ÄKTA*design*

Monitor UV-900

User Manual

18-1120-05

amersham pharmacia biotech

Important user information

Meaning: Consult the instruction manual to avoid personal injury or damage to the product or other equipment.

WARNING!

The Warning sign is used to call attention to the necessity to follow an instruction in detail to avoid personal injury. Be sure not to proceed until the instructions are clearly understood and all stated conditions are met.

CAUTION!

The Caution sign is used to call attention to instructions or conditions that shall be followed to avoid damage to the product or other equipment. Be sure not to proceed until the instructions are clearly understood and all stated conditions are met.

Note

The Note sign is used to indicate information important for trouble-free or optimal use of the product.

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

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SE–751 84 Uppsala
Sweden

Trademarks

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Contents

Reference information

Short instructions on back page

About this manual

This manual comprises two parts; a practical part (sections 1 – 5) and a reference part (sections A – D).

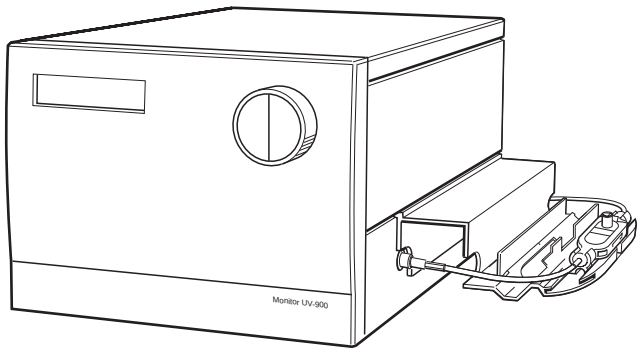
Sections 1 – 5 contain the necessary information for operating the instrument.

1 Introduction

1.1 General

Monitor UV-900 is a UV-absorption monitor for use in liquid chromatography. Monitor UV-900 features:

- Variable wavelength for detection in the range 190–700 nm.
- Up to 3 wavelengths can be monitored simultaneously.
- Two alternative flow cells with path length 2 mm and 10 mm.
- Accurate and reliable monitoring through self-test, self-calibration and fibre optics.



1.2 Safety

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

WARNING! The instrument must not be opened by the user. It contains high voltage circuits which can give a lethal electric shock.

WARNING! The instrument uses high intensity ultra-violet light. Do not disconnect the optical fibres while the monitor is running.

WARNING! Always disconnect the power supply before attempting to replace any item on the instrument.

WARNING! The instrument must be connected to a grounded mains socket.

WARNING! When using hazardous chemicals, all suitable protective measures, such as protective glasses, must be taken.

WARNING! The flow cells must not be used at pressures above 2 MPa (20 bar, 290 psi). At higher pressures the flow cells may break.

2 Installation

2.1 Unpacking

Unpack the instrument and check the items against the supplied packing list. Inspect the items for obvious damage which may have occurred during transportation.

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

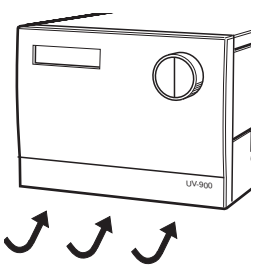
CAUTION! The following information should be read carefully to ensure that the instrument is installed correctly.

2.2 General precautions

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

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

The instrument may be operated at normal ambient temperatures in the range +4 to +40 °C.



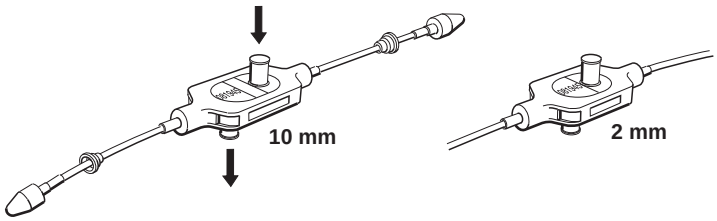
The instrument should be installed on a stable laboratory bench or in ÄKTA™explorer or ÄKTApurifier. To ensure correct ventilation a free space of 0.1 m is required behind and in front of the instrument. Place the instrument directly on the bench. Do not use any soft material under the instrument, to ensure that the ventilation inlet in the front is not blocked.

2.3 Installing the flow cell

Fixing the flow cell

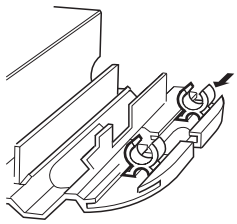
Handle the optical fibres with care, *do not bend excessively*.

Two flow cells are available: UV-900/2 with 2 mm light path length (cell volume 2 µl) and UV-900/10 with 10 mm path length (8 µl).



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 fibre 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 the 10 mm cell.

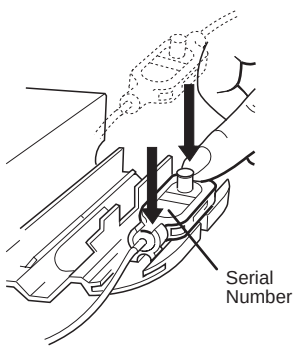


3 Place the flow-cell in the opening between the white clips. The cell should be positioned with the text and serial number facing upwards and to the front. Press the cell into the clips to fasten it.

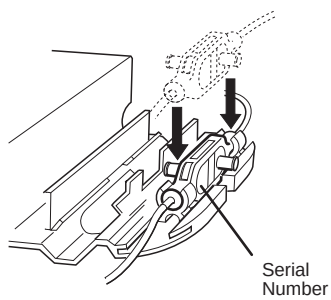
CAUTION! To avoid damaging the optical fibres, press only on the cell body, never on the optical fibres.

To improve the access to the tubing connections, the flow cell can alternatively be positioned with the tubing connections horizontal.

