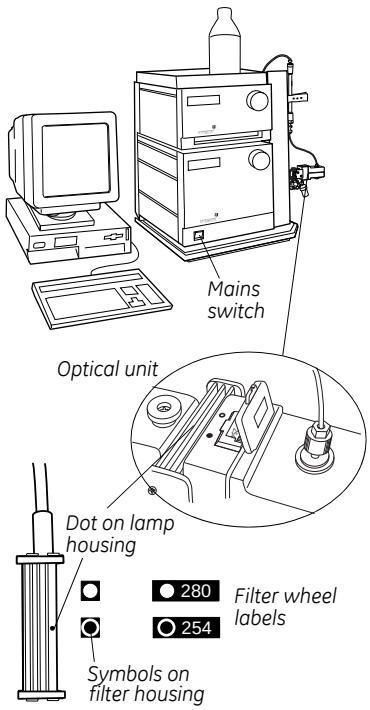
Correct UV monitoring is tested by monitoring the acetone concentration at 254 nm.

6.1 Preparation of ÄKTAFPLC

1 Switch on the ÄKTAFPLC chromatography system with the mains switch located to the left on the ÄKTAFPLC system pump P-920.

2 Switch on the computer and the printer.

3 Check on the optical unit that the UV wavelength is set to 254 nm. If not, set the wavelength by selecting lamp position (indicated by a dot on the lamp housing) in combination with the appropriate filter, i.e., the dot on the lamp housing should be adjacent to the symbol on the filter housing corresponding to the symbol on the filter wheel for the 254 nm filter. A click will indicate that the filter is in position.



4 Check that the inlet filters are submerged in the corresponding buffers A and B.

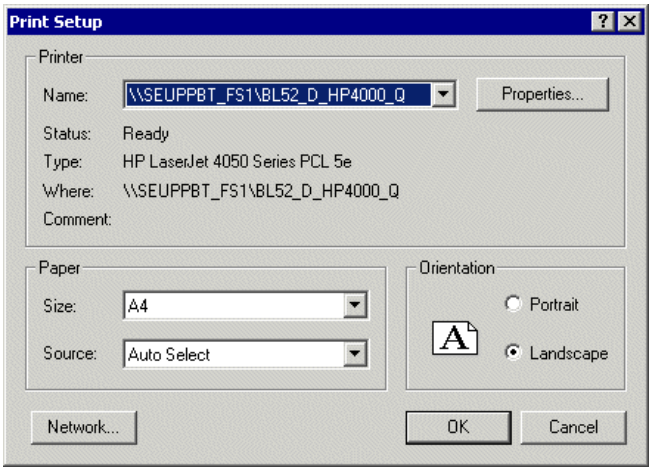
Method Guide

Buffer A:	Distilled water (200 ml)
Buffer B:	0.4% acetone in distilled water (200 ml)
Flow rate:	5 ml/min.
Test run time:	Approximately 25 minutes

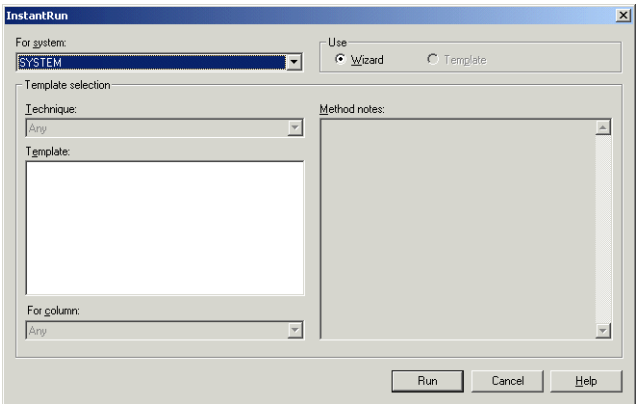
6.2 Running the installation test method

1 Start UNICORN™ as described in the *Making your first runs* booklet.

2 In UNICORN, select **File:Printer Setup...**. Select the appropriate printer from the list and select **Landscape**. Then click **OK** to acknowledge the printer chosen.

