Monitor UVis-920

Operating Instructions

Original instructions

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1 Introduction

Purpose of the Operating Instructions

The *Operating Instructions* provides you with the instructions needed to handle Monitor UVis-920 in a safe way.

1.1 Prerequisites

In order to operate Monitor UVis-920 safely, and according to the intended purpose, the following prerequisites must be met:

- You should be acquainted with the use of bioprocessing equipment and with the handling of biological materials.
- You must read and understand the *Safety* chapter of these *Operating Instructions*.
- The system must be installed according to the instructions in the *Installation* chapter.

About this chapter

This chapter contains important user information, a description of the intended use of Monitor UVis-920, regulatory information, list of associated documentation, definitions of safety notices, etc.

1.2 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

Monitor UVis-920 is a UV and visible light absorption monitor for use in liquid chromatography.

Monitor UVis-920 is intended for research use only, and shall not be used in any clinical procedures, or for diagnostic purposes.

Safety notices

This user documentation contains safety notices (WARNING, CAUTION, and NOTICE) concerning the safe use of the product. See definitions below.

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.

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.

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 (for example, **Power**).

1.3 Regulatory information

In this section

This section describes the directives and standards that are fulfilled by Monitor UVis-920.

Manufacturing information

The table below summarizes the required manufacturing information.

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

In this section

1.3.1 EU Directives

Conformity with EU Directives

This product fulfills the European Directives listed below. See the EU Declaration of Conformity for the directives and regulations that apply for the CE marking.

If not included with the product, a copy of the EU Declaration of Conformity is available on request.

Directive	Title
2014/30/EU	Electromagnetic Compatibility (EMC) Directive
2014/35/EU	Low Voltage Directive (LVD)
2011/65/EU	Restriction of Hazardous Substances (RoHS) Directive

CE marking

CE

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

- used according to the Operating Instructions or user manuals, and
- used in the same state as it was delivered from GE, except for alterations described in the Operating Instructions or user manuals.

1.3.2 Eurasian Customs Union

Introduction

This section contains additional regulatory information to comply with the Eurasian Customs Union technical regulations.

Manufacturer and importer information

The table below summarizes the manufacturer and importer information required by the Eurasian Customs Union.

Requirement	Information
Name and address of manufacturer	See *Manufacturing information*
Telephone number of manufacturer	Telephone: + 46 771 400 600
Importer and/or company for obtaining information about importer	GE Healthcare LLC GE Healthcare Life Sciences Presnenskaya nab., 10C, 12th floor RU-123 317 Moscow, Russian Federation Telephone 1: + 7 495 411 9714 Fax nr: + 7 495 739 6932 Email: LSrus@ge.com

1.3.3 Regulations for USA and Canada

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 B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CAN ICES/NMB compliance

This product complies with the Canadian standard ICES-001/NMB-001 concerning electromagnetic compatibility.

1.3.4 Other regulations and standards

Introduction

This section describes the standards that apply to the Monitor UVis-920 system.

Environmental conformity

This product conforms to the following environmental requirements.

Requirement	Title
2012/19/EU	Waste Electrical and Electronic Equipment (WEEE) Directive
China RoHS	Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products.

Standards, machinery and electrical equipment

Standard requirements fulfilled by this product are summarized in the table below.

Standard	Description
EN ISO 12100	Safety of machinery. General principles for design. Risk assessment and risk reduction.
EN 61010-1, IEC 61010-1, UL 61010-1, CAN/CSA-C22.2 No. 61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements.

Standard	Description
EN 61326-1	Electrical Equipment for Measurement, Control, and Laboratory Use-EMC requirements-Part 1: General requirements (Emission according to CISPR 11, Group 1, class A)
ICES-001	Industrial, Scientific and Medical (ISM) Radio Frequency Generators (Canada)

1.4 User documentation

In addition to these *Operating Instructions*, the documentation package supplied with Monitor UVis-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 Monitor UVis-920 are listed below.

System-specific documentation

User documentation	Content
Monitor UVis-920 Operating Instructions	Detailed system description. Comprehensive user instructions, method creation, operation, advanced maintenance and troubleshooting.
EU Declaration of Conformity for Monitor UVis-920	Document whereby the manufacturer ensures that the product satisfies and is in conformity with the essential requirements of the applicable directives.

2 Safety instructions

About this chapter

This chapter describes safety compliance, safety labels, general safety precautions, emergency procedures, power failure and recycling of Monitor UVis-920.

In this chapter

This chapter contains the following sections:

2.1 Safety precautions

General precautions

Always follow these General precautions to avoid injury when using the Monitor UVis-920 instrument.

WARNING

Do not operate the product in any other way than described in the user documentation.

WARNING

Only properly trained personnel may operate and maintain the product.

Personal protection

WARNING

Always use appropriate Personal Protective Equipment (PPE) during operation and maintenance of this product.

WARNING

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

WARNING

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

Installing and moving the instrument

WARNING

High intensity UV light. This product uses high intensity ultra-violet light. Do not disconnect the optical fibers while the lamp is on.

WARNING

Protective ground. The product must always be connected to a grounded power outlet.

WARNING

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

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.

CAUTION

Make sure that the system is placed on a stable, level bench with adequate space for ventilation.

System operation

WARNING

If liquid is spilled on the equipment, the electrical power supply must be disconnected immediately. The equipment must be completely dry on the inside and the outside before reconnecting the power supply.

Maintenance

WARNING

Electrical shock hazard. All repairs should be done by service personnel authorized by GE. 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 performing any maintenance task.

WARNING

Hazardous chemicals or biological agents. When using hazardous chemicals or biological agents, make sure that the entire system has been flushed thoroughly with bacteriostatic solution (e.g., NaOH) and distilled water before service and maintenance.

WARNING

Use only approved parts. Only spare parts and accessories that are approved or supplied by GE may be used for maintaining or servicing the product.

WARNING

Corrosive substance. 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).

CAUTION

Hazardous chemicals or biological agents in UV flow cell. Make sure that the entire flow cell has been flushed thoroughly with bacteriostatic solution (e.g., NaOH) and distilled water, before service and maintenance.

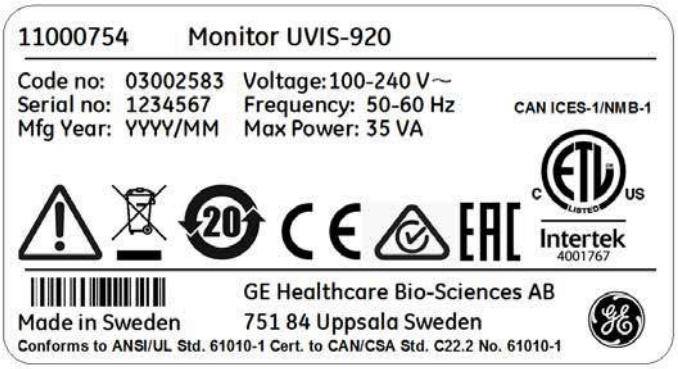
2.2 Labels

Introduction

This section describes the system label on Monitor UVis-920 and its meaning.

System label

The illustration below shows the system label.



Note: *The specific data shown on the system label below is only an example. Actual data is specific for each individual system and may vary from system to system.*

The system label information is explained in the table below.

Label text	Description
Code no:	GE code number.
Serial no:	GE serial number.
Mfg Year:	Manufacturing year and month
Voltage:	Voltage.
Frequency:	Supply voltage frequency.
Max power:	Max power.
	**Warning!** Read the user documentation before using the system. Do not open any covers or replace parts unless specifically stated in the user documentation.

Label text	Description
	This symbol indicates that waste 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 GB/T 26572-2011 Requirements for Concentration Limits for Certain Hazardous Substances in Electronics.
	The system complies with applicable European directives.
	The system complies with the requirements for electromagnetic compliance (EMC) in Australia and New Zealand.
	Eurasian Conformity mark: the single conformity mark indicates that the product is approved for circulation on the markets of the member states of the Eurasian Customs Union.
CAN ICES/NMB-1	This product complies with the Canadian standard ICES-001/NMB-001 concerning electromagnetic compatibility.
	This symbol indicates that Monitor UVis-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.