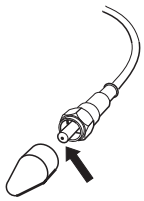
Normal position



Alternative position



Connecting the optical fibres



1 Remove the 2 black protective caps from the optical fibre connectors.

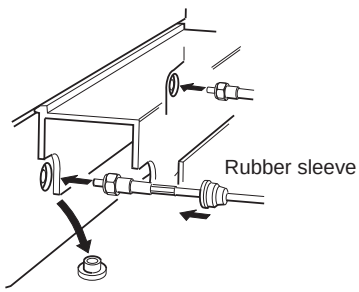
> **CAUTION!** Do not touch the tips of the optical fibres with your fingers as this will result in poor monitor performance. If you accidentally touch the optical fibre tip, it can be wiped with 30% isopropanol using lens paper.

Fibre detachment tool

2 Remove the 2 rubber protective caps from the optical fibre receptacles on the right side of the housing.

3 Connect the 2 optical fibres to the housing by carefully inserting them into the sockets and tightening the nuts fingertight using the fibre detachment tool supplied.

> **CAUTION!** Do not twist the optical fibres during tightening.

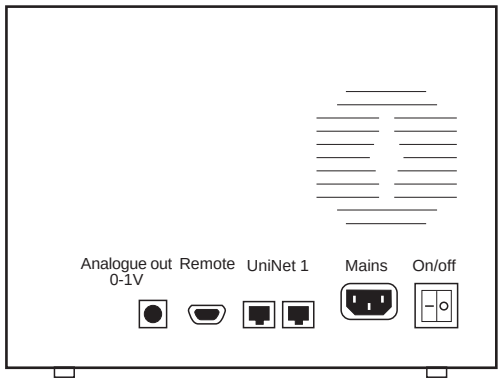


4 Slide the rubber sleeves on the 2 optical fibres onto the connectors. Make sure that the sleeves are pushed tight to the housing to prevent dust or fluid entering the connection.

5. To “run-in” the new optical fibres prior to its use in normal operation, run the monitor for 8 hours at 215 nm.

2.4 Connecting electrical signal cables

The sockets for electrical signals are located on the back panel.



Connecting to recorder (if used)

1 Connect the recorder to the miniDIN-socket **Analogue out** using the cable supplied. Each wavelength signal is available on a separate channel using the following wires:

λ1	Wire 1	+
	Wire 2	–
λ2	Wire 3	+
	Wire 4	–
λ3	Wire 5	+
	Wire 6	–

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.*

2 Set the recorder to 0–1 V input, full scale, 0 V offset.

2.5 Connecting to communication link

The monitor can be used in ÄKTAexplorer or ÄKTApurifier and controlled from a PC running UNICORN™ version 2.20 or higher, using *UniNet* cables.

CAUTION! The mains power to ÄKTAexplorer or ÄKTApurifier must be switched OFF before connecting the instrument to the UniNet 1 link.

1 Connect two *UniNet* cables to the *UniNet 1* connectors. The instrument can be connected in series anywhere in the chain between the PC and the termination plug. The UniNet 1 link connects, in series, the PC with Pump P-900, Monitor pH/C-900, Monitor UV-900 and Frac-900. The termination plug is connected to the last instrument in the chain.

2.6 Connecting to supply voltage

1 Make sure the on/off switch is in the OFF-position (O).

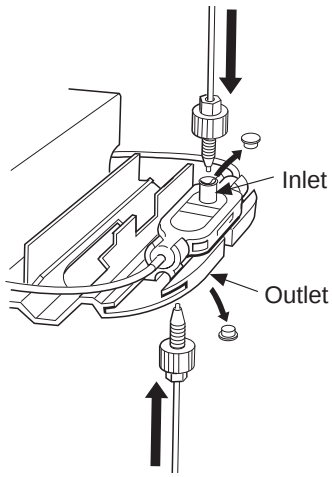
2 Connect a mains cable between the instrument and a grounded mains socket. The instrument is delivered with both European and US type mains cables, as standard. Any voltage 100–240 V AC, 50–60 Hz can be used.

WARNING! The instrument must be connected to a grounded mains socket.

The instrument contains no user replaceable fuse.

2.7 Connecting the tubing

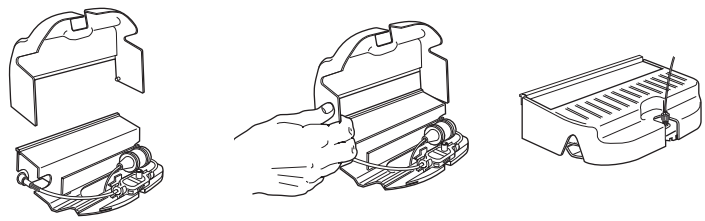
1 Remove the red protective caps from the inlet and outlet of the flow-cell and connect the tubing with 1/16" "Fingertights".



The inlet is on the top of the flow cell, the same side as the serial number.

2.8 Mounting the cell holder cover

The cover is a simple push fit onto the cell holder. Two small lugs on the cover locate in holes at the front and rear of the cell holder The cover is then lowered over the cell holder.



3 Operation

3.1 On/off

```
Selftest
Please wait...
```

```
Calibrating
Please wait...
```

```
λ1(215)  1.123   AU
λ2(254)  0.02345 AU
```

Switch on the instrument at the mains switch on the back panel.

