

Monitor UV-M II



Important user information

Reading this entire manual is recommended for full understanding of the use of this product.



The exclamation mark within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance instructions in the literature accompanying the instrument.

Should you have any comments on this manual, we will be pleased to receive them at:

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1. Introduction

The GE Healthcare Monitor UV-M II (Control Unit, Code No. 18-1001-10, Hg Optics with 254 and 280 nm filters, Code No. 18-0604-02 or Zn Optics with 214 nm filter, Code No. 18-0605-02) is a fixed wavelength monitor for liquid chromatography. The UV-M II consists of a control module and a small optical unit which makes it easy to place it optimally in the system. State of the art electronics and high precision optics offer flexibility and accuracy in UV-M II detection. The UV-M II is ideal for all types of liquid chromatography, primarily FPLC™ and HPLC.

The Optical Unit has interchangeable mercury and zinc lamps, an analytical, high precision double cone (5 mm path length) or a preparative, straight (2 mm path length) flow cell. The double cone shape of the analytical cell minimizes the collisions between light beams and cell wall and maximizes the illuminated volume, i.e. it gives an increased sensitivity. Easy selection of different filters means there is good choice for diverse application needs. This unit may be connected directly to any chromatography column, thus minimizing the dead volume between the column and the monitor.

The Control Unit has touch panel design and solid state electronics. Functions such as autozero and event mark can be executed from a remote source.

2. General Description

2.1 Principle of operation

The UV-M II Optical Unit houses the lamp (Hg or Zn), the wavelength filter and the flow cell. The light beam is directed through a conical or straight flow-through cuvette (6 μ l or 2 μ l illuminated volume), to a photo detector. The photo detector current is passed to the signal processing circuitry in the Control Unit (Fig. 1).

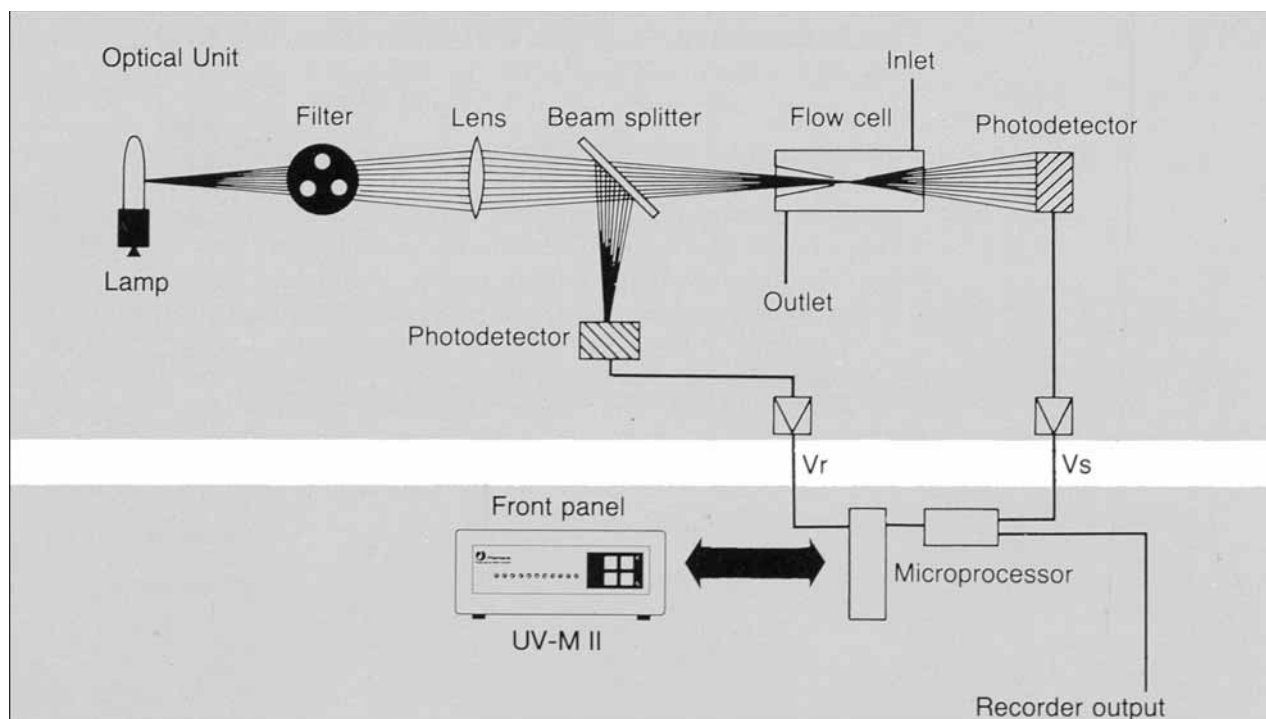


Fig. 1. The operation principle of the Monitor UV-M II

The reference signal comes from the same point in the lamp as the signal measuring the sample, thus assuring a stable baseline by negating the effects of variations in lamp intensity.

The Hg lamp emits light only at some certain wavelengths, it does not emit light at 280 nm, so for this wavelength the light is converted at a fluorescent surface before it passes the filter. On the lamp housing there is special exit for the 280 nm light, which necessitates a change in lamp position when working at this wavelength.

2.2 Control Unit

Front panel

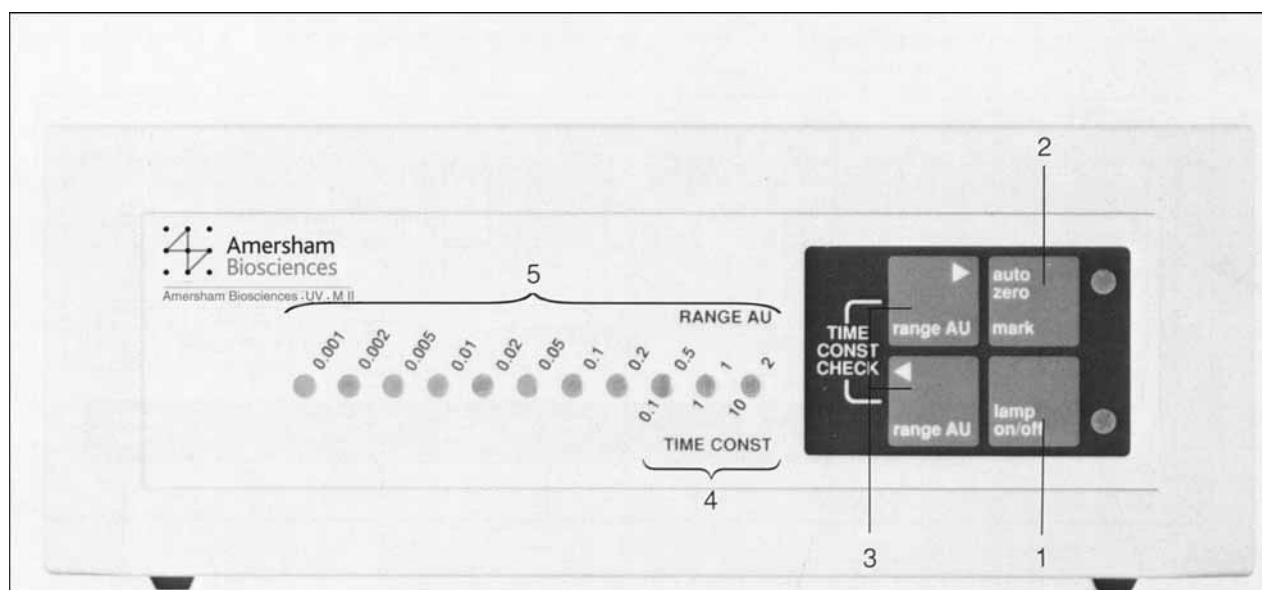


Fig. 2. Control Unit Front panel

No.	Item	Description
1	lamp on/off Key with indicator lamp	1. Switches lamp on/off 2. Indicates the lamp power function 3. Indicates if lamp is connected
2	autozero/mark Key with indicator lamp	1. Autozero when depressed at least 2 s 2. Base line adjustment when used together with the range AU keys 3. Event mark (10% deflection)
3	range AU/TIME CONST CHECK keys	1. Select range values 0.001-2 AUFS a range AU to select from 2 to 0.001 AUFS or b range AU to select from 0.001 to 2 2. Verify the Time constant (seconds) by pressing both keys, which causes the LED above the set value to flash
4	TIME CONST	The LED above the set value flashes when pressing both range AU keys
5	range AU	LED showing sensitivity range