2.3 Emergency procedures

Introduction

This section describes how to perform an emergency shutdown of Monitor UVis-920. The section also describes the result in the event of power failure.

Emergency shutdown

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

Switch off power to the instrument by switching the **On/off** switch on the rear panel to the **(O)** position. If required, disconnect the mains power cord. The run is interrupted immediately.

Power failure

In the event of power failure the run is interrupted immediately.

2.4 Recycling information

Decontamination

Monitor UVis-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 Monitor UVis-920 out of service, the different materials must be separated and recycled according to national and local environmental regulations.

Recycling of hazardous substances

Monitor UVis-920 contains 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/T11364-2014《电子电气产品有害物质限制使用标识要求》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/T11364-2014 Marking for Restriction of Hazardous Substances caused by electrical and electronic 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中国标准GB/T 26572《电子电气产品中限用物质的限量要求》中限量的有害物质。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定期维修和保养要求。

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 GB/T 26572 Requirements of concentration limits for certain restricted substances in electrical and electronic products. The number in the symbol is the Environment-friendly Use Period (EFUP), which indicates the period during which the hazardous substances contained in electrical and electronic products will not leak or mutate under normal operating conditions so that the use of such electrical and electronic 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.

有害物质的名称及含量
Name and Concentration of Hazardous Substances

产品中有害物质的名称及含量
Table of Hazardous Substances' Name and Concentration

部件名称 Component name	有害物质 Hazardous substance					
	铅 Pb	汞 Hg	镉 Cd	六价铬 (Cr(VI))	多溴联苯 PBB	多溴二苯醚 PBDE
11000754	X	0	0	0	0	0

本表格依据SJ/T 11364的规定编制。

This table is prepared according to SJ/T 11364.

0: **表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。**

X: **表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572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 hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.

X: Indicates that this hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in GB/T 26572

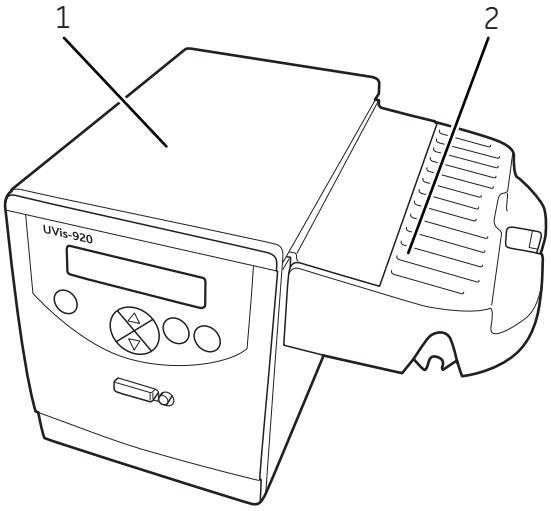
- Data listed in the table represents best information available at the time of publication.

3 System description

The Monitor UVis-920 is a UV and visible light absorption monitor which can be used in wavelengths range between 200-700 nm by changeable fixed wavelength filters. The instrument contains no internal user replaceable items.

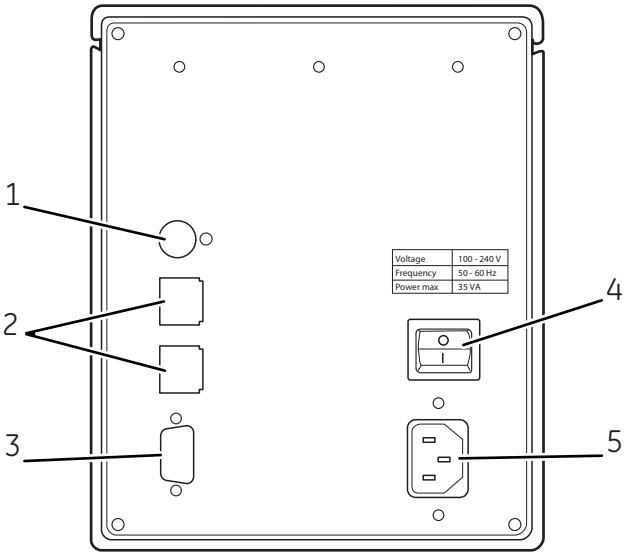
3.1 Illustrations

Main unit



Part	Function
1	Main unit
2	UV cell holder with cover

Rear panel of main unit



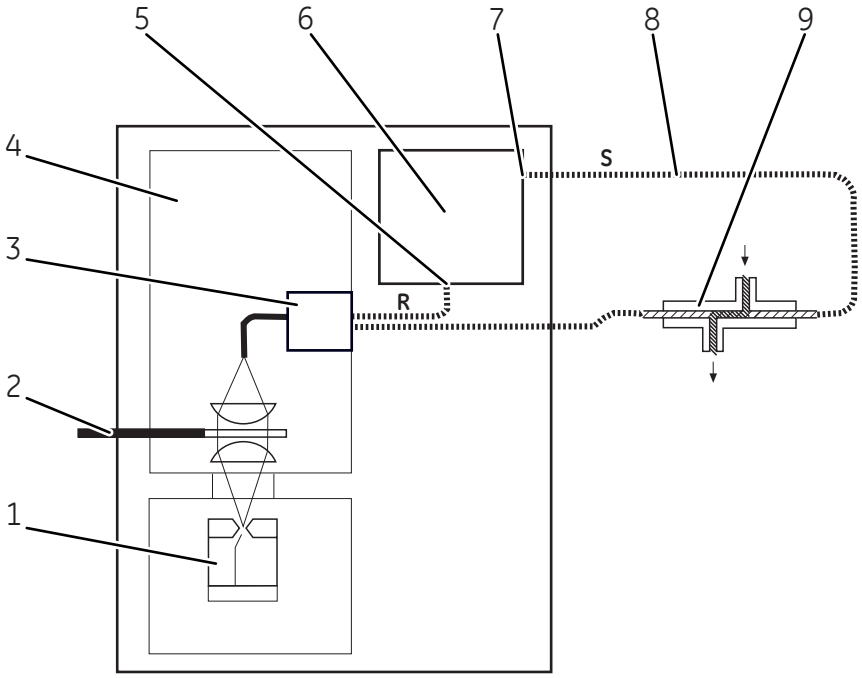
Part	Function
1	Analog out 0-1 V. Recorder output, 1 channel 0 V to 1 V
2	For service use only
3	Remote. Digital control signals.
4	Instrument on/off switch
5	Mains. Supply voltage, grounded.

3.2 Monitor principle

A Xenon flash lamp gives a high intensity, continuous spectrum of light. The lamp is on only during the chromatographic run, ensuring that its long lifetime is used in the most efficient way.

The light enters an interference filter based monochromator which includes a collimating system and a filter unit with a fixed specific wavelength. It is possible to select wavelength between 200-700 nm by changing filter unit.

Monochromatic light from the filter is directed to an optical fiber. The light from the monochromator to the flow cell and from the cell to the detector electronics is guided by optical fibers which focus its full intensity on the liquid flow path, maximizing the sensitivity of the monitoring. Before entering the flow cell, the monochromatic light is split in a beam splitter, with 50% of the light passing through the sample fiber (S) and the flow cell, and 50% being directed through the reference fiber (R). Two photodiodes with identical characteristics monitor the intensities of the measuring and reference beams.

