Pump P-901, Pump P-903, Pump P-905 and Pump P-920

Operating Instructions

Original instructions

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1 Introduction

Purpose of the Operating Instructions

The *Operating Instructions* provide you with the instructions needed to handle Pump P-901, Pump P-903, Pump P-905 and Pump P-920 in a safe way.

Prerequisites

In order to operate Pump P-901, Pump P-903, Pump P-905 and Pump P-920 as is intended, the following pre-requisites must be fulfilled:

- The user should have a general understanding of how a PC and the Microsoft® Windows® operating system works. (if a computer is used)
- The user must understand the concepts of liquid chromatography.
- The user must read and understand the Safety Instructions in this manual.
- Pump P-901, Pump P-903, Pump P-905 and Pump P-920 and software should be installed, configured and calibrated according to these Operating Instructions.

About this chapter

This chapter contains important user information, a description of the intended use of Pump P-901, Pump P-903, Pump P-905 and Pump P-920, regulatory information, list of associated documentation, definitions of safety notices and so on.

1.1 Important user information

Read this before operating the product

All users must read the entire *Operating Instructions* before installing, operating or maintaining the product.

Always keep the *Operating Instructions* at hand when operating the product.

Do not operate the product in any other way than described in the user documentation. If you do, you may be exposed to hazards that can lead to personal injury and you may cause damage to the equipment.

Intended use

Pump P-901, Pump P-903, Pump P-905 and Pump P-920 are high performance laboratory pumps for use in liquid chromatography and other applications where accurately controlled liquid flow is required.

Pump P-901, Pump P-903, Pump P-905 and Pump P-920 are intended for research use only, and shall not be used in any clinical procedures, or for diagnostic purposes.

Safety notices

This user documentation contains WARNINGS, CAUTIONS and NOTICES concerning the safe use of the product. See definitions below.

Warnings

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury. It is important not to proceed until all stated conditions are met and clearly understood.

Cautions

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. It is important not to proceed until all stated conditions are met and clearly understood.

Notices

NOTICE

NOTICE indicates instructions that must be followed to avoid damage to the product or other equipment.

Notes and tips

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

Tip: *A tip contains useful information that can improve or optimize your procedures.*

Typographical conventions

Software items are identified in the text by ***bold italic*** text. A colon separates menu levels, thus ***File:Open*** refers to the ***Open*** command in the ***File*** menu.

Hardware items are identified in the text by **bold** text (e.g., **Power** switch).

1.2 Regulatory information

In this section

This section describes the directives and standards that are fulfilled by Pump P-901, Pump P-903, Pump P-905 and Pump P-920.

Manufacturing information

The table below summarizes the required manufacturing information. For further information, see the EU Declaration of Conformity (DoC) document.

Requirement	Content
Name and address of manufacturer	GE Healthcare Bio-Sciences AB, Björkgatan 30, SE 751 84 Uppsala, Sweden

Conformity with EU Directives

This product complies with the European directives listed in the table, by fulfilling the corresponding harmonized standards.

Directive	Title
2006/42/EC	Machinery Directive (MD)
2004/108/EC	Electromagnetic Compatibility (EMC) Directive
2006/95/EC	Low Voltage Directive (LVD)

CE marking

CE

The CE marking and the corresponding EU Declaration of Conformity is valid for the instrument when it is:

- used as a stand-alone unit, or
- connected to other products recommended or described in the user documentation, and
- used in the same state as it was delivered from GE, except for alterations described in the user documentation.

International standards

This product fulfills the requirements of the following standards:

Standard	Description	Notes
EN/IEC 61010-1, UL 61010-1, CAN/CSA-C22.2 No. 61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use	EN standard is harmonized with EU directive 2006/95/EC
EN 61326-1	Electrical equipment for measurement, control and laboratory use - EMC requirements	EN standard is harmonized with EU directive 2004/108/EC
EN ISO 12100	Safety of machinery. General principles for design. Risk assessment and risk reduction.	EN ISO standard is harmonized with EU directive 2006/42/EC

FCC compliance

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: *The user is cautioned that any changes or modifications not expressly approved by GE could void the user's authority to operate the equipment.*

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. 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 own expense.

Regulatory compliance of connected equipment

Any equipment connected to Pump P-901, Pump P-903, Pump P-905 and Pump P-920 should meet the safety requirements of EN 61010-1/IEC 61010-1, or relevant harmonized standards. Within the EU, connected equipment must be CE marked.

Environmental conformity

This product conforms to the following environmental requirements.

Requirement	Title
2011/65/EU	Restriction of Hazardous Substances (RoHS) Directive
2012/19/EU	Waste Electrical and Electronic Equipment (WEEE) Directive
ACPEIP	Administration on the Control of Pollution Caused by Electronic Information Products, China Restriction of Hazardous Substances (RoHS)
Regulation (EC) No 1907/2006	Registration, Evaluation, Authorization and restriction of CHemicals (REACH)

1.3 Instrument

Pump P-901, Pump P-903, Pump P-905 and Pump P-920 are high performance laboratory pumps for use in liquid chromatography and other applications where accurately controlled liquid flow is required.

The flow rate is set locally or with a front dial.

Pump P-901, Pump P-903, Pump P-905 and Pump P-920 work with a wide range of columns and media supplied by GE Healthcare.

Pump P-901, Pump P-903 and Pump P-905

Product description and mains parts

- Pump P-901 stand-alone or system mounted

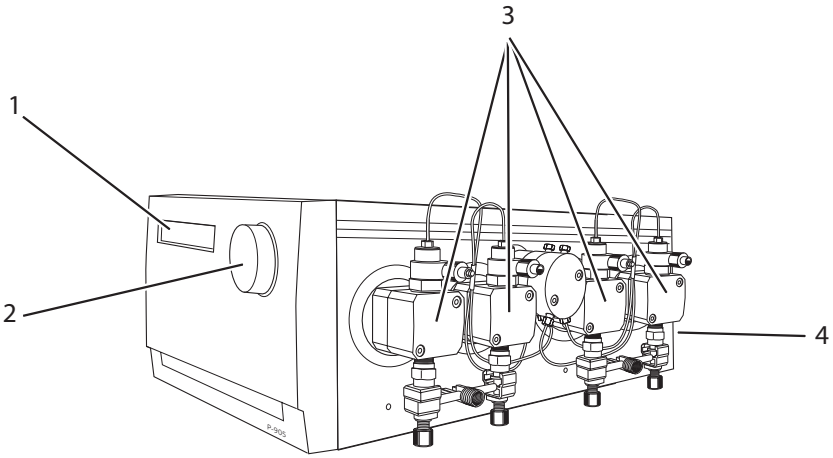
  Used as stand-alone, or in ÄKTAexplorer 100 and ÄKTApurifier 100. Equipped with four pump heads in two pump modules.

- Pump P-903 stand-alone or system mounted

  Used as stand-alone, or in ÄKTApurifier 10 and ÄKTAexplorer 10. Equipped with four pump heads in two pump modules.

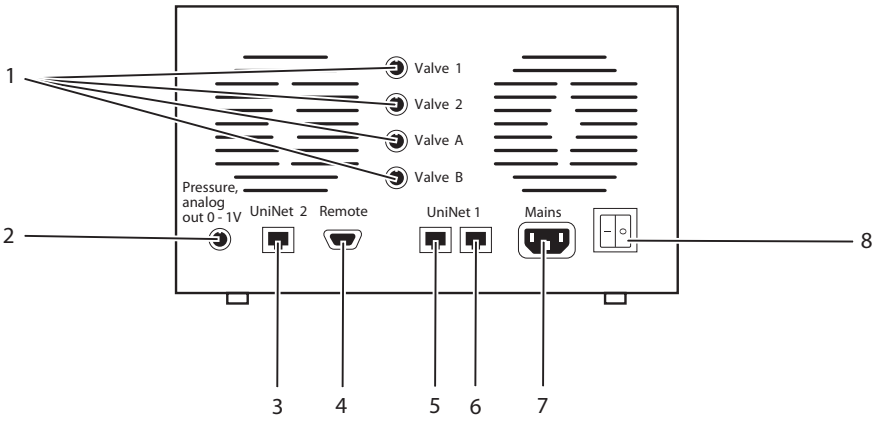
- Pump P-905 system mounted

  Used in ÄKTAmicro. Equipped with four pump heads in two pump modules.