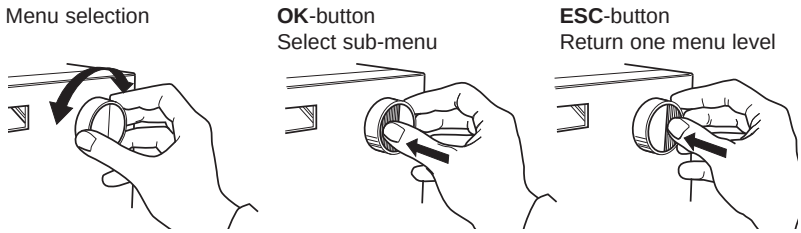
At switch on the instrument performs a selftest and then starts calibration. After approx. 1 minute the display shows the *Main operating menu* and the instrument is ready to use.

All parameters are factory set to default values.

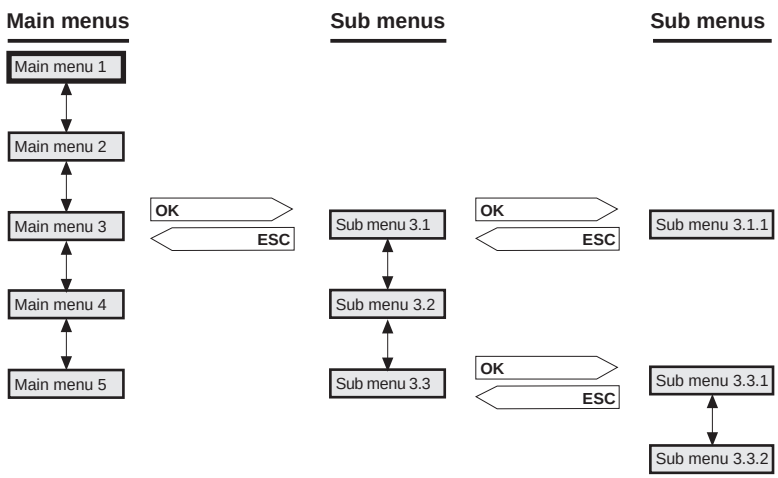
3.2 Menu selection and settings

Menu selection

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



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

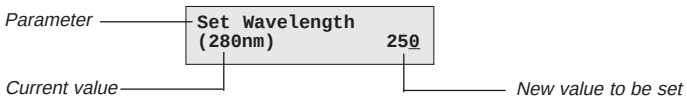


Return to main menu

Pressing **ESC** repeatedly, always returns to the **main menu 2** which is the main operating menu. Press **ESC** once more to return to **main menu 1**, the mode changing menu.

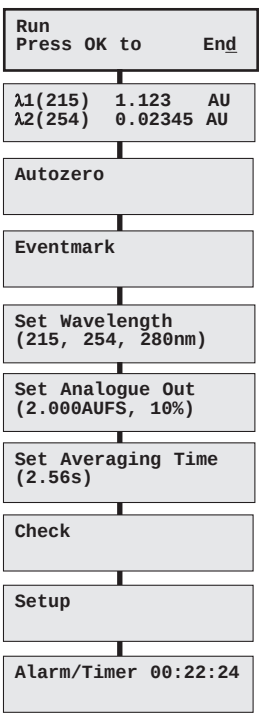
Select value

A cursor below a text or numerical value shows what is affected by the dial. To increase the value turn the dial clockwise. To decrease the value turn the dial counterclockwise.



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

3.3 Main menu overview



Mode changing menu (Mode menu). The menu is accessed from all positions by pressing the ESC-button repeatedly.

Main operating menu. Wavelength display showing first two wavelengths and, if the instrument is in Run mode, their absorbance

Autozero the instrument.

Produce event mark.

Set the wavelengths for the measurements.

Set the recorder output.

Filtering noise.

Check internal operating values.
See *Reference information section B.1*.

Setup language, unit number etc.
See *Reference information section B.2*.

Set different timer options.
See *Reference information section B.3*.

3.4 Setting lamp on/off

Current status

```
Run
Press OK to      End
```

The lamp should be switched off when no measurement is made, to conserve the lamp operating time. The lamp is switched on when a run is started. No warm-up time is required.

1 Select the mode changing menu.

2 Switch the lamp on (Run) or off (End) by pressing OK. Its current status is shown in the upper left of the display.

When controlled from UNICORN, the lamp is switched on automatically when the flow is started and off when the run is ended.

3.5 Reading absorbance values

```
λ1(215)  1.123   AU
λ2(254)  0.0234  AU
```

```
λ3(280)  0.1234  AU
```

The main operating menu shows the absorbance values with 4 digits for up to 3 active wavelengths. The menu is reached from any other menu by pressing the ESC-button repeatedly. The display for the third wavelength is reached by turning the dial clockwise.

or

```
215nm  254nm  280nm
1.123  0.023  0.123
```

As an alternative all 3 wavelengths can be shown in a single display, but limited to 3 decimals. This alternative is reached by turning the dial clockwise.

3.6 Setting wavelength

The instrument can measure up to 3 wavelengths simultaneously and wavelength changes can be set at any time.

```
Set Wavelength
(215, 254, 280nm)
```

1 Select main menu **Set Wavelength**, press OK.

```
Set Wavelength λ1
(215nm)
```

2 Select sub menu **Set Wavelength λ1**, press OK.

```
Set Wavelength λ1
(215nm)        234
```

3 Set the value, press OK.

```
Set Wavelength λ2
(254nm)
```

4 The next wavelength **λ2** is now shown. Set the value or turn the wavelength off, by turning the dial counterclockwise until the value passes through 190 nm. If only one wavelength is to be used, **λ2** and **λ3** should be set to off. Press OK.

The first wavelength **λ1** can never be set to off.

5 Repeat step 4 in the menu **Set Wavelength λ3**.

6 Press ESC to return to the main operating menu.

In UNICORN, the wavelengths are set with the instruction **Wavelength** in **System Control:Manual:Alarm&Mon**.