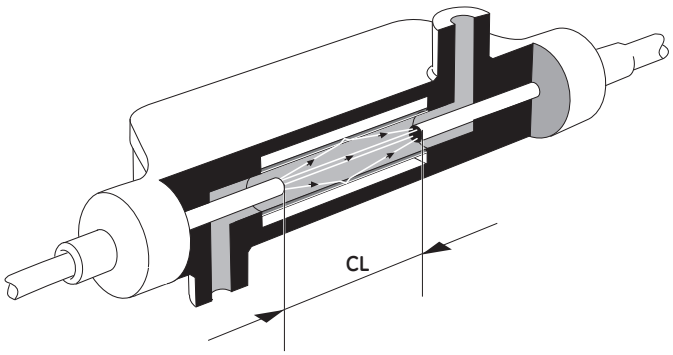


Part	Function
1	Flash lamp 100 Hz
2	Filter unit
3	Beam

Part	Function
4	Interference filter monochromator
5	Reference
6	Micro controller
7	Signal
8	Optical fibres
9	Flow cell

3.3 Flow cell principle

The optical path lengths of the flow cells are 1 mm, 2 mm, 5 mm and 10 mm depending on the type of cell installed. The smaller flow cell is made of quartz with titanium housing and the industrial cells are made of PEEK (Polyetheretherketone). The illustration below highlights the optical path cell length (CL).



The design of the flow cell above prevents the formation of distinct interfaces between eluent components with different refractive indices and eliminates the negative influence these would cause. The precision of monitoring is enhanced by the construction of the flow cell, which ensures total reflectance of light. This maintains a high intensity of light to the detector. The long path length combined with a small cell volume increases sensitivity.

4 Installation

About this chapter

This chapter provides required information to enable users and service personnel to unpack, install, move and transport Monitor UVis-920.

Precautions

WARNING

Before attempting to perform any of the procedures described in this chapter, you must read and understand all contents of the Safety instructions chapter.

In this chapter

This chapter contains the following sections:

4.1 Unpacking

Unpack the instrument and check the items against the supplied packing list. 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.

It is recommended that all packing materials should be retained if onward transport of the instrument is expected.

4.2 Site requirements

Parameter	Requirement
Operation site	Indoor use
Altitude	Maximum 2000 m
Electrical power	100/240 V AC ±10%, 50/60 Hz
Transient overvoltage	Overvoltage category II
Ambient temperature	4°C to 40°C
Placement	Stable laboratory bench or in ÄKTAexplorer or ÄKTApurifier.
Humidity	20% to 95% relative humidity (noncondensing)
Pollution degree	2

The instrument should be located in a place of low temperature variations, away from heat sources, draughts and direct sunlight.

To ensure correct ventilation a free space of 0.1 m is required behind and in front of the instrument. Do not use any soft material under the instrument, to ensure that the ventilation inlet in the front is not blocked.

The instrument should not be used in a corrosive atmosphere or in an atmosphere where deposits are liable to form on the optical surfaces.

4.3 Transport

Before moving the equipment: disconnect all connected cables and tubing.

4.4 Installing the cell holder

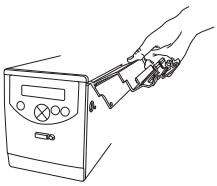
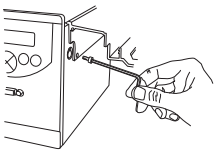
WARNING

High intensity UV light. This product uses high intensity ultra-violet light. Do not disconnect the optical fibers while the lamp is on.

NOTICE

To avoid damaging the optical inlet and outlet the two black rubber caps at the optical fiber connectors must be in place when installing the cell holder.

If UV Flow Cell, 2 mm or UV Flow Cell, 10 mm is to be used the flow cell holder included in the UVis-920 delivery must be installed.

Step	Action	Illustration
1	Unpack the cell holder.	
2	Slide the cell holder in place on the right hand side of the UVis-920.	
3	Fasten the flow cell holder with the two screws included. Use a hex wrench.	

4.5 Installing the flow cells

The following flow cells are available:

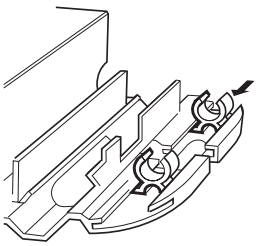
- UV Flow Cell 2 mm
- UV Flow Cell 10 mm

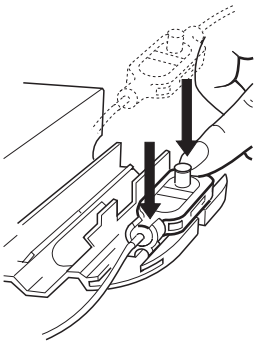
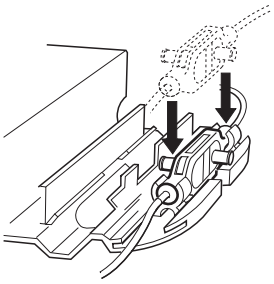
- UV Flow Cell ÄKTApilot, 1/2/5 mm
- Industrial Flow Cell 8 mm (tubing i.d. 8 mm)
- Industrial Flow Cell 1" (tubing i.d. 1")

Installing UV Flow Cell 2 mm and UV Flow Cell 10 mm

NOTICE

To avoid damaging the optical fibers, press only on the cell body, never on the optical fibers.

Step	Action	Illustration
1	Unpack the flow cell. Do not remove the red protective caps from the inlet or outlet, or the black protective caps on the optical fiber connectors.	
2	Slide the rear white clip on the cell holder to its inner position for a 2 mm cell and to its outer position for a 10 mm cell.	
3	Place the flow cell in the opening between the white clips. To improve the access to the tubing connections the cell can be positioned with the text and serial number facing upwards or sideways. Press the cell into the clips to fasten it.	

Step	Action	Illustration
	Normal position. The serial number is facing upwards.	
	Alternative position. The serial number is facing sideways.	

Connecting the optical fibers

WARNING

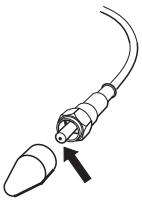
High intensity UV light. This product uses high intensity ultra-violet light. Do not disconnect the optical fibers while the lamp is on.

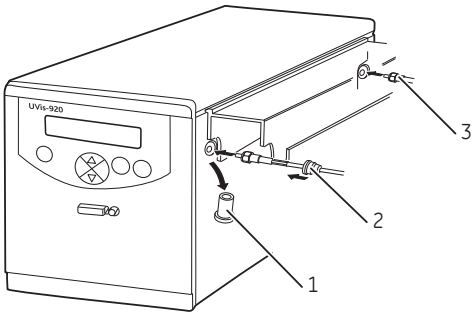
NOTICE

Do not touch the tips of the optical fiber with anything other than lens paper.

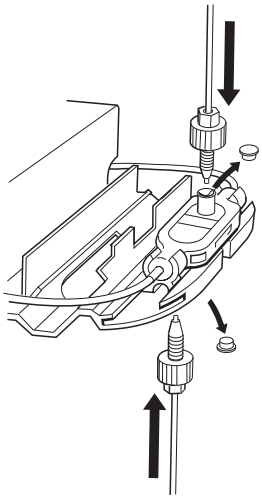
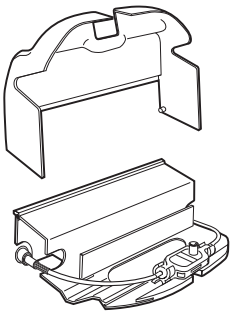
NOTICE

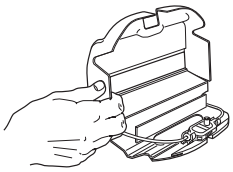
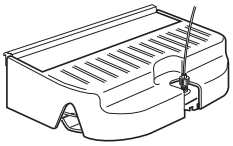
Do not twist the optical fibers during tightening.

Step	Action	Illustration
1	Remove the two black protective caps from the optical fiber connectors.	
2	Remove the two rubber protective caps from the optical fiber receptacles on the right side of the housing.	