Part	Function	Part	Function
1	Instrument display	3	Pump heads
2	Front selection dial	4	Power switch (located at the rear panel)

Electrical and communication connections

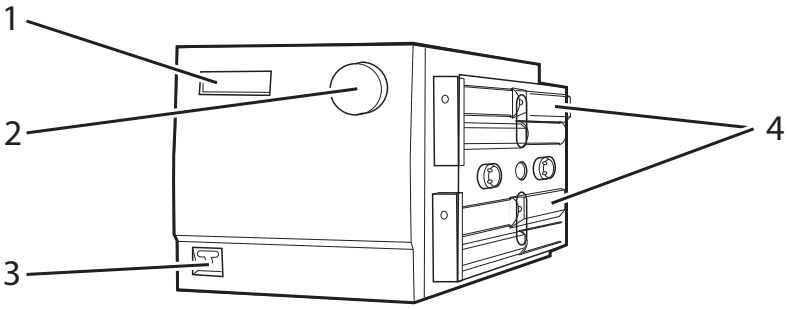


No.	Connection	No.	Connection
1	Valves 1-4	5	UniNet-1 cable
2	Pressure signal to chart recorder	6	UniNet-1 cable
3	UniNet-2 cable	7	Mains power inlet
4	Input/Output of digital signals	8	Power switch

Pump P-920

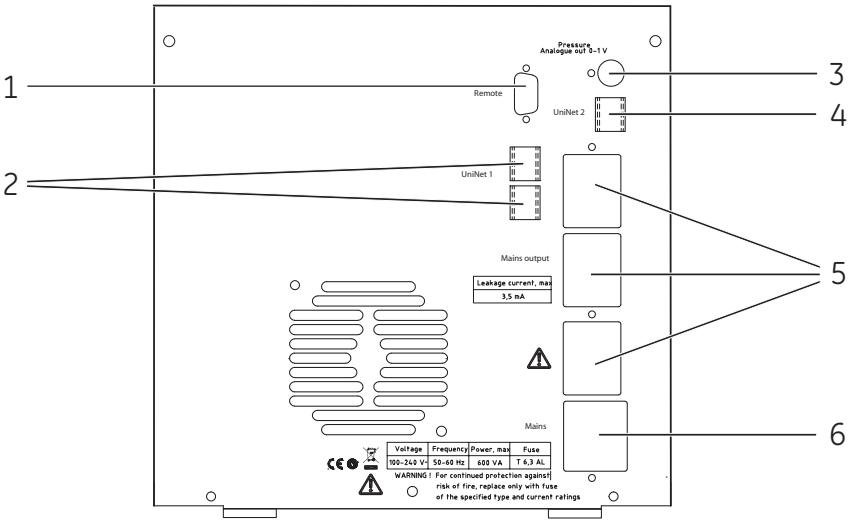
Product description and mains parts

- Pump P-920 stand-alone or system mounted
- Used as stand-alone, or in ÄKTAFPLC chromatography systems. Equipped with four pump heads in two pump modules.



Part	Function	Part	Function
1	Instrument display	3	Power switch
2	Front selection dial	4	Pump modules

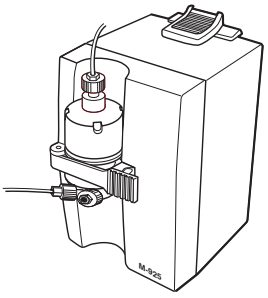
Electrical and communication connections



No.	Connection	No.	Connection
1	Input/Output of digital signals	4	Connection to Mixer M-925 and UniNet-2 network
2	UniNet-1-cable	5	Mains outlets
3	Pressure signal to chart recorder	6	Mains power inlet with fuse

1.4 Accessories

Mixer M-925 can be connected to the pump. When Pump P-901, Pump P-903, Pump P-905 and Pump P-920 are connected to UNICORN, the mixer can be controlled on/off/auto from UNICORN. When Pump P-901, Pump P-903, Pump P-905 and Pump P-920 are run as stand-alone units, the mixer is operated via the local interface.



1.5 Control software and evaluation

UNICORN control software

UNICORN is a complete software for control and supervision of Pump P-901, Pump P-903, Pump P-905 and Pump P-920 when used in ÄKTAexplorer, ÄKTApurifier, ÄKTAmicro or ÄKTAFPLC systems. The software runs under Microsoft® Windows operating system.

Paper chart recorder

It is possible to connect a chart recorder to Pump P-901, Pump P-903, Pump P-905 and Pump P-920 to get real time monitoring. For more information see the *Pump P-900, Pump P-905 and Pump P-920 User Manuals*.

1.6 User documentation

In addition to these *Operating Instructions*, the documentation package supplied with Pump P-901, Pump P-903, Pump P-905 and Pump P-920 also includes product documentation binders containing detailed specifications and traceability documents.

The most important documents in the document package with regard to technical aspects of Pump P-901, Pump P-903, Pump P-905 and Pump P-920 are:

System-specific documentation

User documentation	Content
Pump P-901, Pump P-903, Pump P-905 and Pump P-920 Operating Instructions	All instructions needed to operate the instrument in a safe way, including brief system description, installation, and maintenance.
Pump P-900, Pump P-905 and Pump P-920 User Manuals	Detailed system description. Comprehensive user instructions, method creation, operation, advanced maintenance and troubleshooting.
Pump P-901, Pump P-903 and Pump P-920 Installation Guides	Instructions for installation and installation test.
EU Declaration of Conformity for Pump P-901, Pump P-903, Pump P-905 and Pump P-920	Document whereby the manufacturer ensures that the product satisfies and is in conformity with the essential requirements of the applicable directives.

Software documentation

Together with each system, the following software documentation is supplied providing additional information that applies to Pump P-901, Pump P-903, Pump P-905 and Pump P-920, independent of the specific configuration:

Document	Purpose/Contents
UNICORN™ manual package	• The manuals contain detailed instructions on how to administer UNICORN, work with methods, perform runs and evaluate results. • The Online help contains dialog descriptions for UNICORN. The Online help is accessed from the ***Help*** menu.

Component documentation

Documentation for components produced both by GE and by a third-party are, if existent, also included in the document package.

2 Safety instructions

About this chapter

This chapter describes safety compliance, safety labels, general safety precautions, emergency procedures, power failure and recycling of Pump P-901, Pump P-903, Pump P-905 and Pump P-920.

2.1 Safety precautions

Introduction

Pump P-901, Pump P-903, Pump P-905 and Pump P-920 are powered by mains voltage and handles pressurized liquids that may be hazardous. Before installing, operating or maintaining the system, you must be aware of the hazards described in this manual. **Follow the instructions provided to avoid personal injury or damage to the equipment.**

The safety precautions in this section are grouped into the following categories:

- General precautions
- Using flammable liquids
- Personal protection
- Installing and moving the instrument
- System operation
- Maintenance

General precautions

Always follow these General precautions to avoid injury when using Pump P-901, Pump P-903, Pump P-905 and Pump P-920.

WARNING

Do not operate Pump P-901, Pump P-903, Pump P-905 and Pump P-920 in any other way than described in the *Pump P-901, Pump P-903, Pump P-905 and Pump P-920 Operating Instructions*.

WARNING

Operation and user maintenance of the Pump P-901, Pump P-903, Pump P-905 and Pump P-920 should be performed by properly trained personnel only.

WARNING

Do not use any accessories not supplied or recommended by GE.

WARNING

Do not use the Pump P-901, Pump P-903, Pump P-905 and Pump P-920 if it is not working properly, nor if it has suffered any damage, for example:

- damage to the power cord or its plug
- damage caused by dropping the equipment
- damage caused by splashing liquid onto it

CAUTION

Waste tubes and containers must be secured and sealed to prevent accidental spillage.

CAUTION

Make sure waste container is dimensioned for maximum possible volume when the equipment is left unattended.

NOTICE

Avoid condensation by letting the unit equilibrate to ambient temperature.

Using flammable liquids

When using flammable liquids with Pump P-901, Pump P-903, Pump P-905 and Pump P-920, follow these precautions to avoid any risk of fire or explosion.

WARNING

Fire Hazard. Before starting the pump, make sure that there is no leakage.

WARNING

A fume hood or similar ventilation system shall be installed when flammable or noxious substances are used.

Personal protection

WARNING

Always use appropriate personal protective equipment during operation and maintenance of Pump P-901, Pump P-903, Pump P-905 and Pump P-920.

WARNING

When using hazardous chemical and biological agents, take all suitable protective measures, such as wearing protective glasses and gloves resistant to the substances used. Follow local and/or national regulations for safe operation and maintenance of Pump P-901, Pump P-903, Pump P-905 and Pump P-920.

WARNING

Spread of biological agents. The operator has to take all necessary actions to avoid spreading hazardous biological agents in the vicinity of the instrument. The facility should comply with the national code of practice for biosafety.

WARNING

High pressure. The Pump P-901, Pump P-903, Pump P-905 and Pump P-920 operates under high pressure. Wear protective glasses at all times.

Installing and moving the instrument

WARNING

Supply voltage. Make sure that the supply voltage at the wall outlet corresponds to the marking on the equipment, before connecting the power cord.