3.7 Autozero

The autozero function sets the detected absorbance to zero when the OK-button is pressed. All three wavelengths are autozeroed. Autozero is recommended after wavelength changes in a method and before the sample is injected.

```
Autozero
```

1 Select main menu **Autozero**, press OK. The normal absorbance value display is then shown.

In UNICORN, Autozero is set with the instruction **AutoZeroUV** in **System Control:Manual:Alarm&Mon**.

3.8 Storage and shut-down

Overnight: The flow cell can be left filled with buffer.

Weekend and Long time 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 red protective caps. Never use compressed air as this may contain droplets of oil.

CAUTION! Do not allow solutions which contain 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.

3.9 Using an external chart recorder

Setting range and zero

```
Set Analogue Out
(2.000AUFS, 10%)
```

The external chart recorder output from the instrument is always 0–1 V, but the absorbance value for full scale deflection and the Zero Absorbance level on the recorder can be set.

```
Set Range
(2.000AUFS)    <0.1>
```

1 Select main menu **Set Analogue Out**, press OK.

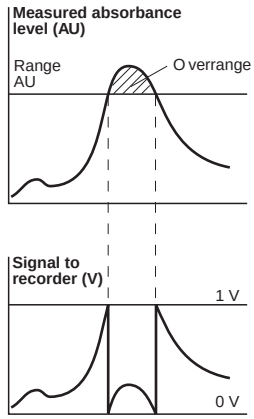
2 Set the range value in the sub menu **Set Range**, press OK. The range is the full scale absorbance range for the chart recorder (1V). Only fixed steps between 5.0 AU and 0.01 AU can be set and the value is the same for all 3 wavelengths.

```
Set Zero Level
(10% of FS)       20
```

3 Select menu **Set Zero Level**, press OK.

4 Set the value, press OK. This value determines where the zero absorbance level should be in relation to full scale on the recorder.

The instrument has an automatic overrange function. If during a peak the monitor signal reaches the full scale value, the signal will drop instantly to 0 V and give an accurate display of the peak starting from this position.



Event mark

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

1 Select main menu **Event mark,** press OK.

3.10 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 min. 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 2.56s.

```
Set Averaging Time
(2.56s)       <2.56>
```

1 Select menu **Set Averaging Time,** press OK.

2 Set the value, press OK. Use the fixed values between 5.12 and 0.08 s. When monitoring more than one wavelength, the recommended averaging time is a minimum of 1.28 s.

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

In UNICORN the averaging time is set with the instruction **AveragingTime** in **System Control:Manual:Alarm&Mon**

3.11 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 *2.3 Installing the flow cell.*

3.12 Restart after power failure

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

4 Maintenance

WARNING! Always disconnect the power supply before attempting to replace any item on the instrument during maintenance.

CAUTION! Only spare parts approved or supplied by Amersham Pharmacia Biotech may be used for maintaining and servicing the instrument.

4.1 Periodic maintenance

Interval	***Action*** (see procedures below)
Every 3 month	Check the instrument
Every 6 month or more often if required	Clean the flow cell and optical fibre connectors

4.2 Cleaning-in-place

Pump a cleaning or sanitizing agent through the flow cell. The standard recommendation is to pump 1 M NaOH for 30 minutes and then wash out with buffer.

WARNING! NaOH is injurious to health. Avoid spillage.

4.3 Checking the instrument

```
Check Lamp Intensity
210nm 85% 300nm 95%
```

Lamp intensity

1 Select menu **Check**, press OK.

2 Select menu **Check Lamp Intensity**.

If the lamp intensity is <20%, contact Amersham Pharmacia Biotech for lamp replacement or change of internal optical fibre.

```
Check Lamp Run Time
200h
```

Lamp ontime

1 Select menu **Check**, press OK.

2 Select menu **Check Lamp Run Time**.

If the lamp ontime is >4000 hours, contact Amersham Pharmacia Biotech for lamp replacement.

Flip time

The flip time is the time the monochromator stepper motor has been in operation.

1 Select menu **Check**, press OK.

```
Check Flip Time
50h
```

2 Select menu **Check Flip Time**.

If the flip time is >2000 hours , contact Amersham Pharmacia Biotech for maintenance.

4.4 Cleaning the flow cell and optical fibre connectors

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

> **CAUTION!** Do not allow solutions which contain 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

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 continue to 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 then flush the flow cell with distilled water (10 ml).

Cleaning the optical fibre connectors

Wipe with 30% isopropanol on lens paper.

4.5 Instrument housing

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

5 Trouble shooting

5.1 General

```
Monitor UV-900
V1.00
```

When contacting Amersham Pharmacia Biotech for support, state the program version of the instrument, which is shown for 2 seconds after the self-test, during switch-on, or in the menu **Check Service Mode**, see section B.1.6.

WARNING! The instrument must not be opened by the user. It contains high voltage circuits which can give a lethal electric shock.

5.2 Faults and actions

If the suggested actions do not correct the fault, call Amersham Pharmacia Biotech.

Fault	*Action*
No text on the front display	1 Check that the mains cable is connected and the power switch is in ON-position I.
Noisy UV-signal, signal drift or instability	1 The buffer may be impure. Check if the signal is still noisy with water. 2 There may be air in the flow cell. Check that the flow restrictor givesa back pressure of 0.2 MPa in ÄKTAexplorer, and 3-5 MPa in ÄKTApurifier. 3 If there is a lot of air in the water, degas the buffer before use. 4 Check the connections of the UV-cell optical fibres. 5 Clean the UV-cell, see section 4.4.
Ghost peaks	1 Check that there is no air in the eluents. Degass if necessary. 2 Clean the system in accordance with *ÄKTAexplorer* or *ÄKTApurifier System Manual.* 3 Clean the column in accordance with the column instructions. 4 Check that the mixer is functioning correctly and that the correct chamber volume is being used.
Error in external chart recorder	1 Check the chart recorder in accordance with its manual. 2 Test the recorder function by selecting recorder test according to section *B.1.5 Check Analogue out*.