Rear panel

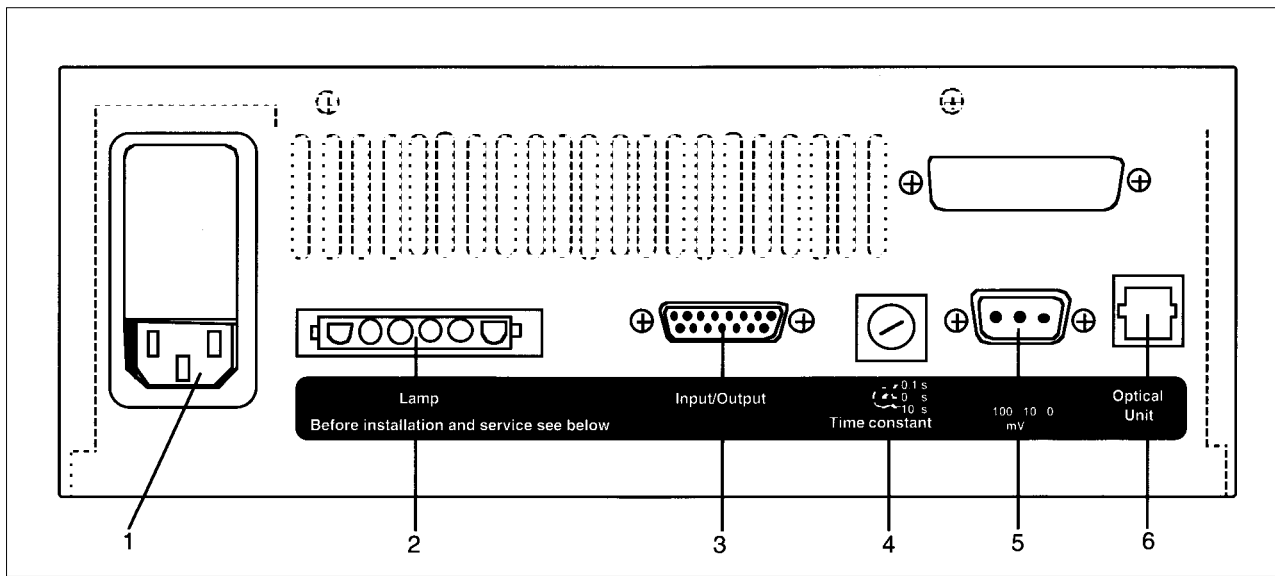


Fig. 3. Control Unit Rear panel



No.	Item	Description
1	Mains inlet with voltage selector and fuse holder	Socket for mains cable. Selects mains voltage 100, 120, 220-230 or 240 V Mains fuses: 1 x 400 mA for 100/120 V 60 Hz 1 x 200 mA for 220-230/240 V 50 Hz
2	Lamp	Inlet for the lamp cable Warning: Disconnect the lamp cable only with the lamp turned off
3	Input/Output	A 15 pin D-SUB connector for external control of event mark and autozero and for signal output
4	Time constant	Sets time constant to 0.1, 1.0 or 10 s
5	Signal output	The output signal is a 10 or 100 mV DC signal. The monitor is connected to a recorder via the 3-pole connector supplied (100 or 10 mV to plus, 0 to minus)
6	Optical Unit	Inlet for the Optical Unit signal cable

Underside

Precautionary instructions are fixed to the underside of the Monitor UV-M II Control Unit. Read them before using or servicing your UV-M II.

2.3 Optical Unit

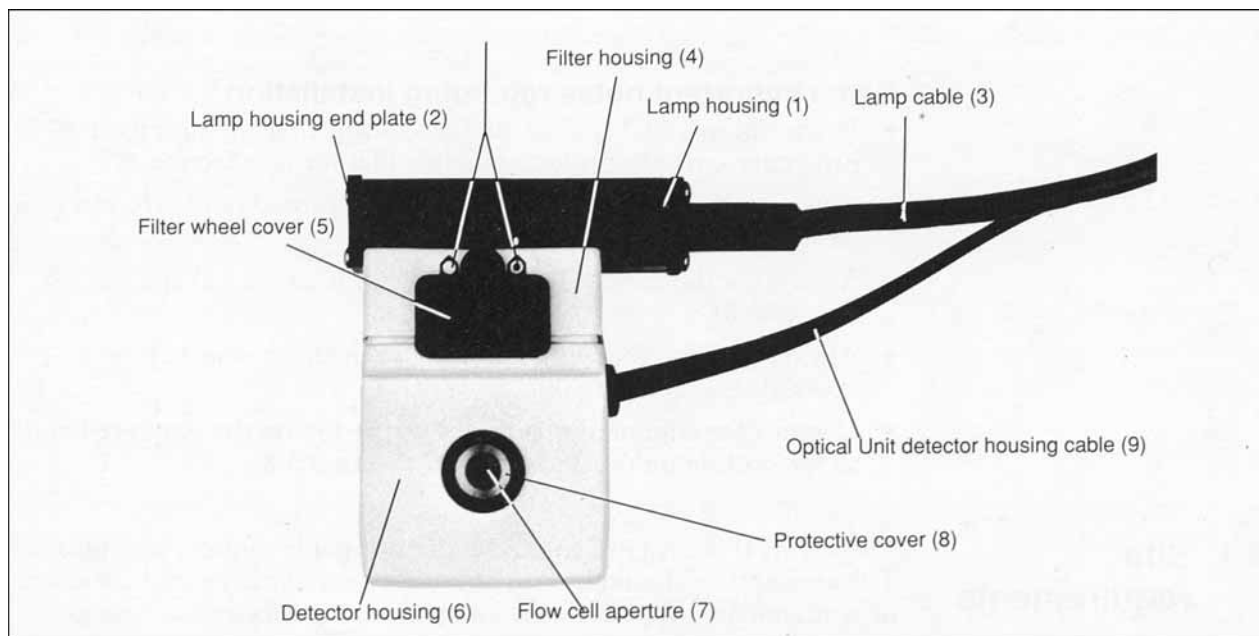


Fig. 4. Optical Unit

No.	Item	Description
1	Lamp housing	Consists of a black heat distributor, the lamp and the lamp cable. Two lamps, Zn and Hg, are available (the Zn lamp housing is the larger). The Hg lamp housing slides to two positions relative to the filter housing, d for detection at 280 nm, e for the other wavelengths
2	Lamp housing end plate	Loosen to exchange lamp
3	Lamp cable	Connects to the Control Unit
4	Filter housing	Contains the filters. Four screws fix the filter housing to the detector housing
5	Filter wheel cover	A black plastic cover that gives access to the filter wheel with the filters. The filter wheel rotates with a click to three positions, each placing a different filter in the light path
6	Detector housing	Contains the flow cell and the photo detector
7	Flow cell	Fits into the top of the detector housing, being firmly held into place by the locking nut on the underside
8	Protective cover	A protective cover around the flow cell inlet/outlet protects the Optical Unit from liquid coming in contact with the electronics
9	Signal cable	Connects to the Control Unit

3. Installation

Some important notes regarding installation

- Be careful to avoid spillage on the Optical Unit. Always use the protective cover to prolong monitor lifetime (see Section 3.7).
- Always make sure that the locking nut is turned to the stop to avoid base-line drift (see Section 3.7).
- Always use the correct Tubing connector to avoid leakage (see Section 3.8).
- Always position the Optical Unit with the filter wheel cover upwards (see Section 3.8).
- Connect the column outlet tubing to the top on the 5 mm cell and to the bottom on the 2 mm cell (see Section 3.8).