WARNING

Pump P-901, Pump P-903, Pump P-905 and Pump P-920 must always be connected to a grounded power outlet.

WARNING

Power cord. Only use power cords with approved plugs delivered or approved by GE Healthcare.

WARNING

Access to power switch and power cord with plug. Do not block access to the power switch and power cord. The power switch must always be easy to access. The power cord with plug must always be easy to disconnect.

WARNING

Installing the computer. The computer should be installed and used according to the instructions provided by the manufacturer of the computer.

NOTICE

Disconnect power. To prevent equipment damage, always disconnect the power from Pump P-901, Pump P-903, Pump P-905 and Pump P-920 before an instrument module is removed or installed, or a cable is connected or disconnected.

NOTICE

Any computer used with the equipment shall comply with IEC 60950 and be installed and used according to the manufacturer's instructions.

System operation

WARNING

Hazardous chemicals during run. When using hazardous chemicals, run ***System CIP*** and ***Column CIP*** to flush the entire system tubing with distilled water, before service and maintenance.

WARNING

Hazardous biological agents during run. When using hazardous biological agents, run ***System CIP*** and ***Column CIP*** to flush the entire pump with bacteriostatic solution (e.g. NaOH) followed by a neutral buffer and finally distilled water, before service and maintenance.

Maintenance

WARNING

Electrical shock hazard. All repairs should be done by service personnel authorized by GE Healthcare. Do not open any covers or replace parts unless specifically stated in the user documentation.

WARNING

Disconnect power. Always disconnect power from the instrument before replacing any component on the instrument, unless stated otherwise in the user documentation.

WARNING

Hazardous chemicals during maintenance. When using hazardous chemicals for system or column cleaning, wash the system or columns with a neutral solution in the last phase or step.

WARNING

Disconnect power. Always disconnect power from the instrument before performing any maintenance task.

WARNING

Only spare parts and accessories that are approved or supplied by GE may be used for maintaining or servicing Pump P-901, Pump P-903, Pump P-905 and Pump P-920.

WARNING

Make sure that the piping system is completely leakage free before performing any CIP on the system.

WARNING

NaOH is corrosive and therefore dangerous to health. When using hazardous chemicals, avoid spillage and wear protective glasses and other suitable Personal Protective Equipment (PPE).

WARNING

After assembly, the piping system must be tested for leakage at maximum pressure for continued protection against injury risks due to fluid jets, burst pipes or explosive atmosphere.

WARNING

Before disassembly, check that there is no pressure in the piping system.

WARNING

Disconnect power. Always disconnect power from the instrument before replacing fuses.

WARNING

Decontaminate the equipment before decommissioning to ensure that hazardous residues are removed.

NOTICE

Cleaning. Keep the instrument dry and clean. Wipe regularly with a soft damp tissue and, if necessary, a mild cleaning agent. Let the instrument dry completely before use.

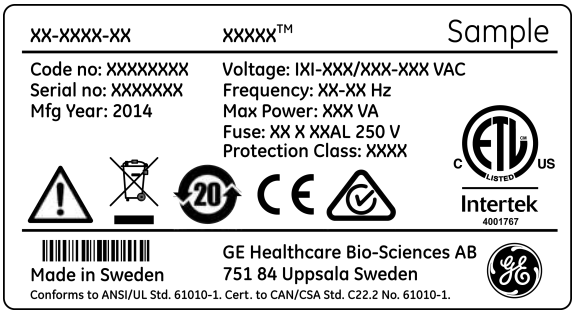
2.2 Labels

In this section

This section describes the instrument labels and labels concerning hazardous substances that are attached to Pump P-901, Pump P-903, Pump P-905 and Pump P-920.

Labels on the instrument

The illustration below shows an example of the identification label that is attached to Pump P-901, Pump P-903, Pump P-905 and Pump P-920.



Symbols used in instrument labels

Label	Meaning
	**Warning!** Read the user documentation before using the equipment. Do not open any covers or replace parts unless specifically stated in the user documentation.
	The equipment complies with the requirements for electromagnetic compliance (EMC) in Australia and New Zealand.

Label	Meaning
	The equipment complies with applicable European directives.
	This symbol indicates that Pump P-901, Pump P-903, Pump P-905 and Pump P-920 has been certified by a Nationally Recognized Testing Laboratory (NRTL). NRTL means an organization, which is recognized by the US Occupational Safety and Health Administration (OSHA) as meeting the legal requirements of Title 29 of the Code of Federal Regulations (29 CFR), Part 1910.7.

Labels concerning hazardous substances

Label	Meaning
	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.
	This symbol indicates that the product contains hazardous materials in excess of the limits established by the Chinese standard SJ/T11363-2006 Requirements for Concentration Limits for Certain Hazardous Substances in Electronics.

2.3 Emergency procedures

In this section

This section describes how to do an emergency shutdown of Pump P-901, Pump P-903, Pump P-905 and Pump P-920.

Emergency shutdown

In an emergency situation, do as follows to stop the run:

Step	Action
1	Switch off power to the instrument by pressing the **Main power** switch to the **0** position. If required, disconnect the mains power cord. The run is interrupted immediately.

Power failure

The result of a power failure depends on which unit that is affected.

Power failure to...	will result in...
Pump P-901, Pump P-903, Pump P-905 and Pump P-920	• The run is interrupted immediately, in an undefined state • The data collected up to the time of the power failure is available in UNICORN
Computer	• The UNICORN computer shuts down in an undefined state • The run is interrupted immediately, in an undefined state

2.4 Recycling information

Decontamination

Pump P-901, Pump P-903, Pump P-905 and Pump P-920 shall be decontaminated before decommissioning and all local regulations shall be followed with regard to scrapping of the equipment.

Disposal, general instructions

When taking Pump P-901, Pump P-903, Pump P-905 and Pump P-920 out of service, the different materials must be separated and recycled according to national and local environmental regulations.

Recycling of hazardous substances

Pump P-901, Pump P-903, Pump P-905 and Pump P-920 contain hazardous substances. Detailed information is available from your GE representative.

Disposal of electrical components

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.

2.5 Declaration of Hazardous Substances (DoHS)

根据SJ/T11364-2006《电子信息产品污染控制标识要求》特提供如下有关污染 控制方面的信息。

The following product pollution control information is provided according to SJ/T11364-2006 Marking for Control of Pollution caused by Electronic Information Products.

电子信息产品污染控制标志说明
Explanation of Pollution Control Label

该标志表明本产品含有超过SJ/T11363-2006《电子信息产品中有毒有害物质的限量要求》中限量的有毒有害物质。标志中的数字为本产品的环保使用期，表明本产品在正常使用的条件下，有毒有害物质不会发生外泄或突变，用户使用本产品不会对环境造成严重污染或对其人身、财产造成严重损害的期限。单位为年。

为保证所申明的环保使用期限，应按产品手册中所规定的环境条件和方法进行正常使用，并严格遵守产品维修手册中规定的期维修和保养要求。

产品中的消耗件和某些零部件可能有其单独的环保使用期限标志，并且其环保使用期限有可能比整个产品本身的环保使用期限短。应到期按产品维修程序更换那些消耗件和零部件，以保证所申明的整个产品的环保使用期限。

本产品在使用寿命结束时不可作为普通生活垃圾处理，应被单独收集妥善处理。

This symbol indicates the product contains hazardous materials in excess of the limits established by the Chinese standard SJ/T11363-2006 Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products. The number in the symbol is the Environment-friendly Use Period (EFUP), which indicates the period during which the toxic or hazardous substances or elements contained in electronic information products will not leak or mutate under normal operating conditions so that the use of such electronic information products will not result in any severe environmental pollution, any bodily injury or damage to any assets. The unit of the period is “Year”.

In order to maintain the declared EFUP, the product shall be operated normally according to the instructions and environmental conditions as defined in the product manual, and periodic maintenance schedules specified in Product Maintenance Procedures shall be followed strictly.

Consumables or certain parts may have their own label with an EFUP value less than the product. Periodic replacement of those consumables or parts to maintain the declared EFUP shall be done in accordance with the Product Maintenance Procedures.

This product must not be disposed of as unsorted municipal waste, and must be collected separately and handled properly after decommissioning.

有毒有害物质或元素的名称及含量
Name and Concentration of Hazardous Substances

产品中有毒有害物质或元素的名称及含量
Table of Hazardous Substances' Name and Concentration

部件名称 Component name	有毒有害物质或元素 Hazardous substance					
	铅 Pb	汞 Hg	镉 Cd	六价铬 Cr6+	多溴联苯 PBB	多溴二苯醚 PBDE
18-1108-56	X	0	0	0	0	0
18-3100-00	X	0	0	0	0	0
18-1147-43	X	0	0	0	0	0
18-1164-68	X	0	0	0	0	0

0: 表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006标准规定的限量要 求以下

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006标准规定的限量要求

- 此表所列数据为发布时所能获得的最佳信息

0: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.