5.3 Error messages

If the suggested actions do not correct the fault, call Amersham Pharmacia Biotech.

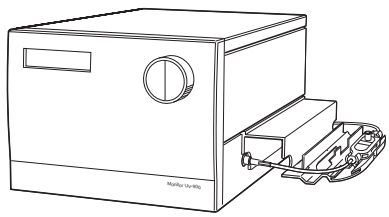
Message	*Action*
Sample fibre failure	There may be too high absorption in the UV-cell. 1 Check the liquid. 2 Ensure that there are no air bubbles in the system. 3 Check the connections of the UV-cell optical fibres. 4 Clean the UV-cell, see section 4.4.
Not calibrated **Calibration failed**	1 Recalibrate by switching the instrument off and then back to on, or choose **Recalibrate** in the **Check** menu.
Change lamp	Call Amersham Pharmacia Biotech for Xe-lamp exchange.
Mode fibre failure **Reference fibre failure** **Lamp module failure** **Low light intensity** **Block filter is defect**	Call Amersham Pharmacia Biotech.
High intensity **in Reference fibre**	1 Recalibrate by switching the instrument off and on.
High intensity **in Sample fibre**	1 Disconnect the optical fibre connectors. 2 Recalibrate by switching the instrument off and on.
ERROR Number 10 **ERROR Number 16** **ERROR key(OK)** **ERROR key (Esc)** **ERROR key (OK+Esc)**. **ERROR 100** **ERROR 109-113** **ERROR 120-121**	1 Switch off the instrument. 2 Check all connections. 3 Switch on the instrument
ERROR 106-108 **ERROR 118**	1 Switch off the instrument. 2 Check all UniNet1 connections. 3 Switch on the instrument.

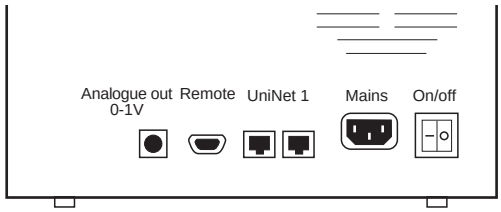
Reference information

A Description

A.1 Instrument

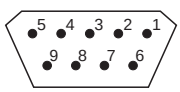
The Monitor UV-900 is a UV-absorption monitor with variable wavelength. The instrument contains no internal user replaceable items.





Connector/switch	*Function*
Analogue out 0–1V	Recorder output, 3 channels 0–1 V
Remote	Digital signal inputs, lamp on/off, autozero, event mark
UniNet 1	Computer network
Mains	Supply voltage, grounded
On/off	Instrument on/off switch

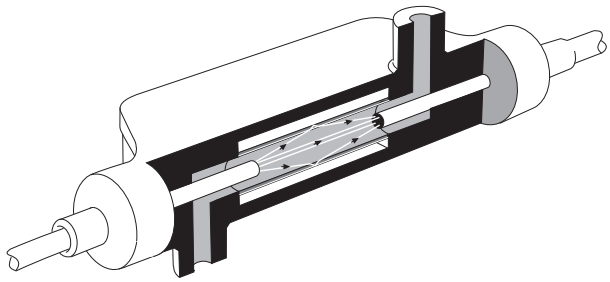
Connect any auxiliary equipment to the 9-pole D–SUB female REMOTE connector (5 V TTL signals only).



Pin	*Signal*	*Function* *Active status = low or closed terminal to pin 5 (0 V)*
1	Remote on/off	Active = lamp on, inactive = lamp off
2	Autozero	Change from inactive to active >100 ms = Autozero
3	Event mark	Change from inactive to active >100 ms = Event mark
4	–	
5	0 V	
6–9	–	

A.2 Flow cell

The monitor can work with flow cells with optical path length 2 mm or 10 mm. The flow cells are made of quartz with a titanium housing.



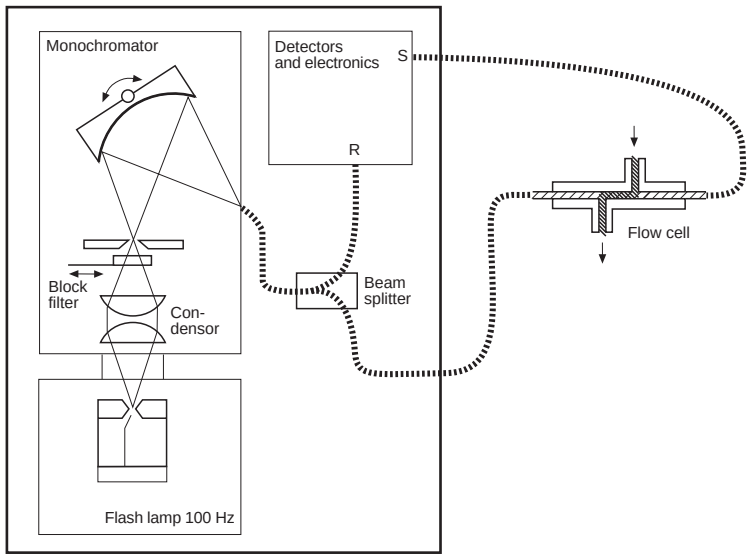
The unique design of the flow cell prevents the formation of distinct interfaces between eluent components with different refractive indices and eliminates the negative influence these would cause. The precision of monitoring is enhanced by the construction of the flow cell, which ensures total reflectance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

A.3 Monitor principle

A Xenon flash lamp gives a high intensity, continuous spectrum throughout the range 160–2000 nm. The light enters a monochromator which includes a condensing system, blocking filter, entrance slit and a concave aberration-corrected holographic grating. Monochromatic light from the grating is directed to an optical fibre. The grating is turned by a stepping motor for wavelength selection between 190–700 nm, in steps of 1 nm. Up to 3 wavelengths can be monitored simultaneously.