3.1 Site requirements

The UV-M II is designed for use under normal laboratory conditions. The atmosphere should be free of both excess humidity and corrosive or contaminated vapours which may form deposits on the optical surfaces.

To minimize drift, the temperature should be kept constant. The Optical Unit should be placed away from draught, heat and direct sunlight or any other influence which may cause large temperature variations.

The UV-M II may be operated at ambient temperatures in the range 4–40 °C.

The power consumption of the monitor is 25 VA.

3.2 Unpacking

Note: It is important that the filters, flow cells and lamps are not handled during unpacking. For protection of these items they should remain in their packing materials until required for use.

For a complete monitor you need one Control Unit, one Hg optics or one Zn optics with filter(s) and one flow cell.

Carefully unpack the Monitor UV-M II. Check the contents against the packing list supplied. Inspect for any damage that may have occurred during transit. Report any damage immediately to the local GE Healthcare representative and to the transport company concerned. Save the packing material for possible future transport.

3.3 Choice of horizontal or vertical position

The Monitor UV-M II can be used horizontally or vertically. Carefully or attach the correct front panel:

1. Remove the protective film from the keyboard on the front of the instrument.
2. Remove the protective film from the back of the front panel.
3. Position the front panel onto the front of the Control Unit (see Fig. 2). Ensure that the touch panel keyboard on the front panel fits onto the instrument keyboard.

4. Attach the rubber feet accordingly.

If the UV-M II is to be used in FPLC System, choose the horizontal front panel and place the feet so that the monitor fits on top of the P-500 pumps.

3.4 Mains installation

Tools needed: Screwdriver

Before connecting this instrument to the mains supply for the first time, please read these instructions.

1. The Control Unit is supplied with mains cables and fuse kits for both 100 - 120 V and 220 - 240 V operation. Choose the 400 mA fuse kit for 100 - 120 V operation and the 200 mA for 220 - 240 V. Discard the unwanted fuse kit and mains cable immediately.
2. Remove the yellow warning label covering the fuse/voltage selector unit on the rear panel.
3. Open the fuse/voltage selector cover with a thin screwdriver (Fig. 5).

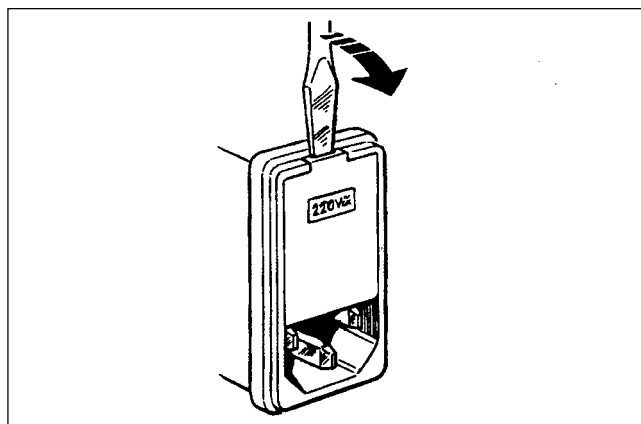


Fig. 5. Opening the fuse/voltage selector cover. Insert the screwdriver at the top centre and apply pressure according to the figure.

4. Install the correct fuse holder and fuse into the right-hand position (Fig. 6).

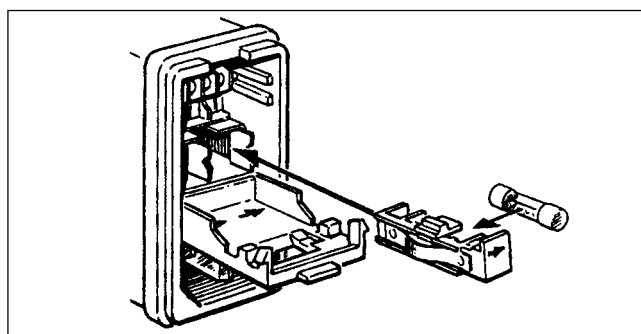
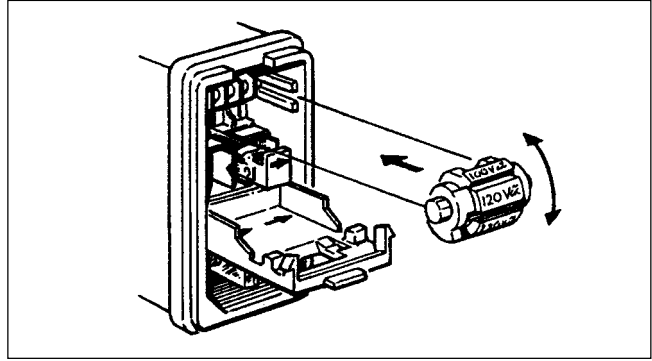


Fig. 6. Installing the fuse holder. Always use the hole at the righthand side when you install the fuse holder

5. Remove the rotary voltage switch and replace it with the correct voltage showing (Fig. 7).

Fig. 7. Choose the correct voltage by turning the voltage selector



3.5 Filter installation

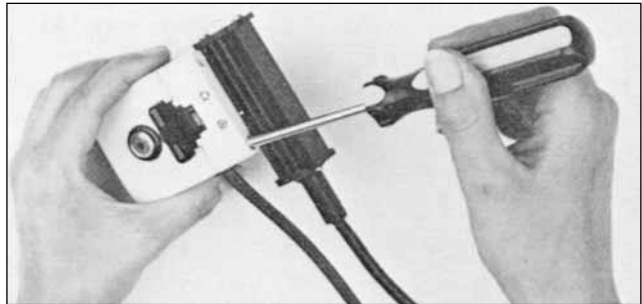
6. Close the cover. The correct voltage should be visible through the window.
7. Connect the instrument to a grounded mains outlet.

Tools needed: Screwdriver
Philips screwdriver

The Hg optics with 254 and 280 nm filters and the Zn optics with 214 nm filter are delivered with the filters installed. If other filters are to be used, install new filters.

1. If the Zn lamp is attached, remove the lamp housing first (see Section 3.6).
2. Remove the four screws in the filter housing. Separate the filter housing from the detector housing (Fig. 8 a).