- Data listed in the table represents best information available at the time of publication.

3 Installation

Pump P-901, Pump P-903, Pump P-905 and Pump P-920 are delivered in protective packing material and shall be unpacked with great care.

Any equipment connected to Pump P-901, Pump P-903, Pump P-905 and Pump P-920 must fulfill applicable standards and local regulations.

NOTICE

Any computer used with the equipment shall comply with IEC 60950 and be installed and used according to the manufacturer's instructions.

For detailed information on Installation, see *Pump P-900, Pump P-905 and Pump P-920 User Manuals*.

3.1 Site requirements

Parameter	Requirement
Operation site	Indoor use
Altitude	Maximum 2000 m
Electrical power	100-240 V AC ±10%, 50-60 Hz
Transient overvoltages	Overvoltage category II
Ambient temperature	4°C to 40°C
Placement	Stable laboratory bench or in an ÄKTA™ system
Humidity	20% to 95%, non-condensing
Pollution degree	2

3.2 Transport

The equipment can be transported on a trolley capable of supporting at least 20 kg.

Before moving the unit:

- disconnect all cables and tubing connected to peripheral components and liquid containers.

- remove any loose items from the top of the instrument.
- grasp the system firmly by placing the fingers under the base of the main unit and lift.

3.3 Unpacking

Check for damage

Check the equipment for damage before starting assembly and installation. There are no loose parts in the transport box. All parts are either mounted on the system or located in the accessory kit box. If any damage is found, document the damage, and contact your local GE representative.

Unpack the system

Remove straps and packing material. Then set the equipment upright before starting installation.

3.4 Assembly

The following parts must be added to Pump P-901, Pump P-903, Pump P-905 and Pump P-920 before they can be used:

- Waste tube
- Various buffer or sample bottles

3.5 Connections

Communication

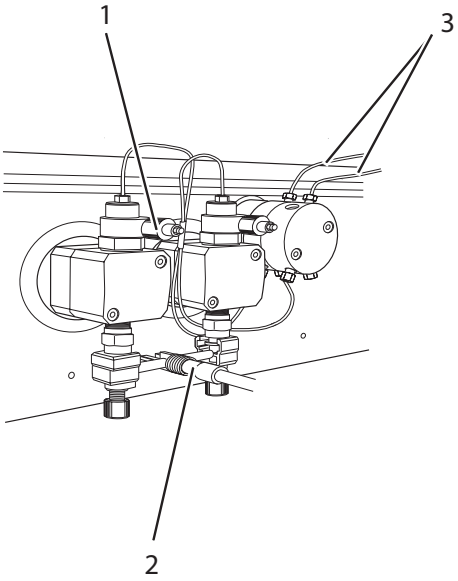
Connect Pump P-901, Pump P-903 and Pump P-905 according to the electrical drawings in *Electrical and communication connections, on page 12*. and Pump-920 according to the electrical drawings in *Electrical and communication connections, on page 13*.

Flow path

Connect inlet and outlet tubing to Pump P-901, Pump P-903 and Pump P-905

The inlet tubing is connected to the centre port of the inlet manifold of each pump module. Connect the tubing using male 5/16”-connections.

Remove the blind plug from the pump head outlet manifold. Connect the outlet tubing using 1/16" Fingertight connectors. Place the end of the tubing in a drain or waste collection vessel.



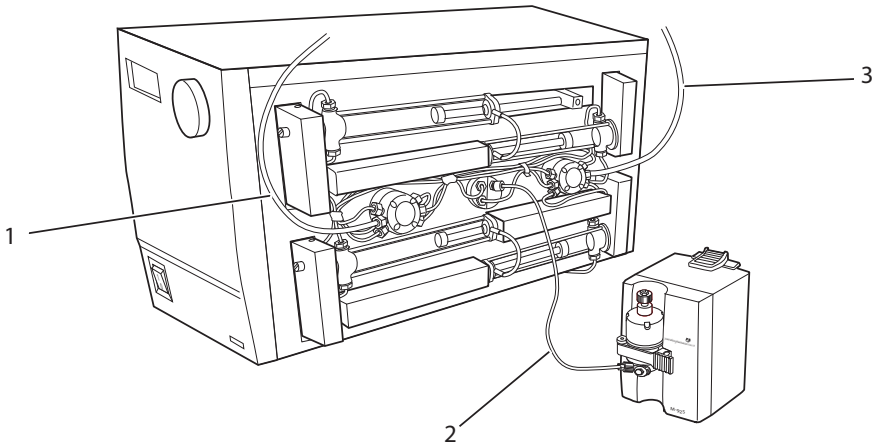
No.	Connection	No.	Connection
1	Purge valve	3	Outlet to mixer
2	Inlet to pump module		

Figure 3.1: Inlet and outlet tubing to Pump P-901 and Pump P-903 instruments.

Connect inlet and outlet tubing to Pump P-920

The inlet tubings (A1, B1, teflon tubing i.d. 1.6 mm, o.d. 1/8") have tubing connectors attached at one end and inlet filters at the other end. The inlet filters have replacable filter inserts.

The inlet tubings are connected to the inlets marked **A IN** and **B IN** on the pump valves and the outlet tubing is connected to the upper connection on the pressure sensor marked **OUT**. The other end of the outlet tubing is connected to a mixer inlet.



No.	Connection	No.	Connection
1	Inlet to pump module A	3	Inlet to pump module B
2	Outlet to mixer		

Figure 3.2: Inlet and outlet tubing to Pump P-920 instrument.

Electrical power

Connect the power cord to a grounded power outlet specified in *Section 3.1 Site requirements, on page 29*.

3.6 Spare parts and accessories

For correct up to date information on spare parts and accessories visit:
www.gelifesciences.com/AKTA

4 Operation

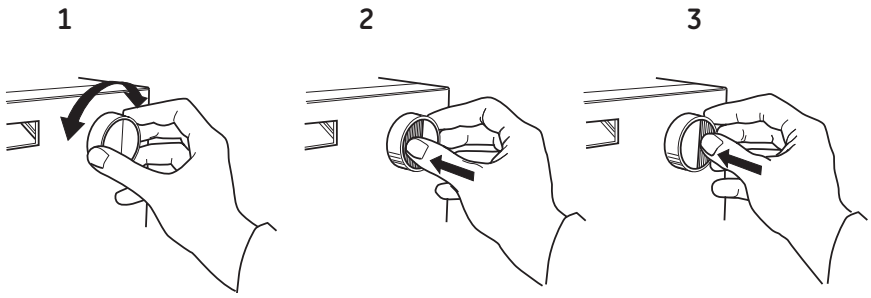
About this chapter

This chapter provides instructions for the use of Pump P-901, Pump P-903, Pump P-905 and Pump P-920.

4.1 Menu selection and settings

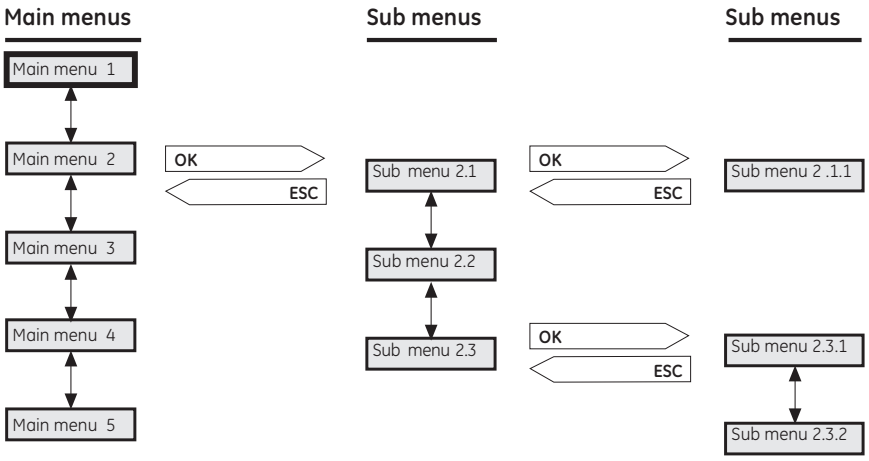
Menu selection

A specific menu is selected by turning the front selection dial clockwise or counter-clockwise. When the required menu is visible, the menu or selection is accepted by pressing the **OK** button.



No	Description
1	Menu selection
2	**OK** button (select submenu)
3	**ESC** button (return one menu level)

If a menu has sub levels, the sub menu is displayed by pressing the **OK** button. Pressing the **ESC** button moves back one menu level.