Part	Function
1	Protective cap
2	Rubber sleeve
3	Black shrinking tube

Step	Action	Illustration
3	Connect the two optical fibers to the housing by carefully inserting them into the sockets and tightening the nuts fingertight using the fiber detachment tool supplied. Do not overtighten. ***Note:*** *The optical fiber end with black shrinking tubing shall be connected to the rear socket connector on the side of Monitor UVis-920.*	 Fiber detachment tool
4	Slide the rubber sleeves on the two optical fibers onto the connectors. Make sure that the sleeves are pushed tight to the housing to prevent dust, fluid or light entering the connection.	
5	Remove the red protective caps from the inlet and outlet of the flow cell and connect the tubing with 1/16" fingertight connectors.	
6	Mount the cell holder cover by pushing it onto the cell holder.	

Step	Action	Illustration
7	Fit the two small lugs on the cover in the holes at the front and rear of the cell holder.	
8	Lower the cover over the cell holder.	

Installing UV Flow Cell ÄKTApilot 1/2/5 mm, and Industrial Flow Cell 8 mm and 1"

Step	Action
1	Unpack the flow cell. Do not remove the black protective caps on the optical fiber transmitter and receiver connector.
2	Choose the optical path length of the flow cell. The optical path length can be changed with shim plates.
3	Attach the flow cell to an appropriate flow cell holder.
4	Connect the inlet and outlet tubing to the flow cell.

Connecting the optical fibers

WARNING

High intensity UV light. This product uses high intensity ultra-violet light. Do not disconnect the optical fibers while the lamp is on.

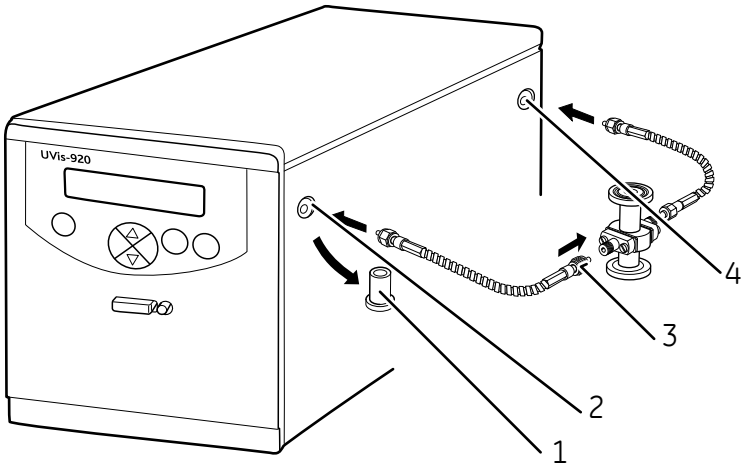
NOTICE

Do not touch the tips of the optical fiber with anything other than lens paper.

NOTICE

To avoid damaging the optical fibers, press only on the cell body, never on the optical fibers.

Step	Action
1	Remove the two protective rubber caps from the optical fiber connectors of Monitor UVis-920.



Part	Function
1	Protective cap
2	Transmitter
3	Knurled nut
4	Reciever

Step	Action
2	Remove the four black protective caps from the optical fiber connectors.
3	Identify the fiber connector which has a gold colored knurled nut.
4	Attach this connector to the flow cell by carefully inserting it into the socket and tightening the nut fingertight (fits only one of the two sockets).
5	Attach the other connector to the transmitter connector of Monitor UVis-920. Do not overtighten. ***Note:*** *The optical fiber with the gold colored knurled nut is the transmitter fiber and must not be mixed up with the other fiber, the receiver fiber.*
6	Connect the other optical fiber to the empty socket on the flow cell and to the rear fiber connector on the monitor.

4.6 Connecting electrical cables

WARNING

Protective ground. The product must always be connected to a grounded power outlet.

WARNING

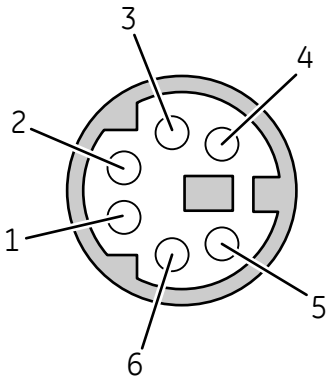
Power cord. Only use power cords with approved plugs delivered or approved by GE.

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.

The sockets for electrical signals are located on the rear panel. The instrument contains no user replaceable fuse.

Analog out connector



Pin	Signal	Function
1	+	0 V to 1 V signal
2	-	Ground
3-6		Not used

Connecting to recorder

Connect the recorder to the miniDIN-socket **Analog out 0-1 V** using the cable supplied. The absorption signal is available on a channel using the following wires:

Wire 1: signal (+)

Wire 2: ground (-)

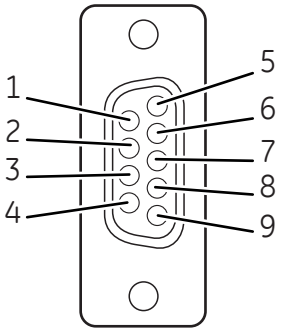
Note: *The signal cable is delivered with protective covers on each wire. Do not remove the protective covers from unused connections as a short circuit may disturb the measurements. Set the recorder to 0 V to 1 V input, full scale, 0 V offset.*

Connecting to auxiliary equipment (if used)

NOTICE

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

Connect any auxiliary equipment to the 9-pole D–Sub female Remote connector (5 V TTL signals only).



Pin	Signal	Function
1	5V (Out)	Signal. Maximum load 50 mA
2		Not used
3		Not used
4	Auto Zero (In)	Negative edge zeroes AU-value
5	Gnd	Common ground for all signals
6	Error (Out)	Goes low at error. Goes high again when OK is pressed
7	State (Out)	0=UVis-920 is in Run-mode 1=UVis-920 is in End-mode

Pin	Signal	Function
8	Run/Stop (In)	Toggles the system between Run and End Negative edge selects Run-mode (starts) Positive edge selects End-mode (stops)
9	Event Mark (In)	Negative edge makes an event mark on recorder

Connecting to supply voltage

Step	Action
1	Make sure the **on/off** switch is in the OFF position **(O)**.
2	Connect a mains cable between the instrument and a grounded mains socket. The instrument is delivered with both European and US type mains cables, as standard. Any voltage 100 V to 240 VAC, 50 Hz to 60 Hz, can be used.

5 Operation

About this chapter

This chapter provides the information required to safely operate Monitor UVis-920.

Precautions

WARNING

Before attempting to perform any of the procedures described in this chapter, you must read and understand all contents of the Safety instructions chapter.

In this chapter

This chapter contains the following sections:

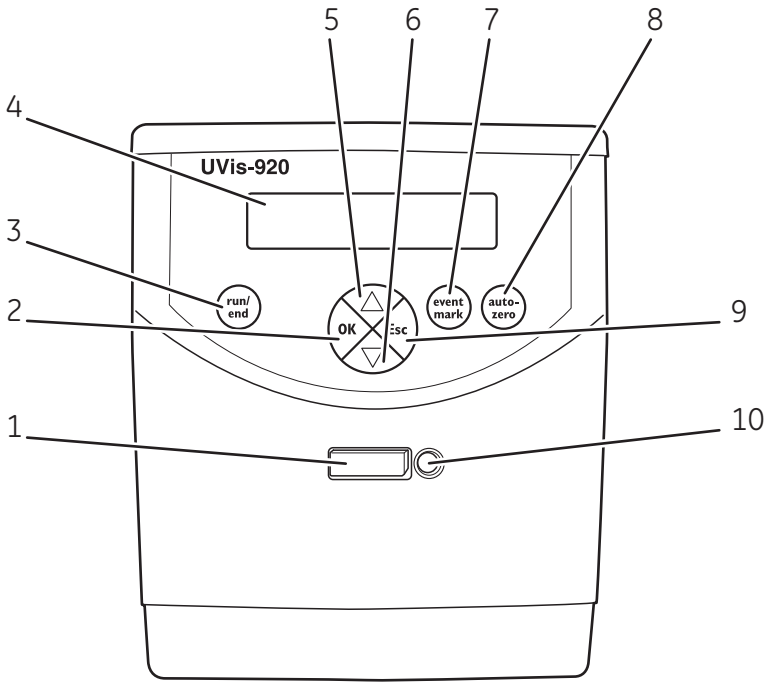
5.1 Menu selection

WARNING

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

5.1.1 Monitor UVis-920 front panel

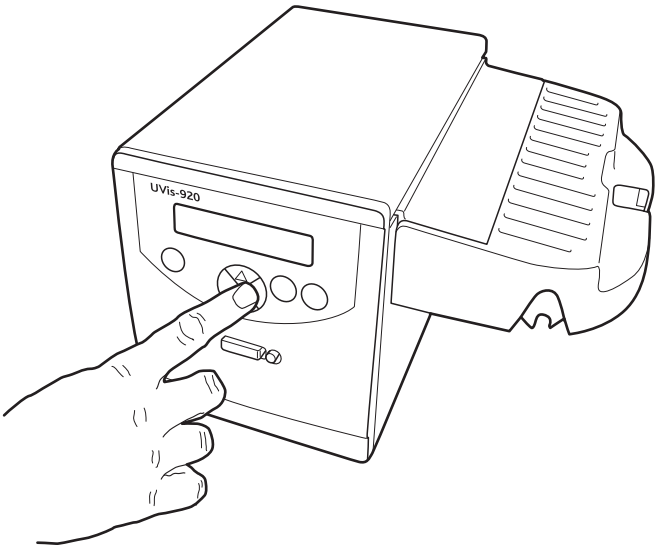
Operation menu and settings are selected by the membrane keys at the front of Monitor UVis-920.



Part	Function
1	eject button for filter unit
2	OK key
3	run/end key
4	display
5	arrow up key
6	arrow down key
7	event mark key
8	autozero key
9	Esc key
10	filter unit insert

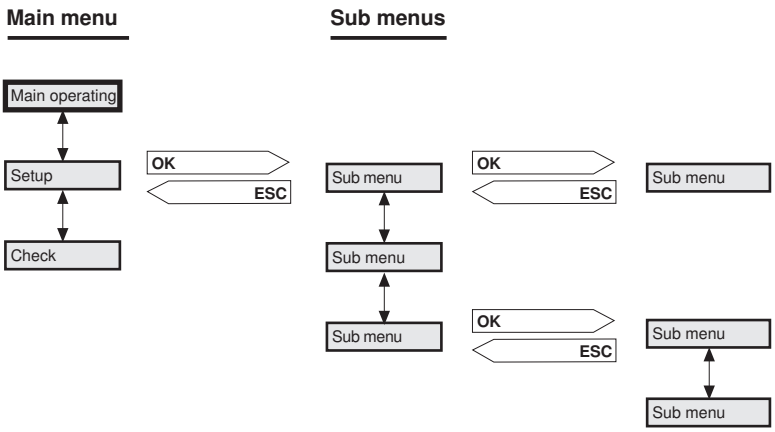
5.1.2 Menu navigation

A specific menu is selected by the front **arrow down** key. When the required menu is visible, the menu or selection is accepted by pressing the **OK** key.



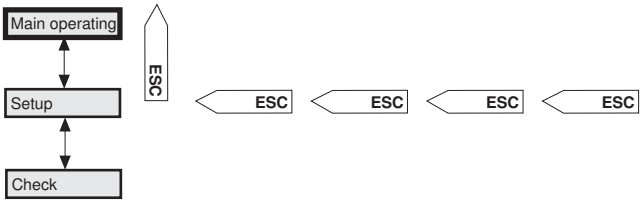
Navigating in sub menus

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



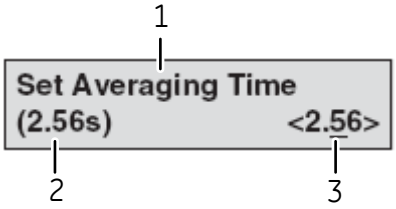
Return to main menu

Pressing **Esc** repeatedly, always returns to the main menu and the main operating window.



Select value

A cursor below a text or numerical value shows what is affected by a key. To increase the value press **arrow up key**. To decrease the value press **arrow down** key.



Part	Function
1	Parameter
2	Current value
3	New value to be set

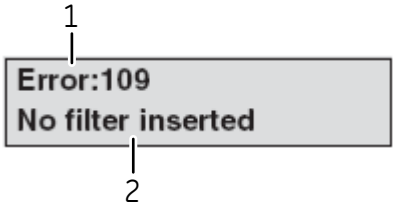
The text or numerical value displayed is accepted by pressing the **OK** key. To cancel, press the **Esc** key.

If the new value to be set is within brackets, it is possible to select between a number of preset values. No brackets make it possible to select step by step within a preset range, for example 0-999.

To set numerical values faster, press **arrow up** key continuously. The display shows 1, 2, 3 ....10, 20, 30 ... 100, 200, 300 ....1000, 2000, 3000 .... It is possible to select decade by pressing **arrow down** key continuously. Each character steps down to zero and then the cursor moves to left and stops at the desired decade when the key is released.

Error messages

If an error is occurred, the display shows an error message.



Part	Function
1	Error type
2	User information

To handle problems through the display interface even if an error message is indicated, it is possible to return to the previous display. Press ***OK*** or **Esc**. If the error remains, a new display with the same message returns 10 seconds after the last display update. See *Section 7.3 Error messages, on page 60* for more information.

5.2 Turning the monitor on and off

1 Switch on the instrument using the **mains** switch on the rear panel.

2 The instrument starts and displays the main operating window. For optimum performance 30 minutes warm-up time is recommended.

To setting a run timer or end timer is another way to switch the Xenon-lamp on/ off. See *Setting run and end timers, on page 49*.

5.3 Main menu overview

The main operating menu (main window) shows the wavelength in nanometers, the cell path length (CL) in millimeters (mm), the absorbance value in absorbance units (AU) and the mode of operation, ***STANDBY*** or ***RUNNING***. The menu is reached from any other menu by pressing **Esc** repeatedly.

Setup menu

Setup menu. Setup of analog out, averaging time, serial number etc. Use the **arrow** keys to reach setup menu.

Check menu

Check menu. Check internal operating values. Use the **arrow** keys to reach check menu.

5.4 Setting wavelength

NOTICE

Filter units must be stored in a clean and dustfree place.

NOTICE

Do not run the monitor with an empty filter holder.

The instrument can measure absorbance at wavelengths between 200-700 nm by changeable filter units. The wavelength currently used is shown in main operating menu. When no filter is inserted the display shows ***λ= - - - nm***.

Step	Action	Display
1	At delivery a dummy filter is in place for protection. Press **eject button** and remove the dummy filter	
2	Insert a filter unit in the monitor.	
3	The instrument reads the code tag of the inserted filter unit and display its wavelength in the main menu.	λ=215nm CL=10.00mm 0.00000AU (STANDBY)

Empty filter holders for custom filters are available. When using a custom filter, its wavelength can be stored in the instrument by the operator. See Setting wavelength for custom filter.

5.5 Custom filters

If a wavelength not covered by available filter units is needed, the empty filter holder together with a custom filter can be used. The filter should have a diameter of 12.5 mm and a maximum thickness of 6.5 mm to fit in the holder. The transmission of the filter must correspond with the working range of the monitor. This can be checked from the light intensity menu where the R-value must be between 2000 and 4500 mV when using the filter. If the value is too high, an aperture can be used. Custom filters are not provided by GE.

Setting wavelength for custom filter

If a custom filter is inserted, the wavelength can be set.

Step	Action	Display
1	Insert a custom filter. The display shows ***Change Wave Length***.	
2	Select ***yes*** to set wavelength, press **OK**. Select ***no***, press **Esc** to return to main displau	
3	If yes, enter the wavelength of custom filter in nanometer. Press **OK**.	λ=215nm CL=10.00mm 0.00000AU (STANDBY)

Resetting filter time

The time the current filter has been used can be shown in hours and resetted to zero. There is one time counter for each filter wavelength.