Fig. 8 a. Removing the filter housing



3. Carefully remove the filter wheel from the filter housing (Fig. 8b).

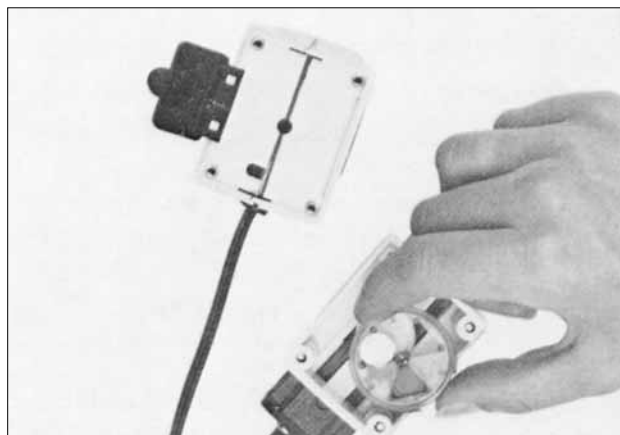


Fig. 8 b. Filter wheel in filter housing

4. If necessary, remove filter(s) from the filter wheel by pressing it/ them out, e.g. with a small screwdriver (Fig. 8 c). Filters are sensitive optical components. Never touch these optical surfaces or expose them to temperatures above 60 °C. Clean them with dry lens cleaning tissue and store them, when not in use, in the container in which they were supplied. Heavy contamination may be removed by using a lens tissue dipped in ethanol.

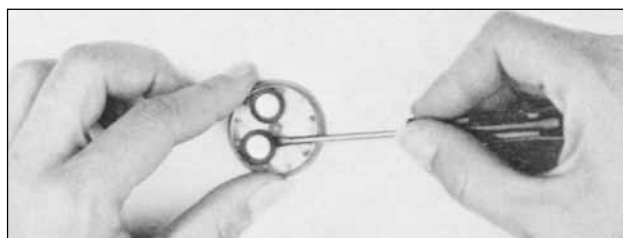


Fig. 8 c. Removal of filter from wheel

5. Place the filter(s) of choice into the filter wheel (max. 3 filters) with the correct orientation (with the mirror side facing upwards) and position over one of the three triangular apertures. The filters snap in by pressing them quite firmly. Do not touch the filter surface (Fig. 8 d).

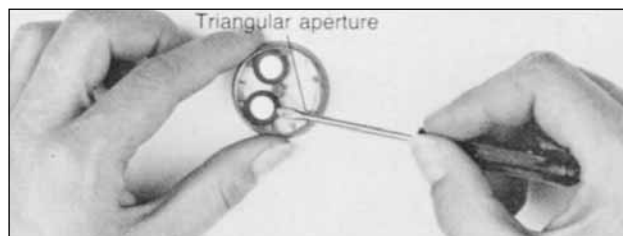
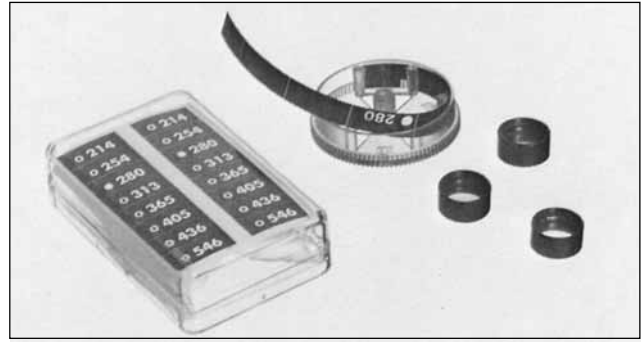


Fig. 8 d. Placement of filter in wheel

6. Remove the circular plastic band showing the wavelength(s).
7. Remove labels from the band if necessary.
8. Place the correct labels in the hand with label designation facing outwards. Ensure that the label position corresponds to the filter position, i.e. the label should be placed opposite to the filter (Fig. 8 e).

Fig. 8 e. Filter wheel accessories.



9. Reassemble the circular plastic band with the filter wheel peg fitting into the band notch (Fig. 8 e).
10. Check that all filters are clean. Place the filter wheel back into the filter housing. It can be placed only in the correct position.
11. Reassemble the filter housing to the detector housing by fastening the four screws.

3.6 Change of the lamp assembly

Tools needed: Philips screwdriver

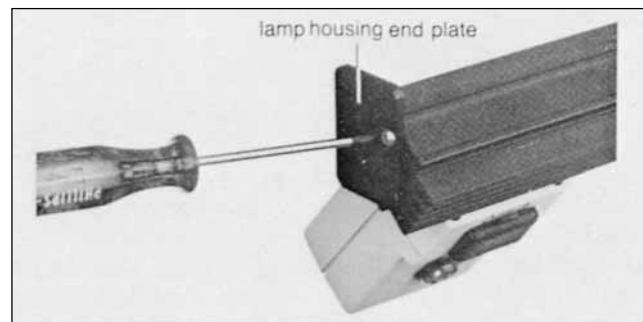


Fig. 9. Changing the lamp type

For changing a defective lamp, see Section 5.3.

Warning: Before changing a defective lamp ensure that the lamp cable is disconnected from the Control Unit to prevent injury to eyes. If the mercury lamp is broken make sure that all mercury is removed.



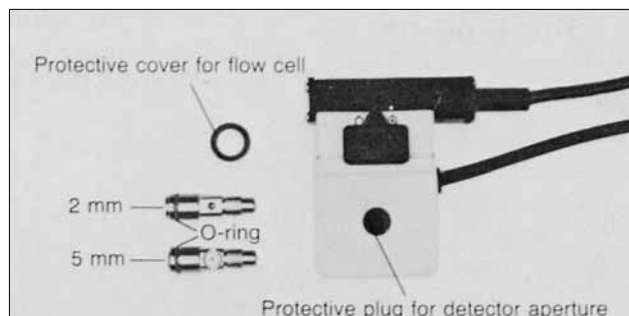
1. Detach the end plate by removing one and loosen one of the two holding screws on the lamp housing on the Optical Unit.
2. Slide the lamp housing off the filter housing.
3. Detach the end plate (as in step 1 above) from the lamp housing you are going to attach to the Optical Unit.
4. Slide the lamp housing onto the filter housing guides with the light aperture facing the filter housing. The lamp and signal cables should be on the same side. As you slide the lamp housing into position, depress the two pressure pads on the filter housing in sequence, to facilitate the installation.
5. Replace the lamp housing end plate.
6. Slide the lamp housing firmly into place. There will be a faint click when the housing is positioned correctly. The Hg lamp housing can take two positions, while the Zn lamp housing has only one position.

3.7 Flow cell installation

There is one analytical (5 mm) and one preparative (2 mm) flow cell available. Both cells are installed in the same way, as below.

1. Remove the red protective plugs from the detector housing and the flow cell (Fig. 10 a).

Fig. 10 a. Flow cell types, protective cover and protective plug



2. Place the flow cell into the detector housing from above (it is impossible to position the flow cell incorrectly) (Fig. 10 b).

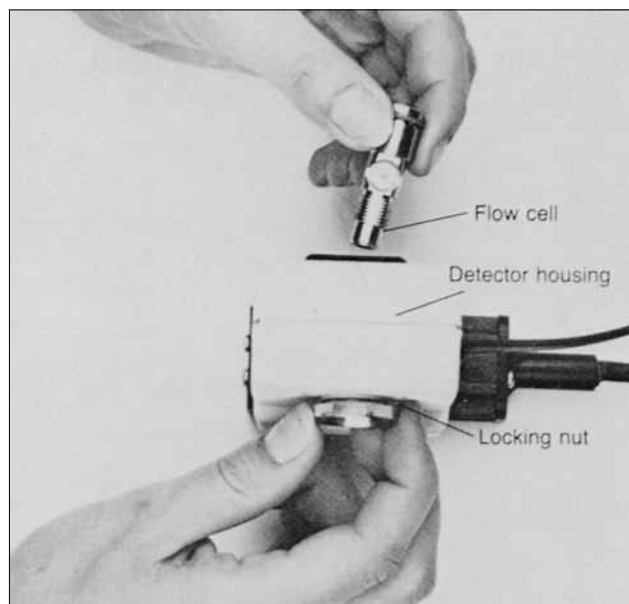


Fig. 10 b. Installation of the flow cell in the detector housing

3. Secure the flow cell by turning the locking nut until the stop (Fig. 10 b). If the locking nut is not tightened sufficiently, the monitor will function poorly (e.g. drifting base-line).
4. Place the protective cover around the flow cell (see Fig. 4) to protect the electronics inside the Optical Unit from liquid spillage. Avoid spillage as much as possible for prolonged monitor lifetime.
5. To remove the flow cell, reverse the procedure.