Return to main menu

Pump P-901, Pump P-903 and Pump P-905

1 Press **ESC** repeatedly to return to the ***Main menu 2*** which is the main operating menu.

2 Press **ESC** once more to return to ***Main menu 1***, the mode changing menu.

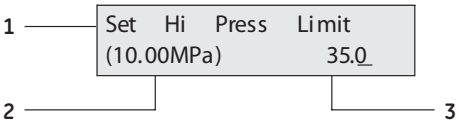
Pump P-920

1 Press **ESC** repeatedly to return to the ***Main menu 2*** which is the main operating menu.

2 Turn the dial one click counter-clockwise to return to ***Main menu 1***, the mode changing menu.

Selecting a value

A cursor below a text or numerical value shows what is affected by the dial. To increase the value, turn the dial clockwise. To decrease the value, turn the dial counter-clockwise. The value can be reset by turning the dial several clicks counter-clockwise.



No	Description
1	Parameter
2	Current value
3	New value to be set

To simplify entering large numerical values, the cursor moves up to the next digit if the dial is turned quickly in one direction. The cursor moves back one place to the right every two seconds if the dial is not turned. The text or numerical value displayed is accepted by pressing **OK**. To cancel, press **ESC**.

4.2 Starting the module

Pump P-901, Pump P-903 and Pump P-905

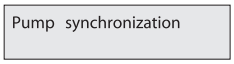
1 Switch on the pump module at the **Power** switch on the rear panel.

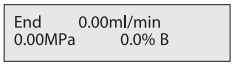
The module performs a selftest and then asks for synchronization.

2 Open the purge valves (see *Purging the pump, on page 40*) to avoid high pressure during synchronization which is done at the speed of 0.1 ml/min.

3 Press **OK**.

The display will show ***Pump synchronization*** and after approximately 1 minute the display shows the main operating menu with the pump in ***End*** mode.





4 Close the purge valves.

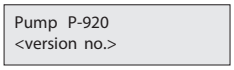
All parameters are factory set to default values.

Pump P-920

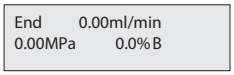
1 Switch on the pump module at the **Power** switch on the front panel.

The module performs a selftest. Several beeps are heard during this process. If an error is detected, an error message is shown.

Name and software version number is shown for 2 seconds.



The selftest takes approximately 30 seconds. When start-up is completed with no errors, the display shows the main operating menu with the pump in ***End*** mode.



All parameters are factory set to default values.

4.3 Menus

Menu overview for Pump P-901, Pump P-903 and Pump P-905

Menu	Description
End 1.00 ml/min Run	Mode changing menu. From here the pump is started, stopped, held, paused and continued. The menu is accessed from all positions by pressing the **ESC** button repeatedly. The appearance of this menu depends on the current mode.
Run 0.40 ml/min 2.00 MPa 45.5 %B	Main operating menu. The menu is accessed from all positions by pressing **ESC** repeatedly.
Set Flow Rate (0.00 ml/min)	Setting flow rate in ml/min.
Set Conc./Gradient (0.0%B)	Setting concentration and gradient values.

Menu	Description
Check	Check internal operating values.
Setup	Setup language, pressure limits, etc.
Alarm/ Timer 12:30:52	Set different timer options. The pump can be started or stopped at set times.

For a full menu overview, see *Figure A.1*. Refer also to *Pump P-900 User Manual*.

Menu overview for Pump P-920

Menu	Description
End 1.00 ml/ min Run	Mode changing menu. From here the pump is started, stopped, held, paused and continued. This menu is accessed from all positions by turning the dial one click counter-clockwise. The appearance of this menu depends on the current mode.
Run 0.40 ml/ min 2.00 MPa 45.5 %B	Main operating menu. The menu is accessed from all positions by pressing **ESC** repeatedly.
Set Flow Rate (0.00 ml/min)	Setting flow rate in ml/min.
Set Conc./Gradient (0.0%B)	Setting concentration and gradient values.
Pump Wash 20ml/min	Wash program selection. Individual pump cylinder assemblies or a complete pump wash can be selected.

Menu	Description
Pump Sync 20ml/min	Pump synchronization selection. This means that the pump cylinder(s) are run to one stop position. Individual pump cylinder assemblies or a complete pump synchronization can be selected.
Change Direction	Change piston direction selection. Individual piston direction or both piston directions can be selected.
Check	Check internal operating values.
Setup	Setup language, pressure limits, etc.
Alarm/Timer 12:30:52	Set different timer options. The pump can be started or stopped at set times.

For a full menu overview, see *Figure A.2*. Refer also to *Pump P-920 User Manual*.

Main operating menu

The main operating menu shows the current flow rate together with a mode indication, pressure and %B, if used. The available modes are:

Run The pump is running with set flow rate.

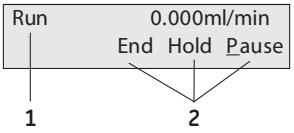
End The pump is not running. Flow rate and gradient are reset.

Pause The pump is stopped but the set flow rate value and the gradient are retained.

Hold The gradient is held at the value displayed, and the pump continues to run.

Mode changing menu

Mode changes are made in the mode changing menu above the main operating menu (turn dial counter clockwise). The current mode is shown in the upper left corner of the display (1). Available actions are shown at the lower right (2).



There are four different displays for this menu and the menu displayed will depend on the current mode (see the other three below). When a new mode is selected the appearance of the menu will change.

End 0.000ml/min Run	Pause 0.000ml/min End Hold Continue	Hold 0.000ml/min End Continue Pause

Pressing **OK** in a mode changing display will select the underlined mode. Different modes can be underlined by turning the dial.

4.4 Preparations before starting

NOTICE

Before the start of each run, always ensure that there is an adequate supply of eluent in the reservoirs. Never allow the pump to run dry, since this will affect the lifetime of the seals.

Pump P-901, Pump P-903 and Pump P-905

1 Check that there is sufficient eluent present for the run, and that the solvent filter is fully immersed. If the eluent is to be changed, see *Section 4.8 Changing eluent, on page 43*.

Note: *The pump may not work if the buffer vessels are sealed. Do not close the vessels off completely.*

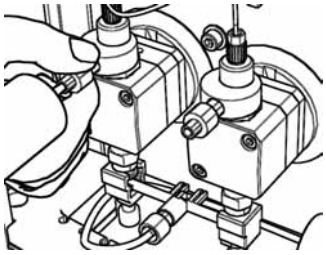
2 If there is air in the tubing or the pump, prime the pump:

Purging the pump

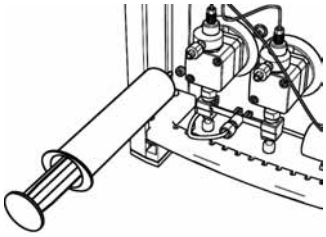
a Fill a reservoir flask with distilled water. Immerse the inlet tubings of both pump modules, with filters, in the water.

Note: *Never place the reservoir flask below the level of the pump inlet.*

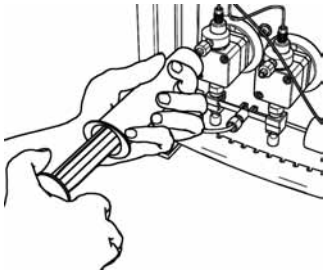
b Turn the purge valve counter clockwise half a turn to open it.



c Connect a syringe to the purge valve.



d Slowly draw solution into the syringe. When fluid starts to enter the syringe, continue to draw a few milliliters before closing the purge valve. Check that there is no visible air left in the tubing.



e Repeat for the other purge valve.

3 Check that there is sufficient liquid (20% ethanol) in the rinsing system reservoir.

4 Set the pressure limit:

a Select sub menu ***Setup Hi Press Limit***. Press **OK**.

b Set the value. Press **OK**.

c Repeat steps a and b for ***Setup Lo Press Limit***.

If the pressure limit is exceeded, the pump is stopped.

Pump P-920

1 Check that there is sufficient eluent present for the run, and that the solvent filter is fully immersed. If the eluent is to be changed, see *Section 4.8 Changing eluent, on page 43*.

Note: *The pump may not work if the buffer vessels are sealed. Do not close the vessels off completely.*

2 Check that there is sufficient liquid (20% ethanol) in the rinsing system (behind the piston heads).

3 Set the pressure limit:

a Select sub menu ***Setup Hi Press Limit***. Press **OK**.

b Set the value. Press **OK**.

c Repeat steps a and b for ***Setup Lo Press Limit***.

If the pressure limit is exceeded, the pump is stopped.

4.5 Starting and stopping the pump

Setting the flow rate

1 In the main operating menu, select ***Set Flow Rate***. Press **OK**.

2 Set the value. Press **OK**.

Starting the pump

1 In the mode changing menu, select ***Run***. Press **OK**.

The pump speed gradually increases to deliver the set flow rate.