For wavelengths between 360–700 nm, a blocking filter is moved into the light path to filter out unwanted light, of a half wavelength from the second order spectrum, before entering the monochromator.

The light from the monochromator to the flow-cell and from the cell to the detector electronics is guided by optical fibres which focus its full intensity on the liquid flow path, maximising 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 fibre (S) and the flow cell, and 50% being directed through the reference fibre (R). Two photodiodes with identical characteristics monitor the intensities of the measuring and reference beams.



The long path length and small volume of the flow cell ensure very high sensitivities and high signal-to-noise ratios. The detection system is also very stable and because the optical unit is located away from the lamp and electronics, noise and drift caused by temperature variations is avoided.

At calibration the instrument automatically finds 2 persistent lines in the spectrum of Xenon. The wavelengths of these known lines are used to calibrate the stepper motor that turns the grating.

B. Menus

B.1 Check menu

B.1.1 Checking autozero level

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

```
Check Autozero
AZ1(215)  0.23456 AU
```

```
AZ2(254)  0.23775 AU
AZ3(280)  0.12326 AU
```

1 Select main menu **Check**, press OK. The autozero absorbance value for wavelength 1 is shown.

2 Turn the selection dial clockwise to display wavelengths 2 and 3.

B.1.2 Lamp intensity, Lamp Ontime, Fliptime

See section *4 Maintenance*.

B.1.3 Checking the wavelength

If there is any doubt that the instrument is showing the correct values, the wavelength calibration can be checked.

1 Select main menu **Check**, press OK.

2 Select sub menu **Check Wavelength**, press OK. The check starts and after approx. 20 seconds the message **Wavelength OK** or **Wavelength not OK** is shown together with the deviation values. If not OK, recalibration can be selected.

```
Checking Wavelength
Please wait...
```

```
Wavelengths OK
230+0 459+0 542+0 OK
```

or

```
Checking Wavelength
Please wait...
```

```
Wavelengths not OK
230+3 459+3 542+3 OK
```

```
Wavelengths not OK
Recalibrate?     OK
```

If a deviation in wavelength occurs repeatedly when checked, contact Amersham Pharmacia Biotech.

B.1.4 Recalibrate

If the instrument is left switched-on for a long period (> 10 days) it may be necessary to recalibrate it. This calibration is identical to that done when the instrument is switched-on.

1 Select main menu **Check**, press OK.

2 Select sub menu **Recalibrate**, press OK. The recalibration starts and after approx. 60 seconds the message **Recalibration finished** is shown.

```
Recalibrating
     Please wait...
```

```
Recalibration
finished         OK
```

B.1.5 Check Analogue Out

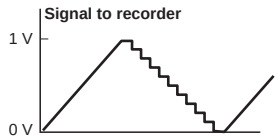
The function of the connected chart recorder can be tested.

1 Select main menu **Check**, press OK.

```
Check Analogue Out
(off)              on
```

2 Select sub menu **Check Analogue Out**, press OK.

3 Start the test by selecting **on**, press OK. The test will ramp the signal on each 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 figure.



4 Stop the test by pressing OK or ESC.

B.1.6 Check Service Mode

Service information relevant to the instrument can be checked. Information may not be available in all menus.

1 Select main menu **Check**, press OK.

```
Check Service Mode
```

2 Select sub menu **Check Service Mode**, press OK.

```
Telephone Service
012345678901
```

3 The service telephone number is displayed, press OK.

```
Contract Number
012345678901
```

4 The service contract number is displayed, press OK.

```
Serial Number
01234567 YM 012345
```

5 The instrument serial number is displayed, press OK.

```
Monitor UV-900
V1.00
```

6 The instrument name and software version are displayed, press OK.

```
Date of Maintenance
     ?
```

7 The date of the last service is displayed, press OK.

```
Buzzer Test
```

8 A test of the instrument buzzer is performed, press OK.

B.2 Setup menu

B.2.1 Setup language

The language used on the display can be changed.

1 Select main menu **Setup**, press OK.

2 Select sub menu **Setup Language** press OK.

```
Setup language
(GB) GB D F E I
```

3 Select the desired language.
GB = British English
D = German
F = French
E = Spanish
I = Italian

B.2.2 Setup unit number

The unit number is the identification the UV-monitor has on the UniNet-bus. It should correspond to the number set in UNICORN for the UV-monitor. The number should be set to 0 if one UV-monitor is used. If more than one UV-monitor is used they must all have different identification numbers.

1 Select main menu **Setup**, press OK.

```
Setup Unit Number
(0)
```

2 Select sub menu **Setup Unit Number**, press OK.

3 Select unit number (0–25).

B.2.3 Setup display angle

The display angle can be set to compensate for different viewing heights.