When the monitor is not in use, clean the cell and use the protective red plugs to cover any open holes or keep the flow cell connected. Store it dry or filled with distilled water. Never allow any solution to dry out in the cells. Never try to dry a cell with compressed air, as such air contains microscopic oil particles. If a cell has to be dried use clean nitrogen.

Liquids flowing through the cells should be free of suspended particles and degassed to prevent the formation of bubbles. Always

make sure that the cell is clean; dirt in the cell may be detected by viewing the light path with a magnifying glass. See Section 5.1 for instructions to clean the cell.

3.8 Connection to the column

If using preflanged tubing for FPLC or Standard Chromatography, drop the Tubing connector FPLC (Fig. 11 a) into the inlet of the flow cell and secure it in position by fingertightening a preflanged tubing over it. Repeat this procedure for the outlet of the flow cell.

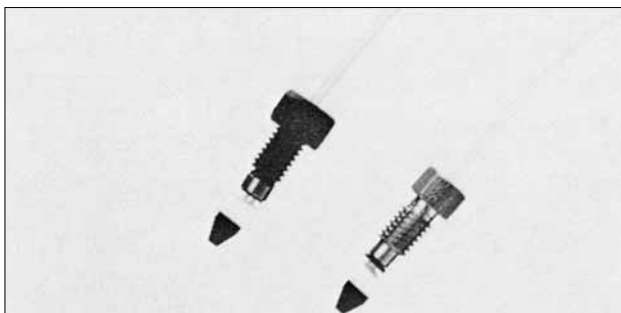


Fig. 11 a. Tubing connector, FPLC with corresponding tubing

1. Fix the Optical Unit directly under the column on the Scaffold holder.

Note: Always position the Optical Unit with the filter wheel cover facing upwards.

2. Prepare the outlet tubing from the column with the appropriate Tubing connector if unflanged (Figs. 11 b and c).

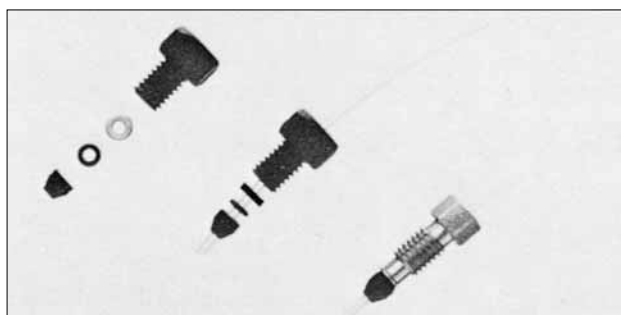


Fig. 11 b. Tubing connector, standard with corresponding tubing

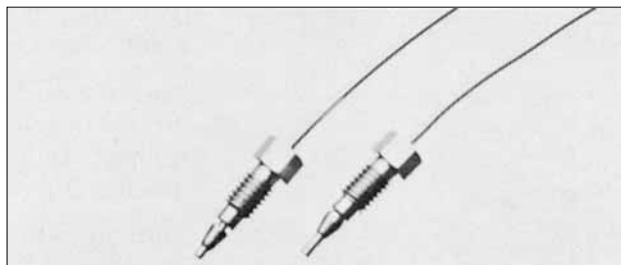


Fig. 11 c. 1/16" Ferrule PTFE, the Tubing connector for HPLC with corresponding tubing

3. Screw the column outlet tubing directly into the top of the Optical Unit for 5 mm flow cell or the bottom for 2 mm flow cell (Fig. 12). Both connections provide all upward flow direction in the cell. i.e. minimizing the risk of trapping air in the flow cell. Screw to fingertightness. Check for leakage when starting to run, and if necessary tighten the tubing further with the supplied wrench.

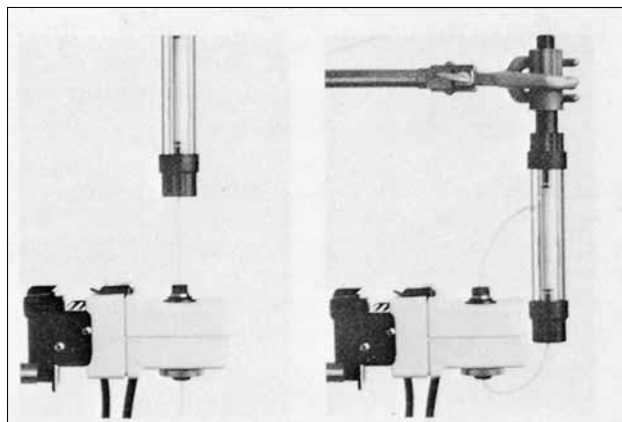


Fig. 12. Connection of the column to the two flow cells

4. Connect the Optical Unit outlet tubing into the opposite hole. Use the cone removal tool (in the Assembly kit) when removing the Tubing connector, FPLC. Screw the tool a few mm into the hole in the Tubing connector and remove the cone.

3.9 Connection of the Optical Unit to the Control Unit



The lamp cable connects into the Lamp socket on the rear of the Control Unit (see Fig. 3). To disconnect the cable, press the outer security clasps and remove the plug.

The Optical Unit signal cable plugs into the Optical Unit socket on the rear of the Control Unit (see Fig. 3). To disconnect the signal cable, lift the lower security clasp and pull the plug out.

Warning: When the lamp is on, the lamp socket carries a dangerous voltage. Do not connect/disconnect with the lamp LED on.

3.10 Connection to a recorder

Tools needed: Small screwdriver

1. Connect the supplied signal cable to the 4 pole connector provided with the Control Unit by loosening the connection screws and inserting the cable wires for the correct output voltage. Connect the positive (+) wire into the 10 mV or 100 mV terminal (choose the 100 mV if possible to minimize electrical noise), the negative (-) wire into the 0 terminal and the ground wire into the $\frac{\perp}{\perp}$ terminal.
2. Tighten the connection screws and ensure that the wires are properly connected by pulling them gently.
3. Connect the plug into the Control Unit socket. It should snap in.
4. If using the REC 111/REC 112, the supplied signal cable is connected to the recorder with the Pin connectors, banana type, supplied with the recorder.

3.11 Remote connection

Connect the Communication cable (Code No. 19-6005-02) to the remote socket marked Input/Output on the rear panel. The following functions and signals are available.

Name	Active voltage	Function	Pin
INPUTS (TTL compatible)			
Autozero	low	Zeroes the base-line	14
Event mark	low	Gives a 10% full scale spike on monitor signal	6
OUTPUTS			
1 V/AU		Monitor signal, not filtered	11
Vr		Voltage on reference diode, not filtered	9
Vs		Voltage on sample diode, not filtered	2
Autozero ready	low	Gives a signal during autozero	7
Analog ground		To be used with signal outputs	10
Digital ground		To be used with autozero and event mark signals	15
Protected ground			1

Remote Control Adaptor (Code No. 19-6008-01) is available as an accessory to provide screw-in socket connection.