2 To change the flow rate while the pump is running:

a In the main operating menu, select ***Set Flow Rate***. Press **OK**.

b Set the value. Press **OK**.

Stopping the pump

To stop the pump, select ***End*** in the mode changing menu. Press **OK**.

4.6 Setting concentration B

A percentage of eluent B can be set.

1 In the main operating menu, select ***Set Conc./Gradient***. Press **OK**.

2 The display shows ***Set Concentration B***. Press **OK**.

3 Set the %B value. Press **OK**.

4.7 Running a gradient

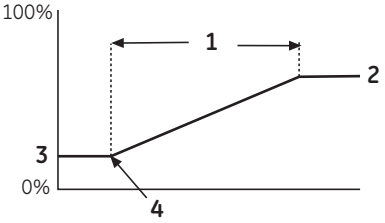
Gradients can be run in *time* or *volume* base. The default is time base.

To change base:

1 Select sub menu ***Setup Gradient Base***. Press **OK**.

2 Select either ***time*** or ***volume***. Press **OK**.

The gradient is run from current concentration to target concentration, in set length of time or volume. The gradient can be set in any operating mode.



No.	Description	No.	Description
1	Gradient length	3	Current concentration
2	Target concentration	4	Gradient started

1 In the main operating menu, select ***Set Conc./Gradient***. Press **OK**.

2 The display shows ***Set Concentration B***. Turn the dial to display ***Set Gradient Length***. Press **OK**.

3 Set the desired value. Press **OK**.

4 Turn the dial to display ***Set Gradient Target***. Press **OK**.

5 Set the desired gradient target value in %B. Press **OK**.

If the pump is in ***Run*** mode, the gradient will start immediately.

6 At the end of the set gradient length time, the pump continues to run at the target concentration.

4.8 Changing eluent

NOTICE

To prevent precipitation of crystals when changing from a salt containing buffer to organic solvent, always flush through the system with water as the intermediate liquid.

Note: *When changing from one eluent to another, it is extremely important that the two eluents are totally miscible with one another. If the two eluents are immiscible, the pump should be flushed first with an intermediate liquid, which is miscible with both eluents. Failure to do this will cause a wrong flow of eluent from the pump.*

When changing from a salt-containing buffer to an organic solvent, use water as the intermediate liquid to prevent precipitation.

Pump P-901, Pump P-903 and Pump P-905

1 Stop the pump by setting it in ***End*** mode.

2 Transfer the inlet tubing into the new eluent or into the intermediate liquid.

3 Run the pump at a flow rate and time as specified in the table below.

Pump	Flow rate (ml/min)	Time (min)
Pump P-901	40	10
Pump P-903	4	10
Pump P-905	0.4	10

4 Stop the pump. If an intermediate liquid is being used, transfer the inlet tubing into the final eluent and repeat step 3 with the new eluent.

Pump P-920

1 Stop the pump by setting it in ***End*** mode.

2 Use a bypass tubing to replace the column.

3 Transfer the inlet tubing into the new eluent or into the intermediate liquid.

4 Perform a pump wash, see *Menu overview for Pump P-920, on page 37*.

5 If an intermediate liquid is being used, transfer the inlet tubing into the final eluent and repeat step 4 with the new eluent.

Note: *When high buffer purity is important, use an intermediate step. This avoids remains of the previous buffer in the inlet filter diffusing out in the new buffer.*

4.9 Restart after power failure

Pump P-901, Pump P-903 and Pump P-905

If the power supply to the pump is interrupted, the pump automatically restarts when the power is restored. During restart the pump performs a self test and prompts for synchronization. All values under the ***Setup*** menu are retained. Other values, for example flow rate, are reset.

Pump P-920

If the power supply to the pump is interrupted, the pump automatically restarts when the power is restored. During restart the pump performs a self test. All values under the ***Setup*** menu are retained. Other values, for example flow rate, are reset.

5 Maintenance

About this chapter

This chapter provides instructions for routine component maintenance and a maintenance schedule.

5.1 General

To avoid personal injury when performing maintenance on the Pump P-901, Pump P-903, Pump P-905 and Pump P-920, follow the instructions below.

WARNING

Electrical shock hazard. All repairs should be done by service personnel authorized by GE Healthcare. Do not open any covers or replace parts unless specifically stated in the user documentation.

WARNING

Disconnect power. Always disconnect power from the instrument before replacing any component on the instrument, unless stated otherwise in the user documentation.

WARNING

Hazardous chemicals during maintenance. When using hazardous chemicals for system or column cleaning, wash the system or columns with a neutral solution in the last phase or step.

WARNING

Do not perform any type of maintenance work while the system is powered electrically or when the piping system is pressurized. Note that the piping system can be pressurized even when the system is closed down.

5.2 Cleaning

Pump a cleaning or sanitizing agent through Pump P-901. The standard recommendation is to pump 1 M NaOH at 1 ml/min for 30 minutes and then wash out with buffer or distilled water.

WARNING

When using hazardous chemical and biological agents, take all suitable protective measures, such as wearing protective glasses and gloves resistant to the substances used. Follow local and/or national regulations for safe operation and maintenance of Pump P-901, Pump P-903, Pump P-905 and Pump P-920.

WARNING

NaOH is corrosive and therefore dangerous to health. When using hazardous chemicals, avoid spillage and wear protective glasses and other suitable Personal Protective Equipment (PPE).

Cleaning before planned maintenance/service

To ensure the protection and safety of service personnel, all equipment and work areas must be clean and free of any hazardous contaminants before a Service Engineer starts maintenance work.

Please complete the checklist in the *On Site Service Health and Safety Declaration Form* or the *Health and Safety Declaration Form for Product Return or Servicing*, depending on whether the instrument is going to be serviced on site or returned for service, respectively.

Copy the form you need from *Section 7.2 Health and Safety Declaration Form, on page 58* or print it from the PDF file available on the User Documentation CD.

5.3 User maintenance schedule

Table 5.1: User maintenance schedule

Interval	Action	Instructions/reference
Daily	General care	• Inspect the pump daily for eluent leaks. • It is essential that all liquids passing through the pump are clean and pure. Impure or dirty eluents will not only cause baseline noise and drift, but will cause damage to the pump head assemblies. • After running with an aqueous eluent the pump should always be thoroughly purged with pure, distilled water to prevent salt precipitation.
Every second month	Perform leakage test	Perform leakage test according to the *Pump P-900, Pump P-905 and Pump P-920 User Manuals*.
When required	Remove trapped air bubbles from the pump (Pump P-920 only)	Purge the pump by manually changing the direction of the piston when the piston reaches its end position. Change direction several times until the air bubbles are removed. Refer to Pump P-920 User Manual.
	Replace the piston seal	Refer to *Pump P-900, Pump P-905 and Pump P-920 User Manuals*.
	Replace a damaged piston	Refer to *Pump P-900, Pump P-905 and Pump P-920 User Manuals*.
	Cleaning or replacing the inlet and outlet check valves	Refer to *Pump P-900, Pump P-905 and Pump P-920 User Manuals*.
	Cleaning the 6-port pump valve (Pump P-920 only)	Refer to Pump P-920 User Manual.

5.4 Disassembly and assembly of components and consumables

The operator must carefully read and understand the instructions supplied for each component before disassembly and assembly of the component. When replacing consumables, such as tubing and tubing connectors, all neccessary safety precautions must be taken. Contact your local GE Healthcare representative if further information or help is needed.

WARNING

Disconnect power. Always disconnect power from the instrument before replacing any component on the instrument, unless stated otherwise in the user documentation.

WARNING

Before disassembly, check that there is no pressure in the piping system.

WARNING

After assembly, the piping system must be tested for leakage at maximum pressure for continued protection against injury risks due to fluid jets, burst pipes or explosive atmosphere.

5.5 Replacement of fuses

WARNING

Disconnect power. Always disconnect power from the instrument before replacing fuses.

Refer to *Section 7.1 Specifications, on page 57* for information about the fuse type and rating. If a fuse repeatedly blows, switch off the system mains switch and contact your local GE Healthcare representative.

WARNING

For continued protection from fire hazard, replace only with same type and rating of fuse.

5.6 Storage

The following conditions shall be maintained while the system is in storage:

- Temperature: +2° to +30°C (preferably room temperature)
- Relative humidity: 0% to 95%, non-condensing (preferably low humidity).

Overnight storage: The pump can be left filled with a buffer.

Note: *If buffers or water are stored at room temperature, there is a risk that bacterial growth may occur.*

Weekend and long-term storage: Flush the pump with water and then fill it with 20% ethanol.