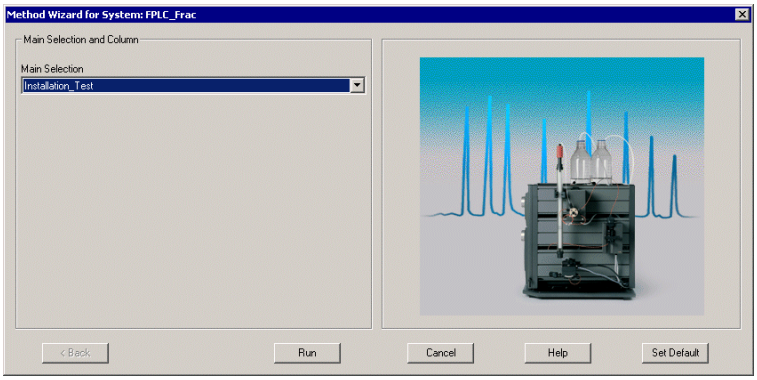


3 Click the **Instant Run** button  . The **Instant Run** window opens.

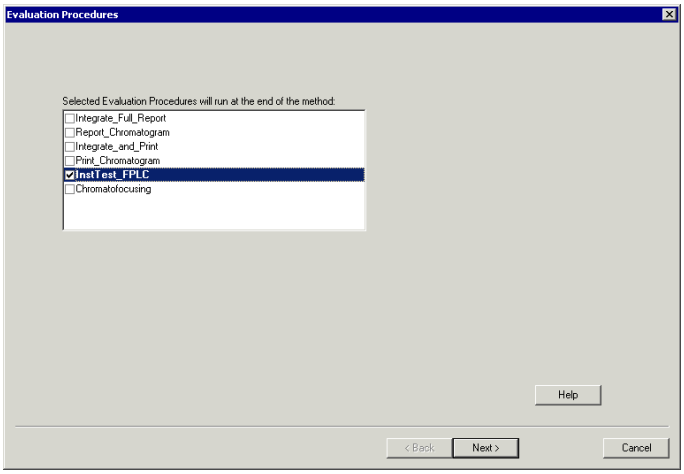


Select the appropriate system and click **Run**.

4 Select **Installation_Test** in the Method Wizard. Click **Run**.



5 In the **Evaluation Procedures** window, select the procedure for your system, for example, **InstTest_FPLC**.



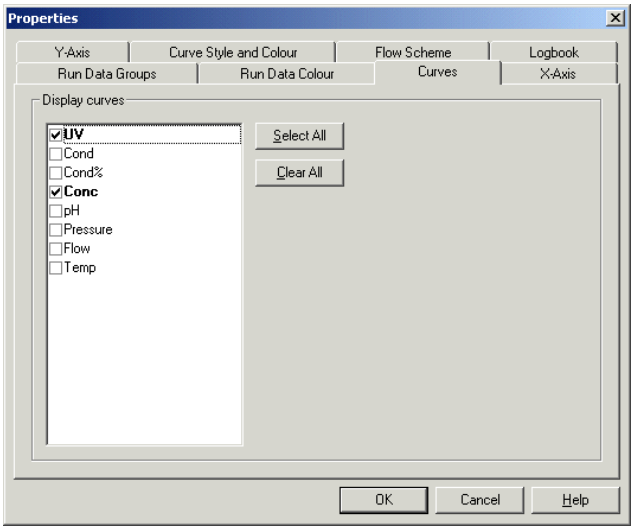
6 Click **Next** in the **Method Information** window.

7 Click **START** in the **Result Name** window to start the installation test.

The progress of the test is monitored in the **System Control** module. The installation test run time is approximately 30 min.

8 To customize the **Curves** pane, right-click in the pane and select **Properties**.

9 Click the **Curves** tab.

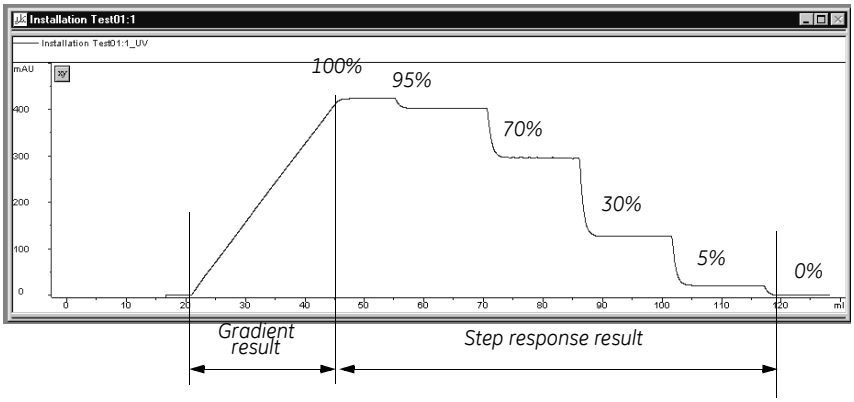


10 Select the following curves to be displayed:

- **UV**
- **Conc**

Clear all other highlighted curves. Click **OK**.

11 When the test run is finished, the printer automatically prints the chromatogram and the test result.



6.3 Evaluating the installation test results

6.3.1 Automatic evaluation

The system automatically prints the test result when the test is finished. The print-out consists of a chromatogram and an evaluation of the test result.

- If the gradient test result is OK, the print-out says "Gradient linearity accepted".
- If the step response test result is OK, the print-out says "Step response accepted".