3.12 Connection to a Controller

The functions autozero and event mark can be controlled from a controller like the Gradient Programmer GP-250 or GP-250 Plus or the Liquid Chromatography Controller LCC-500, LCC-500 Plus or LCC-500 CI.

Connect a Remote Control Adaptor (Code No. 19-6008-01) to the socket Input/Output. Connect one or two Signal cables (Code No. 19-6006-01) between the Remote Control Adaptor and the controller.

	Remote Control Adaptor	GP-250/ LCC-500	Function	Programming
Autozero	Pin 14 Pin 15	Output 21 Output 23	Autozero Ground	PORT.SET 8.1 to autozero and PORT.SET 8.0 approximately 0.1 min later to make the port ready for use again
Event mark	Pin 6 Pin 15	Output 22 Output 23	Event mark Ground	PORT.SET 9.1 to make an event mark and PORT.SET 9.0 approximately 0.1 min later to make the port ready for use again

With the controllers LCC-500, LCC-500 Plus and LCC-500 CI you also connect the UV-M II to the monitor input (socket MONITOR 1 or MONITOR 2). Use the signal cable (Code No. 19-6006-01) supplied or the Y-cable (Code No. 18-0577-01) and choose the 100 mV output voltage, to minimize electrical noise. Connect the positive wire (+) into the 100 mV terminal and the negative wire (-) into the 0 terminal, Connect the ground wire to either the controller or the monitor ground terminal.

4. Operation

4.1 Routine start-up

This is a short instruction on how to start up the UV-M II. You will find more detailed information in Section 4.2 to 4.9

1. Make sure that the installation procedure is properly carried out (see Section 3). The Lamp on/off LED should be lit. If not, see Section 4.3.
2. Select a wavelength by rotating the filter wheel on the Optical Unit and position the moveable lamp housing on ☐ for 280 nm or ● for all other wavelengths.
3. Allow 1 hour warm-up after a cold start. The UV-M II is warmed up when the base line is fully stable.
4. Depress auto zero/mark key until the key LED illuminates. If the LED flashes, see Section 6.
5. Zero the recorder.
6. Select the desired sensitivity range by pressing one of the range AU keys.
7. Verify the Time constant by pressing both range AU key at the same time (TIME CONST CHECK). The LED corresponding to the set Time constant will flash. Changes can be done on the rear of the Control Unit (see Section 4.7).

4.2 Choice of wavelength

1. Open the protective black plastic filter wheel cover on the Optical Unit (see fig. 4).
2. Rotate the filter wheel to the desired position. A click will indicate that the filters is in position.
3. Position the lamp housing (Hg) with the mark on the lamp housing facing the same symbol as in seen on the wavelength label, i.e. ☐ when working at 280 nm and ● when working at other wavelengths.
4. Close the filter wheel cover.

Note: It is very important that the cover is properly closed, otherwise you will get stray light into the monitor.

4.3 Lamp power

After mains power connection lamp power activation is indicated by a continuous glow the lamp on/off LED.

A flushing light indicates that the lamp power cable is not connected. Turn the monitor off, connect the cable to the Lamp socket (see Fig. 3) and depress the lamp on/off key to turn the Lamp on.

To turn the lamp off, depress the lamp on/off key for 2 seconds, until the indicator goes off. This safety feature prevents the lamp from being accidentally switched off.

- 4.4 Warm-up** From a cold start the UV-M II is fully operational after one hour warm up for the system. For stable operation at very high sensitivity, a longer warm-up time is recommended. Use the autozero if the recorder goes out of range.
- 4.5 Autozero**
1. Depress the autozero/mark key for 2 seconds until the autozero LED indicator goes on. The Control Unit now performs an autozero procedure to create a reference zero base line. This new base line will be maintained and is independent of selected range or Time constant. If the LED flashes, refer to Section 6.
 2. Zero the recorder with recorder zero control.
- Autozero can also be performed from a remote control (see Sections 3.11 and 3.12).
- 4.6 Selection of sensitivity range**
- ▶ range AU will cycle range selection from 0.001 to 2 AUFS and then jump to 0.001 to repeat the sequence.
 - ◀ range AU will cycle range from 2 to 0.001 AUFS and then jump to 2 to repeat the sequence.
- Select an alternative range by depressing one of the range AU keys.
- 4.7 Selection of Time constant**
- The Time constant in the Monitor UV-M II is factory set at 1 second. Choose the Time constant according to the peak widths in the chromatogram. The shorter Time constant, the faster response in the monitor, both for peaks and noise. Choose a higher Time constant for broader peaks than for narrower peaks.
- | Technique | Recommended Time constant |
|-------------------------|---------------------------|
| Standard Chromatography | 10 or 1 s |
| FPLC | 1 or 0.1 s |
| HPLC | 1 or 0.1 s |
- To select another setting take the following steps:
1. Insert a thin screwdriver into the Time Constant hole on the rear of the UV-M II (see Fig. 3) and turn the arrow to the appropriate setting of 0.1, 1 or 10 s.
 2. Verify the Time constant by depressing both range AU keys at the same time. The LED indicator for the corresponding TIME CONST will flash.
- 4.8 Event mark** Depression of the autozero/mark key less than 1 second activates an event mark. A spike of 10% full scale will mark the spot on your chromatogram. Event mark can also be performed from a remote control (See Section 3.1 and 3.12).
- 4.9 Base line adjustment** Depress autozero/mark and one of the range AU keys at the same time. ◀ range AU will raise the baseline level, ▶ range AU will lower it. The new base line is maintained until a new sensitivity range is selected or a new autozero procedure is performed.

5. Maintenance

5.1 Instrument

Wipe the instrument regularly with a damp cloth. Let the instrument housing dry completely before use.

5.2 Cleaning the flow cell

A clean flow cell is essential for the proper operation of the UV-M II. Ensure that the flow cell is not allowed to dry out if it contains a liquid with dissolved salts, proteins or other solutes with low volatility. Do not allow particles to enter the flow cell.

The cells may be inspected for particles and air bubbles by removing the flow cell and examining the light path through the window with a magnifying glass.

Note: It is possible to remove the flow cell without disconnecting the top tubing. Unscrew the flow cell locking nut, and slide the Optical Unit housing down from the flow cell.

If the cell contains trapped particles proceed as follows:

1. Remove the flow cell from the Optical Unit.
2. Connect a syringe to the outlet tubing and flush a clean solution of ethanol in distilled water (50% v/v) through the cell in small aliquots. Examine the cell from time to time to see that the particles have been washed out.
3. Rinse the cell with particle-free distilled water (about 20 ml) and replace it in the Optical Unit.
4. Replace the cell in the Optical Unit and reconnect the system to be monitored.

Most non-particulate contaminants e.g. denatured proteins, salts etc. can be removed by flushing the cell with the appropriate solvent followed by thorough rinsing with clean solvent. Laboratory detergents of the type used to decontaminate glassware may also be used.

Oily deposits, which increase the tendency to trap air bubbles, can be removed by rinsing the flow cell first with a non-polar solvent (e.g. hexane), then with a polar solvent (e.g. isopropanol) and finally with distilled water or with detergent.

Persistent contaminants may be removed by either of the following procedures depending on the nature of the contaminant. Warming the cleaning media up to 40 °C may improve the result.