6 Troubleshooting

6.1 Faults and actions

Fault	Action
Large spillage over/into system/module	1 Unplug the mains inlet cable. 2 Clean and dry the system/module with a dry cloth or paper. If necessary, tilt the system/module backwards to drain. 3 Contact GE Healthcare local service for advice.
No text on the front display	1 Check that the mains cable is connected and the power switch is in ON-position I. 2 Check the mains power supply. 3 Check the mains inlet fuse.
Erratic flow, noisy baseline signal, irregular pressure trace	
Air bubbles passing through or trapped in the pump	1 Check that there is sufficient eluent present in the reservoirs. 2 Check all connections for leakage.
6-port pump valve not functioning correctly (Pump P-920 only)	1 Follow the instructions in Pump P-920 User Manual.
Piston seal leaking	1 Replace the piston seal according to the instructions in the User Manual.
Blockage or partial blockage	1 Flush through to clear blockage. 2 If necessary, replace tubing. 3 Check inlet tubing filter. It can become clogged if unfiltered buffers or samples are applied.
Liquid leaking from the assembly	
Wiper and/or end piece gasket incorrectly fitted pump cylinder	1 Replace or re-install the faulty part(s).

Fault	Action
Low eluent flow and noise as the pistons move (Pump P-920 only)	1 Disassemble the pump cylinder assembly and examine the piston seal and glass cylinder walls according to Pump P-920 User Manual. Replace if necessary. 2 If the glass cylinder walls are scratched, check the piston seal. Ensure that the piston rinsing system is always used, especially when working with aqueous buffers with high salt concentrations. 3 Check the piston for damage. If damaged, replace the piston. 4 Never reinstall used or old parts that may be worn.
Leaking connection and/or crystallized material around a connector	1 Unscrew the tubing connector and check if it is worn or incorrectly fitted. If so, replace the connector. 2 Tighten the connector properly.
Error in external chart recorder	1 Check the chart recorder according to its manual.

6.2 Error messages

P-920 error messages

Message	Action
1 ERROR in software notify instr support **33 ERROR in software notify instr support** **34 ERROR in software notify instr support** **35 ERROR in software notify instr support**	1 Reboot system. 2 If error remains, notify instrument support.

Message	Action
70 WARNING no mixer Check connection **71 Error in mixer Check mixer**	1 Switch off the module. 2 Check the UniNet-2 connections to the mixer. 3 Check the mixer. 4 Switch on the module.
72 Error in UniNet2 Check units **73 WARNING UniNet2 Check connection**	1 Switch off the module. 2 Check all UniNet-2 connections. 3 Switch on the module.
75 Error in valve A Cont./Call service **76 Error in valve B Cont./Call service**	1 Switch off the module. 2 Switch on the module. 3 If still persistent, call service.
80 WARNING Pump overpressure	1 Check high pressure limit setting. 2 Check the column (may be blocked). 3 Check the flowpath for blockage.
81 WARNING Pump underpressure	1 Check low pressure limit setting 2 Check the column (may be leaking). 3 Check the flowpath for leakage. 4 Check for air in the pump.
82 WARNING pump overheated check fan	1 Switch off the module and let it cool. 2 Clean or clear the air inlets. 3 Switch on the module and check that the fan is running

Message	Action
83 ERROR endsensors pump A call service **84 ERROR endsensors pump B call service**	1 Call service.
85 Failed to set offset	1 Reboot system. 2 If error remains, call service.
86 ERROR in EEPROM Recalib. all values	1 Call service for recalibration.
88 Not allowed current mode.	1 Select other instruction, or change mode (End, Run or Pause).
3300 Error software notify instr support **3400 Error software notify instr support** **3401 Error software notify instr support** **3410 Error software notify instr support** **3411 Error software notify instr support** **3510 Error software notify instr support** **3621 Error software notify instr support** **3622 Error software notify instr support** **3624 Error software notify instr support**	1 Reboot system. 2 If error remains, notify instrument support.

Message	Action
3600 Low lim>hi-lim	1 Low pressure limit can not be set higher than high pressure limit. Reset limit.
3605 Low lim>hi-lim Hysteresis	1 Low pressure limit for warning can not be set higher than high pressure limit for warning. Overlapping ranges due to hysteresis are not allowed. Reset limit.
3610 Disconpressure then set analog V.	1 Release pressure in system before setting analogue output voltage.
3620 Error hardware notify instr suppor	1 Call instrument support.
3636 Value must be greater than 0	1 Full scale pressure must be greater than zero. Reset value.
ERROR key (OK) **ERROR key (Esc)** **ERROR key (OK+Esc)**	1 The key was pressed during self-test, or is faulty. 2 Switch off the module. 3 Switch on the module.
ERROR number 100 ERROR number 109-113 ERROR number 120-121	1 Switch off the module. 2 Check all connections. 3 Switch on the module.

Message	Action
ERROR number 106-108 ERROR number 118	1 Switch off the module. 2 Check all UniNet 1 and UniNet 2 connections. 3 Switch on the module.

P-901, P-903 and P-905 error messages

Message	Action
ERROR no mixer Check connection! ERROR in mixer Check mixer!	1 Switch off the instrument. 2 Check the connections to the mixer. 3 Switch on the instrument.
ERROR in valve x Check connections!	1 Switch off the instrument. 2 Check the connections to the valve(s). 3 Switch on the instrument.
ERROR Pump too warm Check fans!	1 Switch off the instrument to let it cool. 2 Clean or clear the front air inlet. 3 Switch on the instrument and check that the fans are running.
ERROR Sync failure Please restart!	1 Switch off the instrument. 2 Switch on the instrument. Remember to open the purge valves before synchronization

Message	Action
ERROR key (OK) ERROR key (Esc) ERROR key (OK + Esc) ERROR number 100 ERROR number 109-113 ERROR number 120-121	1 Switch off the instrument. 2 Check all connections. 3 Switch on the instrument.
ERROR number 106-108 ERROR number 118	1 Switch off the instrument. 2 Check all UniNet1 and UniNet 2 connections. 3 Switch on the instrument.

7 Reference information

About this chapter

This chapter contains technical data, regulatory and other information.

7.1 Specifications

Parameter	Value
Ingression protection	IP20
Supply voltage	100-240 V AC ±10%, 50 to 60 Hz
Power consumption	up to 400 VA including accessories (P-901 and P-903) 600 VA (P-920)
Fuse specification	T 6.3 AL
Dimensions (H × W × D)	150 × 260 × 370 mm
Weight	17 kg (P-901 and P-903) 18 kg (P-920)
Ambient temperature	4° to 40°C
Relative humidity tolerance (non-condensing)	20% to 95%
Atmospheric pressure	84 to 106 kPa (840 to 1060 mbar)
Acoustic noise level	< 80 dB A

7.2 Health and Safety Declaration Form

On site service

On Site Service Health & Safety Declaration Form

Service Ticket #:	

To make the mutual protection and safety of GE service personnel and our customers, all equipment and work areas must be clean and free of any hazardous contaminants before a Service Engineer starts a repair. To avoid delays in the servicing of your equipment, please complete this checklist and present it to the Service Engineer upon arrival. Equipment and/or work areas not sufficiently cleaned, accessible and safe for an engineer may lead to delays in servicing the equipment and could be subject to additional charges.

Yes	No	Please review the actions below and answer "Yes" or "No". Provide explanation for any "No" answers in box below.
		Instrument has been cleaned of hazardous substances. Please rinse tubing or piping, wipe down scanner surfaces, or otherwise ensure removal of any dangerous residue. Ensure the area around the instrument is clean. If radioactivity has been used, please perform a wipe test or other suitable survey.
		Adequate space and clearance is provided to allow safe access for instrument service, repair or installation. In some cases this may require customer to move equipment from normal operating location prior to GE arrival.
		Consumables, such as columns or gels, have been removed or isolated from the instrument and from any area that may impede access to the instrument.
		All buffer / waste vessels are labeled. Excess containers have been removed from the area to provide access.
Provide explanation for any "No" answers here:		

Equipment type / Product No:		**Serial No:**	

I hereby confirm that the equipment specified above has been cleaned to remove any hazardous substances and that the area has been made safe and accessible.

Name:		**Company or institution:**	
Position or job title:		**Date (YYYY/MM/DD):**	
Signed:			

DOC1149542/28-9800-26 AC 05/2014

Product return or servicing

Health & Safety Declaration Form for Product Return or Servicing

Return authorization number:		*and/or* **Service Ticket/Request:**	

To make sure the mutual protection and safety of GE personnel, our customers, transportation personnel and our environment, all equipment must be clean and free of any hazardous contaminants before shipping to GE. To avoid delays in the processing of your equipment, please complete this checklist and include it with your return.