Step	Action	Display
1	Select menu ***Reset Filter Time***, press **OK**.	
2	Display toggles between ***yes*** and ***no***. Select ***yes*** to reset the time counter for the current filter wavelength, press **OK**.	

5.6 Autozero

The autozero function sets the detected absorbance to zero when the **autozero** key is pressed. Autozero is recommended before a sample is injected.

Press **autozero** key. The absorbance value is then shown in main operating menu.

5.7 Reading absorbance values

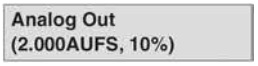
The main operating menu shows the absorbance values. The menu is reached from any other menu by pressing the **Esc** key repeatedly.

5.8 Setup menu

Setting analog output to an external chart recorder

Setting range and zero

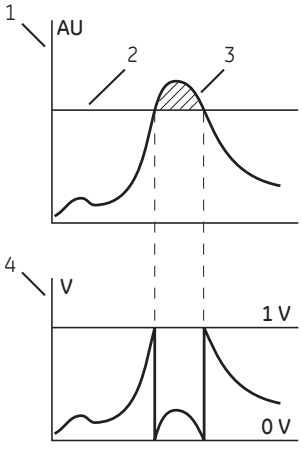
UVis-920 displays the measured absorbance value as an analog voltage in the recorder connector. The output from the instrument is always 0 V to 1 V, but the absorbance value for full scale deflection (AUFS) and the zero absorbance level on the recorder can be set.

Step	Action	Display
1	Select menu ***Analog Out***, press **OK**.	

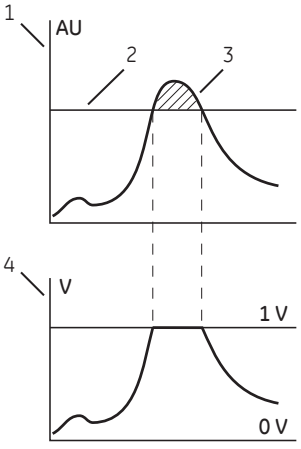
Step	Action	Display
2	Select menu ***Set Range***, press **OK**. The range is the full scale absorbance for the chart recorder (1 V).	Set Range (2.000AUFS)
3	Use the **arrow** keys to set the absorption range for recorder output in AUFS, press **OK**. Only fixed steps between 5.0 AUFS and 0.001 AUFS can be set.	Set Range (0.050AUFS) <0.050>
4	Select menu ***Set Zero Level***, press **OK**. The zero level is where on the paper the 0 AU value will be positioned. Values 0-99.	Set Zero Level (10%)
5	Use the **arrow** keys to set the value and press **OK**.	

Automatic overrange

The instrument has an automatic overrange function. If the monitor signal reaches the full scale value on the recorder, the signal will instantly drop to 0 V and give an accurate display of the peak starting from this position. When the function is disabled, the signal does not drop to 0 V when reaching maximum but is instead clipped and hold at the maximum (see illustration below). The overrange is managed in the same way when the signal reaches the minimum.



a) Automatic overrange enabled



b) Automatic overrange disabled

Part	Function
1	Measured absorbance level (absorbance units)
2	Maximum range (absorbance units)
3	Overrange
4	Signal to recorder (V)

The automatic overrange can be disabled/enabled in the ***Setup*** menu.

Step	Action	Display
1	Select menu ***Automatic Overrange***, press **OK**.	Automatic Overrange (no)
2	Use the arrow keys to select ***Yes*** or ***No***, then press **OK**.	Automatic Overrange Yes No

Event mark

Event marks can be set, for example when the sample is injected, and are displayed as spikes on the chart recorder. The spikes are 10% of the full scale of the chart recorder which corresponds to 0.1 V.

Press **event mark** key to insert an event mark.

Setting averaging time (filtering noise)

To filter the noise in the UV-signal, a moving average filter is used. The averaging time is the time interval used for calculating the moving average of the absorbance signal. A long averaging time will smooth out noise efficiently, but it will also distort the peaks. Peaks narrower than the minimum peak width value may be distorted. Because of this the averaging time should be as short as possible, see the table below. On delivery the averaging time is set to 2.56 s.

Step	Action	Display
1	Select menu ***Set Averaging Time***, press **OK**.	Set Averaging Time (2.56s)

Step	Action	Display
2	Use the arrow keys to set the value. Use the fixed values between 5.12 seconds and 0.08 seconds.	Set Averaging Time (2.56s) <2.56>

Averaging time (s)	Time constant (s) (approximate)	Min. peak width at half height (s)
5.12	2.0	32
2.56	1.0	16
1.28	0.5	8.0
0.64	0.2	3.2
0.32	0.1	1.6
0.16	0.05	0.8
0.08	0.03	0.5

Setting cell serial number, cell type and cell path length

It is possible to store cell data in the instrument for up to five different cells. The data is uniquely defined by each cells serial number.

Step	Action	Display
1	Select menu ***Set Cell Serial Number***, press **OK**.	
2	Enter the serial number of the cell (see the label on the flow cell). Press **OK**. The serial number must be 1000 or higher.	Set Cell Serial Number (123456) 000000
3	Select menu ***Set Cell Type***. Check the cell type value. If the value is correct, use the **arrow** keys to go to next menu. If the value has to be changed, press **OK** to change it.	Set Cell Type (2mm) <2>
4	Select menu ***Set Cell Path Length***, press **OK**.	Set Cell Path Length (----mm) 02.10

Step	Action	Display
5	Enter the calibrated value of the cell path length if available, press OK. The cell type must always be set before the calibrated cell path length.	

Setting run and end timers

Step	Action	Display
1	Select menu ***RunTimer End Timer,***, press **OK**.	
2	Set run time, press **OK** to select action. Choose the ***Run*** mode time 1 minutes to 999 minutes. Timer is disabled if set to 0. If timer is enabled by **OK**, the remaining minutes to run are shown.	 
3	Set end time, press **OK** to select action. Choose the ***End*** mode time 1 minutes to 999 minutes. Timer is disabled if set to 0. If timer is enabled by **OK**, the remaining minutes to run are shown.	 
4	Press **Esc** key to return to the ***RunTimer End Timer*** menu which now shows the countdown time and end time.	

Setting unit number

For service use only.

5.9 Check menu

Autozero

The instruments internal absorbance value for autozero can be checked to test the consistency in buffers.

Step	Action	Display
1	Select menu ***Check***, press **OK**.	
2	Select menu ***Autozero***. The autozero absorbance value is shown.	

Flow cell (checking flow cell type and number)

This menu shows the type and serial number of the flow cell stored in the monitor.

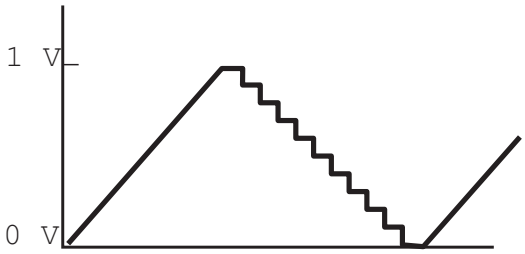
Step	Action	Display
1	Select menu ***Check***, press **OK**.	
2	Select menu ***Flow Cell***. If serial number is not set, ----- is shown. The serial value is shown number must be 1000 or higher.	

Check analog output

The function of the connected chart recorder can be tested.

Step	Action	Display
1	Select menu ***Check***, press **OK**.	
2	Select menu ***Check Analog Out***, press **OK**.	

Step	Action	Display
3	Start the test, press **OK**. The test will ramp the channel up to 1 V and then decrease the signal in 10% steps back to 0 V. The test is run continuously. Compare the diagram of the chart recorder with the image below.	Check Analog Out Testing
4	Stop the test by pressing **Esc**.	



Light intensity

This menu shows the voltages generated at the light detectors. These voltages are proportional to the light intensities in each channel. The R-value gives an indication of the condition of the lamp, filter and optical fibers.