Cleaning with detergent:

1. Remove the flow cell from the Optical Unit.
2. Fill the cell with a 10% solution of RBS 25, Deconex or equivalent, and let it stand for at least two hours
3. Rinse the cell with
 - a) distilled water (20 ml)
 - b) ethanol/distilled water (50% v/v, 20 ml)
 - c) distilled water (20 ml)
4. Replace the cell in the Optical Unit and reconnect the system to be monitored.



Cleaning with chromic acid:

Warning: Chromic acid is extremely corrosive. Be careful at handling and treat spills immediately with a large excess of water.

1. Prepare fresh chromic acid by adding concentrated sulphuric acid (100 ml) to a saturated solution of sodium dichromate (3.5 ml).
2. Remove the flow cell from the Optical Unit.
3. Connect a glass syringe to the outlet of the cell and carefully draw chromic acid into the cell. Do not draw acid into the syringe.
4. Allow the acid to remain in the cell for 10-20 minutes.
5. Eject the cleaning solution carefully without splashing and rinse the cell with
 - a) distilled water (100 ml)
 - b) ethanol/distilled water (50% v/v, 20 ml)
 - c) distilled water (20 ml)
6. Replace the cell in the Optical Unit and reconnect the system to be monitored.

5.3 Cleaning the filters

For optimal performance, it is essential that the interference filters are clean and free of any particulate material. Do not touch the interference filters. Should the filters become contaminated with dust, finger prints or oil, proceed as follows:

1. Carefully take out the filter from the housing without touching or scratching the filter surface (see Fig. 8c).
2. Use lens cleaning tissue dipped in ethanol to gently clean the filter surfaces.
3. Place the clean filter back into the filter wheel for installation or into its protective bag for storage.

5.4 Changing a defective lamp



The mercury lamp has an expected lifetime of approx. 8 000 hours, the reflective surface used for 280 nm approx. 4 000 hours and the zinc lamp approx. 2 000 hours.

Warning: Before changing a defective lamp ensure that the lamp cable is disconnected from the Control Unit to prevent injury to eyes. If the mercury lamp is broken make sure that all mercury is removed.

Warning: If the mercury lamp is accidentally broken, carefully remove all mercury and glass to prevent mercury poisoning. Follow local safety regulation when disposing of mercury waste.

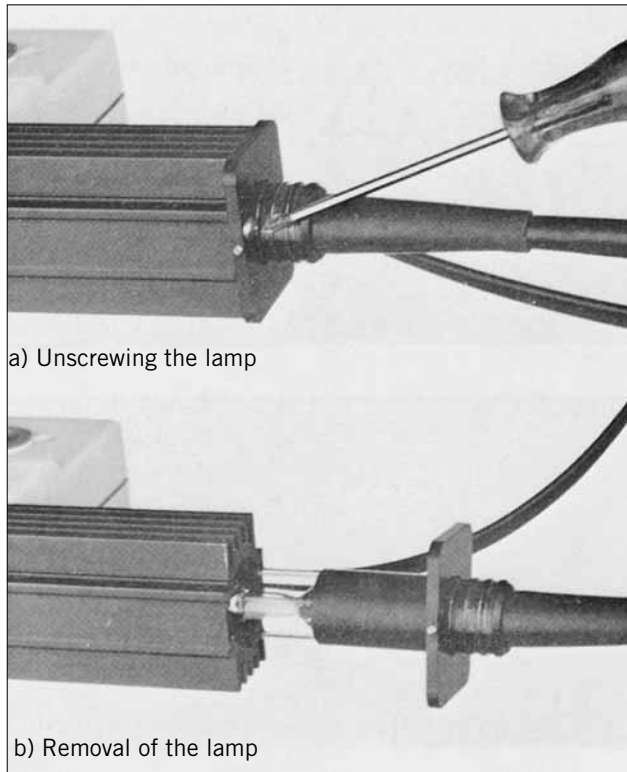


Fig. 13. Changing a defective lamp

1. Remove the two screws on the lamp housing end plate which is attached to the power cable (Fig. 13).
2. Carefully slide the lamp out of the lamp housing.
3. Insert the new lamp into the lamp housing and secure the end plate with the two screws. Do not touch the lamp.

6. Trouble shooting

The Monitor UV-M II has been designed for trouble-free use. If good chromatographic practice is followed, very little difficulty should be experienced. Clean optical surfaces are essential if low noise levels are to be maintained. The following check list is meant to be a guide in trouble shooting. If the checks in this section are executed and the UV-M II does not work properly, consult your local GE Healthcare representative.

Symptom	Cause	Remedy
Panel keys do not work	Lamp plug connected or disconnected with mains power on	Disconnect the mains cable for a short while
lamp on/off LED does not light	<ol style="list-style-type: none"> 1. Mains cable not connected 2. No voltage at wall socket 3. Fuse blown 	<p>Plug in</p> <p>Check by plugging table lamp in</p> <p>Replace fuse if fuse blows again immediately consult GE Healthcare representative</p>
lamp on/off LED flashing	<ol style="list-style-type: none"> 1. Lamp cable not connected 2. UV lamp power malfunction 	<p>Connect lamp cable</p> <p>Consult service engineer</p>
lamp on/off LED on, no recorder	<ol style="list-style-type: none"> 1. Control Unit not connected to recorder 2. Recorder not operating 3. Recorder zero not set correctly 4. Recorder range incorrect 5. Wrong filter 6. Wrong lamp 7. Faulty electronics 	<p>Connect Control Unit (make sure that the response green connector snaps in)</p> <p>Check recorder function</p> <p>Zero recorder</p> <p>Set recorder range to UV-M II output range (10 or 100 mV)</p> <p>Change to the correct filter</p> <p>Check which lamp is installed</p> <p>Contact service engineer</p>
Autozero LED flashing	<ol style="list-style-type: none"> 1. Optical Unit not connected to Control Unit 2. Flow cell not installed 3. Wrong lamp position 4. Wrong filter 5. Locking nut not properly closed 6. Dirty cell 7. Aging lamp 8. Dirty filter 	<p>Connect Optical Unit</p> <p>Install flow cell</p> <p>Check that the lamp position and the wavelength fit together</p> <p>Change to the correct filter</p> <p>Turn the locking nut to stop</p> <p>Clean the cell</p> <p>Check lamp. Replace if necessary</p> <p>Clean the filter</p>

Symptom	Cause	Remedy
Excessive noise (short term)	1. Poor ground contact	Check contact to ground
	2. Filter wheel cover not properly	Close the cover closed
	3. Locking nut not properly closed	Turn the locking nut to stop
	4. Recorder range incorrect	Set recorder range to UV-M II output range 110 or 100 mV)
	5. Recorder connections incorrect	Check connection between output terminals and recorder (make sure that the green connector snaps in properly)
	6. Dirty cell	Clean the cell
	7. Deposits on filter	Clean the filter
	8. Solvent with high UV absorbance	Change to a more suitable solvent or another wavelength where the solvent does not absorb
	9. Impure chemicals	Filter the liquids before use. Change to purer chemicals
	10. Bubbles passing through the cell	Degas solvent. Check for leaks. Connect a Flow Restrictor after the Optical Unit
	11. Aging lamp	Check lamp. Replace if necessary
	12. Excess noise on mains supply	Use alternative power source or remove source of disturbance.
Excessive baseline drift	1. Variable absorbance gradient	Change to another solvent or another wavelength without absorbance
	2. Contaminated solvent	Use fresh solvent. Use purer grade
	3. Large temperature variation	Relocate Optical Unit or remove source of temperature change
	4. Instrument not warm	Allow 1 hour warm-up
	5. Bubble trapped in the cell	Clean the cell. Connect a Flow Restrictor
	6. Locking nut not properly closed	Turn the locking nut to stop.
Long term noise often regular waves in recorder response	1. Temperature variation especially in cold room	Relocate the Optical Unit or remove source of temperature change
	2. Flow rate variations	Check pump system and column packing
	3. Poor ground contact	Check contact to ground
	4. Dirty cell	Clean the cell
	5. Deposits on filter	Clean the filter
	6. Locking nut not properly closed	Turn the locking nut to stop.
Low sensitivity	1. Aging lamp	Check lamp. Replace if necessary
	2. Dirty cell	Clean the cell
	3. Dirty filter	Clean the filter
	4. Wrong filter	Change to the correct filter
	5. Wrong lamp position	Check that the lamp position and the wavelength fit together