1. Please note that items will NOT be accepted for servicing or return without this form
2. Equipment which is not sufficiently cleaned prior to return to GE may lead to delays in servicing the equipment and could be subject to additional charges
3. Visible contamination will be assumed hazardous and additional cleaning and decontamination charges will be applied

Yes	No	Please specify if the equipment has been in contact with any of the following:	
		Radioactivity (please specify)	
		Infectious or hazardous biological substances (please specify)	
		Other Hazardous Chemicals (please specify)	

Equipment must be decontaminated prior to service / return. Please provide a telephone number where GE can contact you for additional information concerning the system / equipment.

Telephone No:		
Liquid and/or gas in equipment is:	☐	**Water**
	☐	**Ethanol**
	☐	**None, empty**
	☐	**Argon, Helium, Nitrogen**
	☐	**Liquid Nitrogen**
	Other, please specify	

Equipment type / Product No:		**Serial No:**	

I hereby confirm that the equipment specified above has been cleaned to remove any hazardous substances and that the area has been made safe and accessible.

Name:		**Company or institution:**	
Position or job title:		**Date (YYYY/MM/DD)**	
Signed:			

To receive a return authorization number or service number, please call local technical support or customer service.

DOC1149544/28-9800-27 AC 05/2014

7.3 Ordering information

For ordering information visit www.gelifesciences.com/AKTA.

Appendix A

Menu and text overview

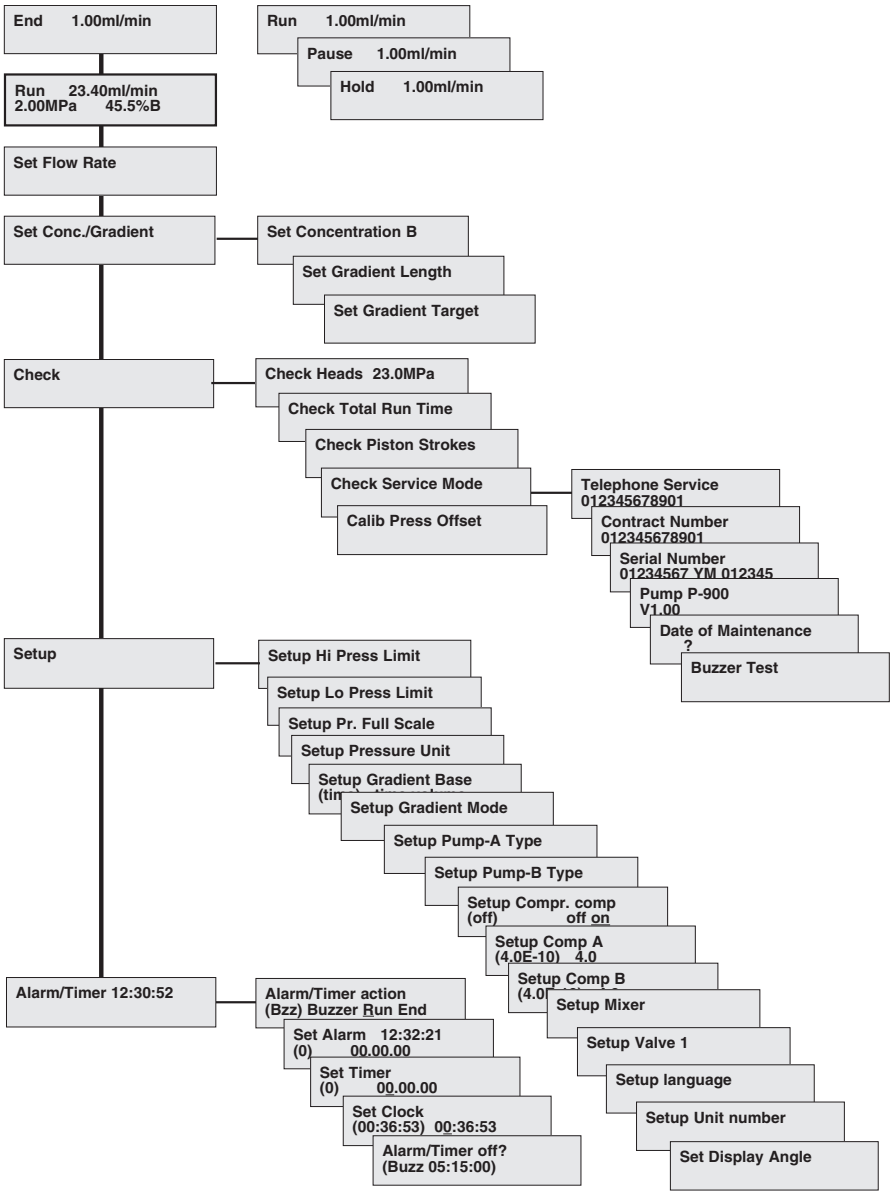


Figure A.1: Menu and text overview for Pump P-901 and Pump P-903.

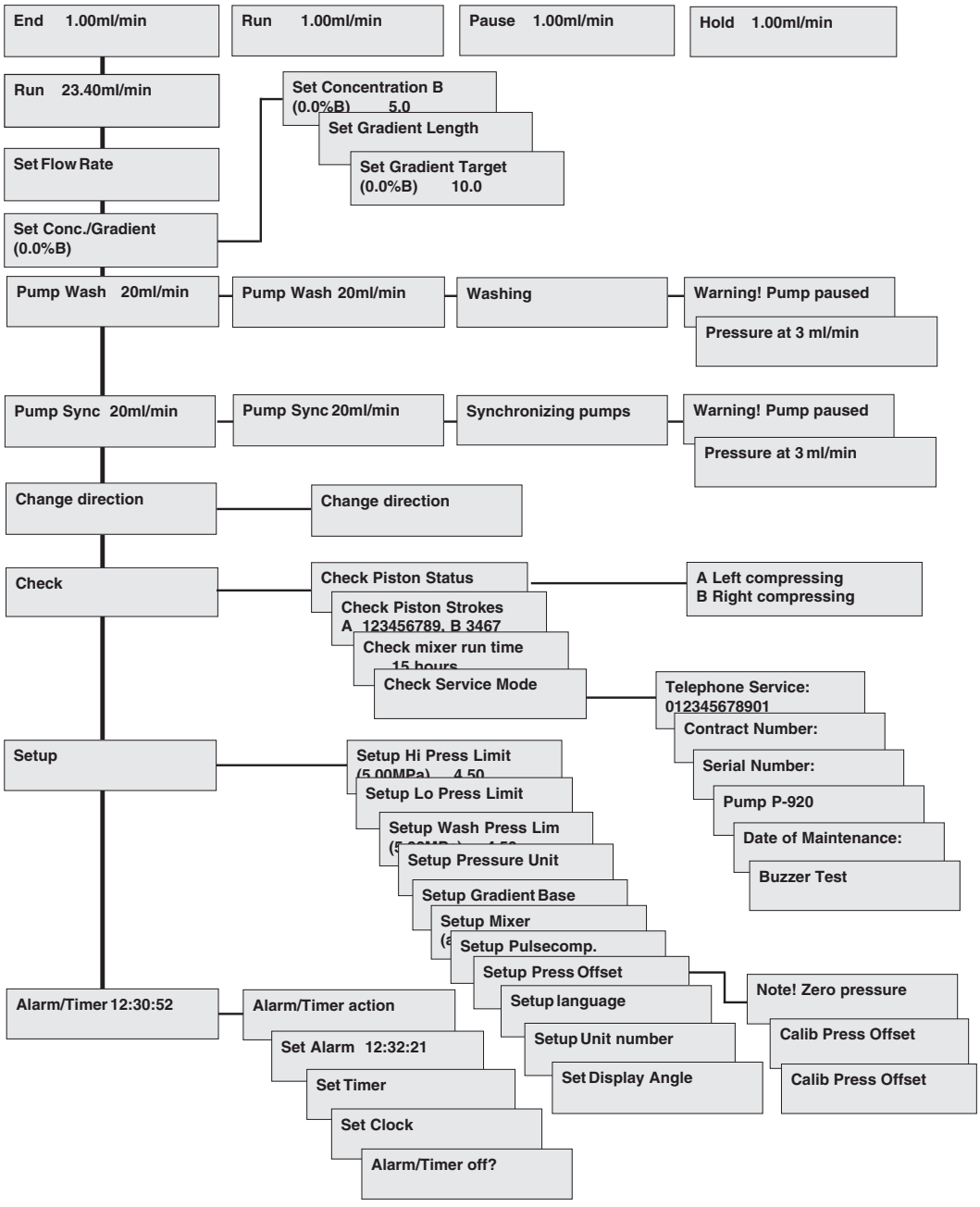


Figure A.2: Menu and text overview for Pump P-920.

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

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