If any of the evaluated values fall outside the specified range, go to step *6.4 Correcting faulty evaluation results.*

6.3.2 Manual evaluation

If your chromatography system deviate from the standard configuration, e.g. if optional components have been installed, the automatic evaluation will not give a reliable result. If so, perform a manual evaluation as described below.

1 Select the **UNICORN Main menu** module.

2 Click on  in the **Results** window and then double-click on the **Wizard Generated001** icon to open the result file.

3 Click **Print** to obtain a printed report of the result.

Evaluating the gradient
Place a ruler along the gradient part of curve **Wizard Generated001:1_UV@01,SMTH** in the printed report.

The curve should be linear between 10% B and 90% B and void of discontinuities.

Evaluating the step response
Calculate the relative adsorption plateau heights for curve **Wizard Generated001:1_UV@01,SMTH** as follows:

1 Subtract the base line value (0% B) from each of the values in column 2 in the Step response table of the Test record (see page *page 23*) and enter the results in column 3.

2 Divide each value in column 3 by the baseline corrected value corresponding to 100% B, multiply by 100 and enter the results in column 4.

The values of column 4 should all fall within the intervals given in column 5.

6.4 Correcting faulty evaluation results

Should any of the evaluated values fall outside the specified range, proceed as follows:

- If the system differs from the standard configuration, evaluate the result manually.

  If the faulty evaluation result remains, continue below.

6.4.1 Faulty gradient

- The gradient is linear but the interval is too small – Mixer chamber too large, or faulty mixer.
- Disturbances – may arise from air in the pump, pump valves or bad seals in the pump. Refer to the *Pump P-920 User Manual*.

6.4.2 Faulty step response

- If all values are faulty – air in pump or faulty pump.
- 5% and 95% faulty – bad sealing in pumps (5% faulty = pump module B, 95% faulty = pump module A).

7 Test record

Date: .....

ÄKTAFPLC serial no.: .....

7.1 Gradient test result

Gradient linear from .....%B to .....%B. (10 - 90%)

7.2 Step response test result

Step response table:

1 Programmed Conc.%B	**2 Value read**	**3 Baseline corrected value**	**4 Normalized value**	**5 Allowed interval**
100				
95				94 - 96
70				69 - 71
30				29 - 31
5				4 - 6
0				

8 Installation record

Check	Sign	Rem.
1 Unpacking • Contents according to packing lists. • All packing material removed. • No visible damage.		
2 Installation • Injection valve waste tubings (port 4 and 5, marked W1 and W2) to waste reservoir. • Fraction collector unpacked and installed. • Outlet tubing from flow restrictor connected to fraction collector. • Outlet waste tubing extended to waste reservoir. • Computer and printer installed. • UniNet-1 cabling installed. • Mains power cabling installed.		
3 Installation test • Solutions prepared. • ÄKTAFPLC prepared. • Installation Test method run. • Installation Test results evaluated. • Test Record completed. • Registration Form completed. • Test Record and copy of Registration form stored in System Logbook. • Registration form posted to Service Administration. • Installation Guide stored in User Manual box for future use.		

9 Registration form

Important!

Warranty registration information

Please ensure that this form is completed and returned to Service Administration to register the users' equipment under warranty.

Name:.....

Institute/company:.....

Address:.....

Department/location:.....

Post Code:.....

Phone Number:..... **Fax Number:**.....

End Users:..... **E-mail:**.....

Date of Installation:..... **Quote No:**.....

Customer Order No:..... **Invoice No:**.....

Support Agreement purchased with the instrument: Y / N

If YES give details:.....

Installer (name):.....

Signature of Installer:.....

Installation Accepted:.....Date:.....

Note: *Fill in serial numbers overleaf.*

9.1 Components

ÄKTAFPLC system serial numbers:.....

QTY	Part Number	Description	Serial Number
		System rack III	
		Mixer M-925	
		Monitor UPC-900	
		Pump P-920	
		Fraction collector	
		INV-907	
		Computer	
		Computer display	

For contact information for your local office, please visit
www.gelifesciences.com/contact

GE Healthcare Bio-Sciences AB
Björkgatan 30
751 84 Uppsala
Sweden

www.gelifesciences.com

GE Healthcare UK Ltd
Amersham Place,
Little Chalfont,
Buckinghamshire,
HP7 9NA, UK

GE Healthcare Bio-Sciences Corp
800 Centennial Avenue,
P.O. Box 1327, Piscataway,
NJ 08855-1327,
USA

GE Healthcare Europe GmbH
Munzinger Strasse 5,
D-79111 Freiburg,
Germany

GE Healthcare Bio-Sciences KK
Sanken Bldg. 3-25-1,
Hyakunincho, Shinjuku-ku,
Tokyo 169-0073,
Japan

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