7. Technical Specification

Control Unit

Full scale ranges (AU)	0.001, 0.002, 0.005, 0.01, 0.02, 0.05, 0.1,0.2, 0.5, 1, 2
Autozero	Range -0.2 to 2 to AU Reproducibility 1% full scale Set time 3 seconds Control front switch or remote
Base line adjust	Adjustable up to $\pm 100\%$ full scale
Event mark	Will give a $\pm 100\%$ of full scale spike. Control activated by front switch or remote
Electronic filter	Response time* -selectable 0.1, 1 or 10 s 10% to 90% of full scale. 2nd degree Bessel filter for no peak distortion *Note: Traditionally, time constant refers to the time taken for the output signal to rise from 0 to 63%. Thus, a response time here of 1.0 second corresponds to a traditional time constant of 0.5 seconds, and so on
Remote Input/Output	Connector type: 15 pin D-SUB connector (female) Description 1 V/AU (Output, not filtered) 11 Vr* (Output, not filtered) 9 Vs** (Output, not filtered) 2 Analog ground 10 Autozero base line (TTL input)*** 14 Event mark (TTL input)*** 6 Autozero ready (TTL output)*** 7 Digital ground 15 Protected ground *Vr=Voltage on reference diode **Vs=Voltage on sample diode *** active low
Recorder output	100 mV full scale, over-range to 5 V (50x)10 mV full scale, over-range to 0.5 V (50x) 0 common c safety ground Connector type: screw terminal
Linearity	1% up to 2 AU at 254 nm 5% up to 2 AU at other wavelengths
Output impedance	200 ohm
Environment	+4 to +40 °C, 10-95% relative humidity, 84 - 106 kPa (840 - 1060 mbar) atmospheric pressure
Humidity	10 - 95%
Power requirements	100/120/220 - 230/240 V $\pm 10\%$, 50/60 Hz
Power consumption	25 VA
Dimensions	245 x 304 x 92 mm (W x L x H)
Weight	28 kg

EMC standards

This product meets the requirement of the EMC Directive 89/336/EEC through the harmonized standards EN 50081-2 (emission) and EN 50082-1 (immunity)

Note: This is a class A product. In a domestic environment this product may cause radio interference in which cases the user may be required to take adequate actions.

Note: The declaration of conformity is valid for the instrument when it is:

- used in laboratory locations
- used in the same state as it was delivered from GE Healthcare except for alteration described In the User Manual
- used as "stand alone" unit or connected to other CE labelled GE Healthcare products or other products as recommended

Safety standards

This product meets the requirement of the Low Voltage Directive (LVD) 73/23/EEC through the harmonized standard EN 61010-1

Optical Unit

Hg lamp	254, 313, 365, 405, 436 and 546 nm: Lifetime 8 000 h.	
Zn lamp	280 nm: Lifetime 4 000 h	
Filters	Wavelength 214 nm: Lifetime 2 000 h Interference. Circular 1.27 cm diameter. Wavelengths 214, 254, 280, 313, 365, 405, 436 and 546 nm	
Safety standard requirements	Electronics designed according to IEC and UL	
	Flow cell 2 mm	Flow cell 5 mm
Optical path length	2.0 ± 0.2 mm	5.0 ± 0.1 mm
Illuminated volume	2 µl	6 µl
Total dead volume	30 µl	10 µl
Cell shape	Straight flow through cuvette	Horizontal double cone with inlet and outlet distributor
Cell material in direct contact with liquid	Quartz (Suprasil®), ETFE	Quartz (Suprasil®), titanium, ETFE
Flow range	0 - 1 000 ml/h	0 - 1 000 ml/h
Pressure	Max 40 bar	Max 40 bar
Tubing connection type	Flanged (FPLC)	Unflanged type (standard)
Dimensions	Capillary 1/16" o.d. metal (HPLC)	
Weight	100 x 100 x 50 mm (W x L x H) 0.4 kg	
	Sensitivity specifications	
Static short term noise	± 3 x 10 ⁻⁶ AU	
Dynamic short term noise	± 6 x 10 ⁻⁶ AU	
Static long term noise	± 2 x 10 ⁻⁵ AU	
Dynamic long term noise	± 4 x 10 ⁻⁵ AU	
Static drift	± 1 x 10 ⁻⁴ AU/h	
Dynamic drift	± 2 x 10 ⁻⁴ AU/h	
Flow sensitivity	2 x 10 ⁻⁴ AU min/ml	
	Test conditions	
Dynamic condition	1 ml/min methanol	
Response time	1 s	
Room temperature	25 ± 0.2 °C	
Wavelength	254 nm	
Flow cell	5 mm cell	

8. Accessories and Spare Parts

Please order accessories and spare parts according to the designations and code numbers given below.

Designation	Code No.	No. per pack
Lamps and filters		
Hg optics with filters*	18-0604-02	1
Zn optics with filter*	18-0605-02	1
Hg lamp assembly**	18-0630-01	1
Zn lamp assembly**	18-0631-01	1
Filter Wheel	18-0647-01	1
Filter 214 nm	18-0622-01	1
Filter 254 nm	18-0620-01	1
Filter 280 nm	18-0621-01	1
Filter 313 nm	18-0623-01	1
Filter 365 nm	18-0624-01	1
Filter 405 nm	18-0625-01	1
Filter 436 nm	18-0626-01	1
Filter 546 nm	18-0627-01	1
* The optics with filter(s) contain 1 Lamp 1 Lamp housing 1 Filter wheel 1 or 2 filters (Zn:214 nm. Hg: 254 and 280nm) 1 filter strip with label(s) all assembled		
** The lamp assemblies contain lamp and lamp housing		
Flow cells		
Filow Cell 2 mm*	18-0684-01	1
Flow Cell 5 mm*	18-0675-01	1
* The flow cells contain 1 Flow Cell 1 Assembly Kit 2 Tubing connector standard 2 Tubing connector FPLC® 1/116" Ferrule PTFE		
Liquid connections		
Tubing connector, standard	18-0765-01	2
Tubing connector. FPLC	18-0766-01	2
Protective cover	18-0763-01	10
Assembly kit*	18-0768-01	1
* Assembly kit containing 1 cone removal tool 2 protective cover 2 M6 tubing nipple, stainless steel		
Other Accessories and Spare Parts		
Remote control adaptor	19-6008-01	1
Fuse holder 5x20 (220V)	19-8654-01	1
Fuse holder 6.3x32 (110V)	18-0847-01	1
Mains Cable, 220V	19-2448-01	1
Mains Cable, 110V	19-2447-01	1
Scaffold Holder	18-0716-01	1
Aluminium support rod	18-0552-01	1
Flow Restrictor	18-1012-07	1
Keyboard and Overlay	18-1003-96	1



GE imagination at work