Step	Action	Display
1	Select menu ***Check***, press **OK**.	
2	Select menu ***Light Intensity***. If the R-value is < 750 mV, check filter used time. Change filter if the used time is > 2500 hours. If the R-value still is < 750 mV after replacing filter, contact GE.	Light Intensity R=1150mV S=1800mV

Filter used time

This menu shows how many hours the filter has been used, i.e. the time in running mode. There is one time counter for each filter wavelength.

Step	Action	Display
1	Select menu ***Check***, press **OK**.	

Step	Action	Display
2	Select menu ***Filter Used Time***. If the filter used time is > 2500 hours, it is recommended to change the filter.	Filter Used Time 024h

Lamp used time

Step	Action	Display
1	Select menu ***Check***, press **OK**.	
2	Select menu ***Filter Used Time***, press **OK**.	Filter Used Time 024h
3	If the lamp used time is > 4000 hours, contact GE for lamp replacement.	Check Analog Out Testing
4	Stop the test by pressing **Esc**.	

Software version

Step	Action	Display
1	Select menu ***Check***, press **OK**.	
2	Select menu ***Software version***.	Software Version V1.00.00

5.10 UV cell calibration

For exact measurements of the nominal flow cell path length, the path length in the UV flow cell can be calibrated. This is not necessary for standard operations.

Call GE for advice.

5.11 Changing flow cell

The flow cell can be changed when required, for example from 2 mm to 10 mm when the sensitivity of the measurement must change due to a small amount of sample being applied, or from a 10 mm to 2 mm when a lower sensitivity is desired, due to output signal limitation. See *Section 4.5 Installing the flow cells, on page 26*. Data for up to five flow cells are saved in memory in Monitor UVis-920.

5.12 Restart after power failure

If the power supply to the instrument is interrupted, the instrument automatically restarts itself and displays the main operating menu. All set values are retained in the instrument but the instrument starts with the lamp switched off (standby).

6 Maintenance

Monitor UVis-920 does not require any periodic maintenance.

About this chapter

This chapter provides required information to enable users and service personnel to clean and maintain Monitor UVis-920. The instrument contains no internal user replaceable parts.

Precautions

WARNING

Before attempting to perform any of the procedures described in this chapter, you must read and understand all contents of the Safety instructions chapter.

In this chapter

This chapter contains the following sections:

WARNING

Use only approved parts. Only spare parts and accessories that are approved or supplied by GE may be used for maintaining or servicing the product.

NOTICE

The mains power to Monitor UVis-920 must be switched off before connecting the instrument to any cells or external equipment.

6.1 Cleaning before planned service

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 8.2 Health and Safety Declaration Form, on page 66* or print it from the PDF file available on the User Documentation CD.

6.2 Cleaning the instrument housing

Step	Action
1	Wipe the instrument housing regularly with a damp cloth. Do not allow spilled liquid to dry on the instrument.
2	Remove dirt from the surface using a cloth and a mild cleaning agent.
3	Let the instrument dry completely before using it.

6.3 Cleaning the flow cell and optical connectors

A clean flow cell and optical connectors are essential for ensuring the correct operation of the UV-monitor.

WARNING

Hazardous chemicals or biological agents. When using hazardous chemicals or biological agents, make sure that the entire system has been flushed thoroughly with bacteriostatic solution (e.g., NaOH) and distilled water before service and maintenance.

CAUTION

Hazardous chemicals or biological agents in UV flow cell. Make sure that the entire flow cell has been flushed thoroughly with bacteriostatic solution (e.g., NaOH) and distilled water, before service and maintenance.

NOTICE

Keep UV flow cell clean. Do not allow solutions containing dissolved salts, proteins or other solid solutes to dry out in the flow cell. Do not allow particles to enter the flow cell, as damage to the flow cell may occur.

Cleaning the flow cell

Step	Action
1	Connect a syringe to the inlet of the flow cell and squirt distilled water through the cell in small amounts. Then fill the syringe with a 10% surface active detergent solution like Decon™ 90, Deconex™ 11, RBS™ 25 or equivalent, and squirt five times.
2	After five squirts, leave the detergent solution in the flow cell for at least 20 minutes.
3	Pump the remaining detergent solution through the flow cell.
4	Rinse the syringe and flush the cell with distilled water (10 ml).

Cleaning the optical fiber connectors

When required, wipe the optical fiber connectors with 30% isopropanol on lens paper.

6.4 Storage

NOTICE

Keep UV flow cell clean. Do not allow solutions containing dissolved salts, proteins or other solid solutes to dry out in the flow cell. Do not allow particles to enter the flow cell, as damage to the flow cell may occur.

Overnight

The flow cell can be left filled with buffer.

Weekend and long term storage

Flush the flow cell with distilled water and then fill it with 20% ethanol.

The flow cell can also be stored dry by flushing as above with distilled water and then blowing a compressed inert gas such as nitrogen (N_2) through the cell. Replace the protective caps. Never use compressed air as this may contain droplets of oil.

7 Troubleshooting

About this chapter

This chapter provides information required to enable users and service personnel to identify and correct problems that may occur when operating Monitor UVis-920.

If the suggested actions in this guide do not solve the problem, or if the problem is not covered by this guide, contact your GE representative for advice.

Precautions

WARNING

Before attempting to perform any of the procedures described in this chapter, you must read and understand all contents of the Safety instructions chapter.

WARNING

Hazardous chemicals or biological agents. When using hazardous chemicals or biological agents, make sure that the entire system has been flushed thoroughly with bacteriostatic solution (e.g., NaOH) and distilled water before service and maintenance.

WARNING

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

CAUTION

Hazardous chemicals or biological agents in UV flow cell. Make sure that the entire flow cell has been flushed thoroughly with bacteriostatic solution (e.g., NaOH) and distilled water, before service and maintenance.

7.1 General

When contacting GE for support, state the program version of the instrument, which is shown in the check menu. See *Software version, on page 52*

7.2 Faults and actions

If the suggested actions do not correct the fault, call GE.

Fault	Possible cause	Corrective action
No text on the display	No power to the monitor	Check that the mains cable is connected and the **mains** switch is in ON-position **(I)**
Noisy UV-signal, signal drift or instability	The buffer may be impure	Check with water if the signal is still noisy
	There may be air in the flow cell	If there is a lot of air in the water, degas the buffer continuously (we recommend helium sparging). Check the connections of the UV cell optical fibers.
	Dirt in the flow cell or fiber connectors	Clean the UV cell, see *Cleaning the flow cell, on page 56*
Ghost peaks	Air in the eluents	Degas if necessary (we recommend helium sparging)
	Dirt or residues in the flow path from previous runs	Clean the flow cell and flow path
	Residues in the column from previous runs	Clean the column in accordance with the column instructions
Error in external chart recorder	The recorder not properly set up	Check the chart recorder in accordance with its manual
	Monitor UVis-920 not properly set up	Test the recorder function by selecting recorder test according to *Check analog output, on page 50*

7.3 Error messages

If the suggested actions do not correct the fault, call GE.

Message	Description/Action
Cell/fiber fail	Check the connections of the UV cell optical fibers.
	Check the liquid.
	Ensure that there are no air bubbles in the system.
	Clean the UV cell, see *Cleaning the flow cell, on page 56*.
No filter inserted	Insert a wavelength filter unit in the UV monitor.
No filter in holder?	Check that there is a filter in the filter holder.
Filter clogged?	Check the filter for obvious obstacles restraining the light.
Internal error	Call GE.
Low transmission	The transmission in the flow cell is too low due to air bubbles or too high absorption in the buffer. Flush cell and/or change buffer.
Low light intensity	See *Light intensity, on page 51*.
Serial no not valid	Serial number entered from display is not valid. Enter a correct serial number. Must be 1000 or higher.
Error 100	The UV-signal is not stable during calibration. See *Section 7.2 Faults and actions, on page 59* for corrective actions.
Error 250	Undefined error. 1 Switch off the instrument. 2 Switch on the instrument. 3 If the error display remains call GE.