1 Select main menu **Setup**, press OK.

```
Set Display Angle
( ->|) ->\ ->| ->/
```

2 Select sub menu **Set Display Angle**, press OK.

3 Select viewing angle (`->\` Up, `->|` Mid or `->/` Down).

B.3 Setting and using the alarm timer

You can set the alarm function to either a fixed alarm time or using a count-down timer. The lamp can be automatically switched on or off at a set time. You cannot set both an alarm time and a count-down timer. The default or current value is shown in parentheses.

```
Alarm/Timer 12:30:52
```

1 Select main menu **Alarm/Timer**, press OK. The display shows the current time.

```
Alarm/Timer action
(Buzz)Buzzer Run End
```

2 Set the action to take place. Press **OK** to select action. **Buzzer** will generate an audible alarm for 15s and a message. **Run** will switch on the lamp, **End** will switch off the lamp, each generating one beep and a message.

```
Set Alarm   12:32:21
(0)         00.00.00
```

3 Select sub menu **Set Alarm**, if you want to set an alarm at a fixed time. Press OK to enter the time value in the form **HH.MM.SS**, pressing the OK button after entering each time unit.

```
Set Timer
(18:34:52)  00.00.00
```

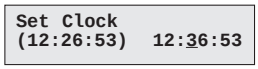
4 If you want to set a count-down timer, turn the dial to select sub menu **Set Timer**. Press OK to enter the countdown value in the form **HH.MM.SS**, pressing the OK button after entering each time unit.

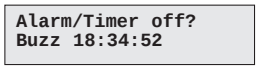
5 Press ESC button to return to the **Alarm/Timer** menu which now shows the set alarm time or count-down time as **BzzHH:MM:SS**.

```
Alarm/Timer 12:35:16
Bzz00:33:00
```

6 When the alarm time is due or the count-down timer reaches 00:00:00, an alert display is shown and the instrument beeps, until the OK button is pressed. The display shows the time elapsed since the alarm, and the current time.

```
Bzz00:00:29 13:08:45
  !! Alarm time !!
```





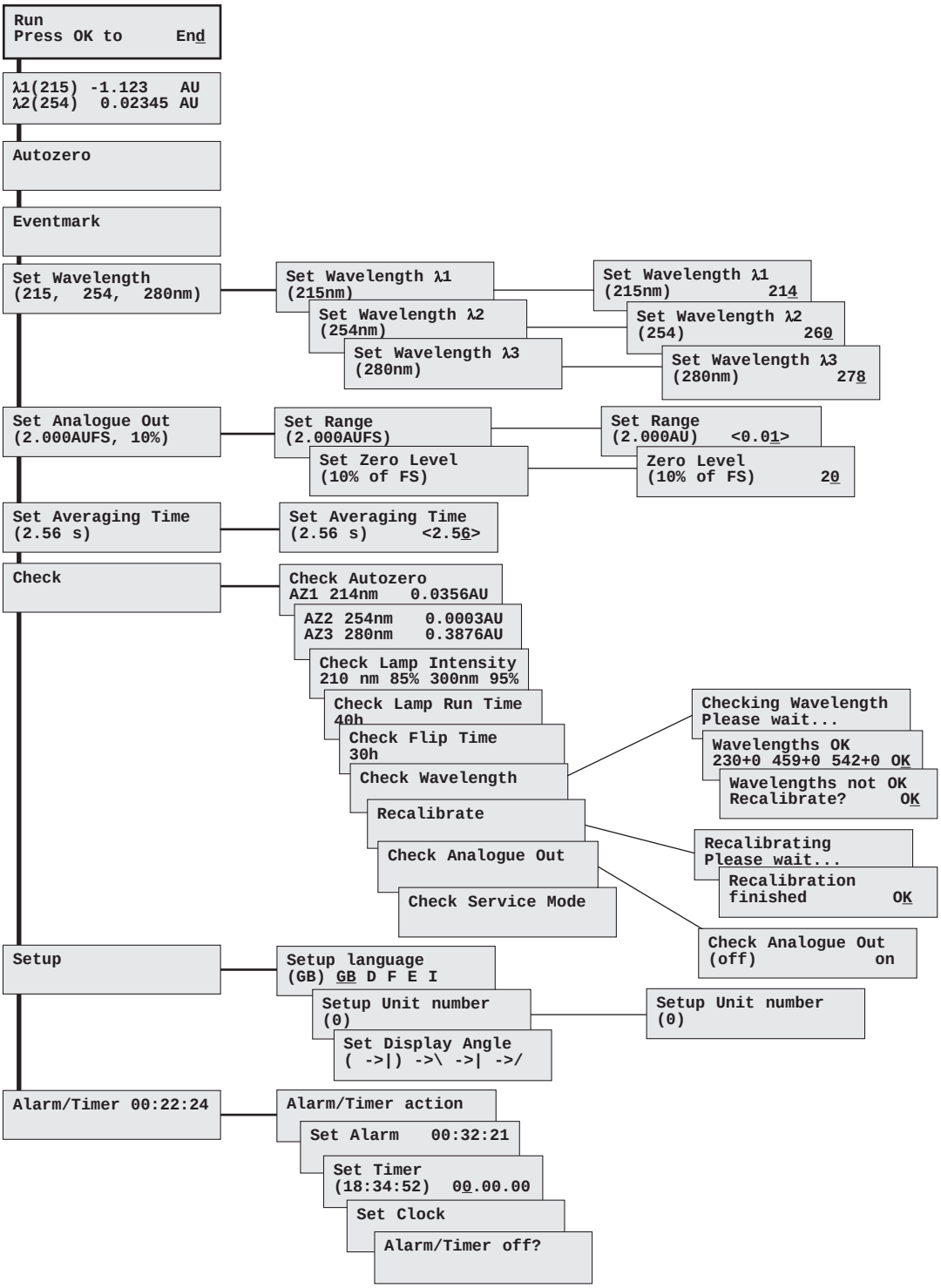
The alarm timer is based on the internal instrument clock which can be set in the **Set Clock** menu placed after the **Alarm/Timer** menu. The clock will be reset when power is turned off.