8 Reference information

About this chapter

This chapter provides technical reference information and a list of spare parts and accessories for Monitor UVis-920.

In this chapter

This chapter contains the following sections:

8.1 Technical specifications

Operating data

Wavelength range	200-700 nm, changeable wavelength filter units
Filter center wavelength accuracy	±2 nm
Filter bandwidth	< 10 nm
Linearity	< 5% deviation up to 2 AU at 280 nm with ferric sulphate in 0.1 M sulphuric acid
Short term noise (0.5–1 min) [1 2]	< $2x10^{-4}$ AU at 280 nm
Long term noise (1–10 min) [1, 2]	< $2x10^{-4}$ AU at 280 nm
Drift [2]	< $2x10^{-4}$ AU/h at 280 nm

Environment	4°C to 40°C 20%–95% relative humidity (noncondensing) 84–106 kPa (840-1060 mbar) atmospheric pressure
Noise emission	< 70 dB A

1 Measured with water at 1 ml/min, time constant 1 second, 10 mm flow cell.

2 Typical values at room temperature after 2 hours with lamp on.

Physical data

Light source	Xenon flash lamp
Lamp lifetime	> 4000 hours
Control	Stand alone or via Remote connector
Power consumption	35 VA
Power requirement	100–240 V AC ±10%, 50/60 Hz
Analog output	0–1 V full scale, overrange function
Digital inputs	5 V, 1 mA current sinking, lamp on/off, autozero, event mark
Display	2 rows with 20 characters each
Dimensions (H x W x D)	200 x 160 x 262 mm without cell holder 200 x 300 x 262 mm with cell holder
Weight	5.1 kg
Degree of protection	IP 20
Noise emission	< 70 dB A

UV flow cell, 2 and 10 mm

Recommended maximum flow rate	100 ml/min
Maximum pressure	2 MPa (20 bar, 290 psi)
Backpressure	Maximum 0.5 bar at 2 ml/min with water at 25°C

Liquid temperature range	4°C to 40°C
Optical path length, 2 mm cell	2 mm
Optical path length, 10 mm cell	10 mm
Cell volume, 2 mm cell	2 µL
Cell volume, 10 mm cell	8 µL
Wetted materials	PTFE (polytetrafluoroethylene) PEEK (polyetheretherketone) Titanium (palladium alloy) Quartz (synthetic fused silica)
pH stability range	1–13, 13–14 (< 1 days exposure)
Chemical resistance	The wetted parts are resistant to organic solvents and salt buffers commonly used in chromatography of biomolecules, except 100% ethyl acetate, 100% hexane, and 100% tetrahydrofuran (THF) or 15% THF in acetonitrile
Tubing connections	UNF 10-32 fingertight connectors for tubing with 1/16" outer diameter

UV Flow Cell ÄKTApilot 1/2/5 mm

Recommended maximum flow rate	800 ml/min
Maximum pressure	2 MPa (20 bar, 290 psi)
Backpressure	Max. 0.05 bar at 400 ml/min with water at 25°C
Liquid temperature range	4°C to 40°C
Optical path length	1, 2 and 5 mm
Cell volume	300 µL
Wetted materials	PEEK (polyetheretherketone) Titanium (palladium alloy) FFKM (perflorelastoner) or EPDM Quartz (synthetic fused silica)
pH stability range	1–13, 13–14 (< 1 days exposure)

Chemical resistance	The wetted parts are resistant to organic solvents and salt buffers commonly used in chromatography of biomolecules, except 100% ethyl acetate, 100% hexane, and 100% tetrahydrofuran (THF)
Tubing connections	5/16"

Industrial flow cell 8 mm

Recommended maximum flow rate	*
Maximum pressure	2 MPa (20 bar, 290 psi up to 40°C
Backpressure	Max. 0.1 bar at 1800 l/h with water at 25°C
Liquid temperature range	4°C to 80°C (at max 0.1 MPa)
Optical path length	1, 2 and 5 mm
Cell volume	2.5 ml
Wetted materials	PEEK (polyetheretherketone) Titanium (palladium alloy) Quartz (synthetic fused silica) PFR-91 or EPDM
pH stability range	1–13, 13–14 (< 1 days exposure)
Chemical resistance	The wetted parts are resistant to organic solvents and salt buffers commonly used in chromatography of biomolecules, except 100% ethyl acetate, 100% hexane, and 100% tetrahydrofuran (THF) or 15% THF in acetonitrile
Tubing connections	TC25 connector

Industrial flow cell 1"

Recommended maximum flow rate	*
Maximum pressure	1 MPa (10 bar, 145 psi) up to 40°C
Backpressure	Max. 0.4 bar at 600 l/h with water at 25°C.

Liquid temperature range	4°C to 80°C (at max 0.1 MPa)
Optical path length	1, 2 and 5 mm
Cell volume	12 ml
Wetted materials	PEEK (polyetheretherketone) Titanium (palladium alloy) PFR-91 or EPDM
pH stability range	1–13, 1–14 (<1 days exposure)
Chemical resistance	The wetted parts are resistant to organic solvents and salt buffers commonly used in chromatography of biomolecules, except 100% ethyl acetate, 100% hexane, and 100% tetrahydrofuran (THF) or 15% THF in acetonitrile
Tubing connections	TC50 connector

8.2 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:			

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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.

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8.3 Accessories and spare parts

UV monitor

Item	Quantity per pack	Code no.
Monitor UVis-920 complete without flow cell and without filter	1	11000754

Flow cells

Item	Quantity per pack	Code no.
UV Flow Cell 2 mm , including optical fibres	1	18111110
UV Flow Cell 10 mm , including optical fibres	1	18111111
UV Flow Cell ÄKTApilot 1/2/5 , including optical fibres	1	11000850
Industrial Flow Cell 8 mm	1	18113456
UV Flow Cell 1" PEEK FPM/FKM	1	28959578
Industrial flow cell short optical fibre Kit (20 cm)	1	18113485
Industrial flow cell short optical fibre Kit (50 cm)	1	18113486

Filter units

Item	Quantity per pack	Code no.
215 nm	1	11000733
260 nm	1	11000734
280 nm	1	11000735
405 nm	1	11000736
Empty filter holder for custom filter	1	11000738

Signal cables

Item	Quantity per pack	Code no.
Signal cable for recorder. Length 1.5 m	1	18111064

Tubing and connectors

Item	Quantity per pack	Code no.
O-ring kit UV flow cell (8 mm) FPM/FKM	1	28969705
O-ring kit IC, EPDM (for flow cell 8 mm)	1	18113488
FEP tubing, i.d. 1/8", o.d. 3/16"	3 m	18111247
Tubing connector for 3/16" o.d. tubing	10	18111249
Ferrule for 3/16" tubing	10	18111248
Stop plug, 5/16"	5	18111250
Stop plug, 1/16"	5	18111252
Union Luer female/ 1/16" male	2	18111251
Union 1/16" female/ M6 male	6	18111257
Union M6 female/ 1/16" male	8	18111258
Union 1/16" male/ 1/16" male, i.d. 0.25 mm	2	18112092
Union 1/16" male/ 1/16" male, i.d. 0.50 mm	2	18112093
PEEK tubing, i.d. 0.15 mm, o.d. 1/16"	2 m	18115659
PEEK tubing, i.d. 0.25 mm, o.d. 1/16"	2 m	18112095
PEEK tubing, i.d. 0.50 mm, o.d. 1/16"	2 m	18111368
PEEK tubing, i.d. 0.75 mm, o.d. 1/16"	2 m	18111253
PEEK tubing, i.d. 1.0 mm, o.d. 1/16"	2 m	18111583
ETFE tubing, i.d. 0.25 mm, o.d. 1/16"	2 m	18112136
ETFE tubing, i.d. 0.75 mm, o.d. 1/16"	2 m	18111254
Fingertight connector 1/16"	10	18111255

Tools

Item	Quantity per pack	Code no.
Fiber detachment tool	1	18111116

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

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