A set alarm/timer function can be reset by pressing OK in the menu **Alarm/Timer off?**

B.4 Service displays

The instrument has service displays for use by authorised service personnel. If the service display **Insert Access Code:** is accidentally selected, press the ESC-button to exit to the normal operation display.

B.5 Menu overview



C Technical specifications

Operating data

Wavelength range	190-700 nm in steps of 1 nm, 3 wavelengths simultaneously
Bandwidth	4 nm
Wavelength accuracy	± 2 nm
Wavelength reproducibility	± 0.01 nm
Wavelength switch time	< 500 ms (one cycle from 214 nm to 254 nm and back to 214 nm)
Linearity	< 2% deviation up to 2 AU at 260 nm with Uracil at pH 2
Noise[1, 2)]	
Single wavelength	
short term (0-1 min)	< $6x10^{-5}$ AU at 230 nm
long term (1-10 min)	< $6x10^{-5}$ AU at 230 nm
Dual wavelengths	
short term (0.5-1 min)	< $2x10^{-4}$ AU at 230 and 254 nm
long term (1-10 min)	< $2x10^{-4}$ AU at 230 and 254 nm
Drift [2)]	< $2x10^{-4}$ AU/h at 254 nm
Environment	+4 to +40 °C 20-95 % relative humidity 84-106 kPa (840-1060 mbar) atmospheric pressure

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

2) Typical values at room temperature after varm-up.

Flow cell

Max. flow rate	100 ml/min
Max. pressure	2 MPa (20 bar, 290 psi)
Backpressure	Max. 0.5 bar at 100 ml/min with water at 25°C
Liquid temperature range	+4 to +40 °C
Optical path length	
2 mm cell	2 mm
10 mm cell	10 mm
Cell volume	
2 mm cell	2 µl
10 mm cell	8 µl
Degree of protection	IP 21
Wetted materials	PTFE (polytetrafluoroethylene) PEEK (polyetheretherketone) titanium (palladium alloy) Quartz (synthetic fused silica)
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% Ethylacetate, 100% Hexane, and 100 % Tetrahydrofuran (THF).
Tubing connections	UNF 10-32 2B “fingertights” for capillary tubing with 1/16” outer diameter

Physical data

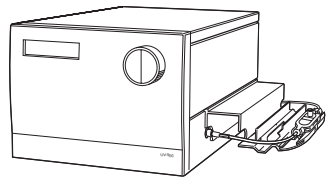
Light source	Xenon flash lamp
Lamp lifetime	> 4000 hours
Control	Stand alone or from a computer running UNICORN 2.20 or higher through UniNet 1 connection
Power consumption	65 VA
Power requirement	100–240 V AC, 50–60 Hz
Analogue output	3 signals, 0-1 V full scale, overrange function
Digital inputs	5 V, 1 mA current sinking, lamp on/off, autozero, event mark
Display	2 rows with 20 characters each
Dimensions (H xW xD)	200 x 260 x 370 mm
Weight	8.5 kg
Degree of protection	IP 20
EMC Standards	This product meets the requirement of the EMC Directive 89/336/EEC through the harmonized standards EN 50081-1 (emission) and EN 50082-1 (immunity) 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 Amersham Pharmacia Biotech except for alterations described in the user manual • used as “stand alone” unit or connected to other CE labelled Amersham Pharmacia Biotech instruments 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.

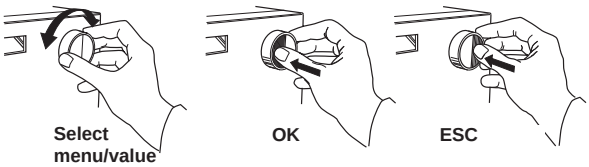
D Accessories and spare parts

Item	*Quantity per pack*	*Code no.*
Monitor UV-900 complete but without flow cells	1	18-1108-35
Flow cell UV-900/2 (2 mm)	1	18-1111-10
Flow cell UV-900/10 (10 mm)	1	18-1111-11
Signal cable	1	18-1110-64
Fibre detachment tool	1	18-1111-16
Teflon tubing, i.d. 1/8", o.d. 3/16"	3 m	18-1112-47
Tubing connector for 3/16" o.d. tubing	10	18-1112-49
Ferrule for 3/16" tubing	10	18-1112-48
Stop plug, 5/16"	5	18-1112-50
Stop plug, 1/16"	5	18-1112-52
Union Luer female/1/16" male	2	18-1112-51
Union 1/16" female/M6 male	6	18-1112-57
Union M6 female/1/16" male	8	18-1112-58
PEEK tubing, i.d. 0.75 mm, o.d. 1/16"	2 m	18-1112-53
Teflon tubing, i.d. 0.75 mm, o.d. 1/16"	2 m	18-1112-54
PEEK tubing, i.d. 1.0 mm, o.d. 1/16"	2 m	18-1115-83
Fingertight connector 1/16"	10	18-1112-55

Short instructions

The following short instructions are intended as a guide to users who are fully familiar with safety precautions and operating instructions described in this manual. The instructions assumes that the instrument is installed according to the installation instructions.





1 **Switch on the instrument** by means of the mains switch on the back panel.

```
Calibrating
Please wait...
```

2 **Switch on the UV-lamp** by selecting **Run**.

```
End
Press OK to      Run
```

3 **Select wavelength** for one, two or three wavelengths.

```
Set Wavelength
(215,  254,  280nm)
```

```
Set Wavelength λ1
(215nm)
```

```
Set Wavelength λ2
(254nm)
```

```
Set Wavelength λ3
(280nm)
```

4 **Autozero** the instrument by pressing the OK-button.

```
Autozero
```

5 The **main operating menu** (RUN-menu) is shown.

```
λ1(215)  1.123
λ2(254)  0.02345
```

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