

Chapter 1

Introduction

1.1 Introduction

The 'Expert 96' is a microprocessor controlled 8-channel microplate reader designed to measure the optical density of liquid in the wells of 96-well microplates.

Data reduction is performed using external software on personal computers.

1.2 Expert 96 Features:

□ Digital light control system

Extra long-time stability

Self-check and self-calibration before each measurement

□ Robotics friendly design

Low profile self-centering plate carrier and front loading provides easy automation.

□ Positive filter detection

Never false results because of wrong inserted filters

□ Light-tight reading chamber

Avoids influence of extraneous light

□ Small footprint

Saves valuable lab bench space

1.3 Specifications

Measurement range:	0--4.000 O.D
Wavelength range:	340 to 800 nm (Expert 96 UV) 400 to 800 nm (Expert 96)
Accuracy:	+/- 1% and +/- 0.005 O.D. at 2.0 OD.
Precision:	+/- 0.5% and +/-0.005 OD. at 2.0 OD
Reading speed:	5 seconds
Interference filters:	340, 405, 492, and 620 nm (Expert 96 UV) 405, 450, 492 and 620 nm (Expert 96) up to 6 filters possible
Light source:	Halogen lamp,50W
Measurement system:	8-channel optical system with self-calibration and self-check
Computer interface:	RS232-C
Power:	90 to 250V AC, 50/60 Hz
Dimensions:	41cm x25cm x 17cm (WxDxH)
Operating Temperature	+10 to + 35° C
Operating Humidity	0 to 80 % (Non condensing)
Environmental conditions	Humidity 5 to 95%, non condensing (storage only) Maximum altitude 2000m

1.4 Order numbers and Accessories

Expert 96 Reader with 4 Filters, power cord, RS-232 cable

Order number:..... G018065

Expert 96 UV Reader with 4 Filters, power cord, RS-232 cable

Order number:..... G018066

Software options:

Kim software Screening /Curve-fit.....010
DigiCom.....050
Mikrowin 2000 Screening /Curve-fit060
MikroWin 2000 Screening/Curve-fit/Kinetics.....070
MikroWin 2000 lite080

Accessories:

Spare lamp:.....B011016
Interference filter 340nmB010075
Interference filter 405nmB010060
Interference filter 450nmB010061
Interference filter 492nmB010062
Interference filter 550nmB010063
Interference filter 620nmB010064
Interference filter 690nmB010066

Other wavelengths on request

Chapter 2

Installation

2.1 Introduction

This chapter contains the necessary information for installing the instrument and the software

The installation procedures involve unpacking, power requirements, environmental requirements, interfacing and software installation.

2.2 Unpacking and Inspection

The instrument is shipped in one carton which includes:

- Instrument,
- Power cord,
- Computer connection cable,
- Software (depending on your order)
- Instruction manual (This manual)

2.2.1 Unpacking Procedure

1. Visually inspect, the container for damage, before opening it.
Report any damage immediately to the delivering carrier.
2. Place the carton in an upright position and open it.
3. Lift the instrument out of the carton and place it on a flat surface, free from dust, vibration and away from direct sunlight.
4. Open the plate cover and visually inspect the instrument for loose, bent or broken parts.
Report any damage immediately.
5. Compare the instrument's serial number, attached on the rear panel of the instrument, against the serial number of the instrument, on the delivery (shipping) note.
6. Check the instrument accessories against the delivery (shipping) note.
7. Please save all packing materials, as they maybe required for later transportation.

2.3 Power Requirements

The instrument has an autosensing power supply which operates in the voltage range from 90V to 260 V AC.

Check the voltage specifications on the rear panel of the Instrument.

WARNING:

For safe operation of the equipment it is mandatory that it is connected to a wall socket equipped with a ground (earth) connector.

For instructions how to change fuses please refer to chapter 4 of this manual.

2.4 Environmental Requirements

The instrument should be placed on an even surface that is free from dust, solvents and acidic vapors.

Vibration and direct sunlight must be avoided, to ensure correct results.

Before the instrument is installed and switched on, it should be left to stand for at least 2 hours, so there is no possibility of condensation causing a malfunction.

2.5 Warning and precautions

If inflammable, toxic or biologically hazardous substances are used when operating the equipment, please observe the instructions and precautions enclosed with such substance.

Never spill fluids in or on the equipment.

Wash your hands thoroughly after handling test fluids.

If equipment has been in contact with hazardous substances, it must be disinfected prior to shipment in accordance with the effective provisions.

Voltages dangerous to human life are present in this device. Do not remove any cover.

Ensure that only fuses with the rated current and of the specified type are used for replacement.

The instrument should be serviced by authorized service personnel only.

Do not expose the instrument to environmental condition outside the one described in the specifications. The system performance may be adversely affected if the instrument is operated outside the temperature range 10 – 35°C.

2.6 Safety symbols

The following safety symbols may be found in several locations on the instrument. Only persons who fully understand the safety precautions and recognize shock hazards should operate this instrument.



Alternating current



Earth ground terminal



Protective ground terminal



ON



OFF



Caution (see enclosed documents)



Caution, risk of electric shock

2.7 Instrument Installation Procedure

The following procedures detail the necessary steps to be followed when installing the Instrument.

When the requirements above have been met, the instrument is installed using the following procedure:

1. Place the instrument into the required position
Ensure, that the distance between the back panel of the instrument and the wall, is at least 10 cm.
2. Connect the instrument to the computer with the supplied interfacing cable.

The interfacing cable is connected into the 9 pin serial interface socket in the back panel of the instrument.

Plug the other side of the interface cable into a free serial interface socket of the computer. If the connector of the computer is a 25-pin type, use a 9 to 25-pin adapter.

3. Ensure the instrument's mains power switch in the back panel of the instrument is in the OFF position.
4. Insert the power cable into the mains power socket in the back panel of the instrument.

2.8 Installation of the software program

Please refer to the instructions given in the respective software manual.

Chapter 3

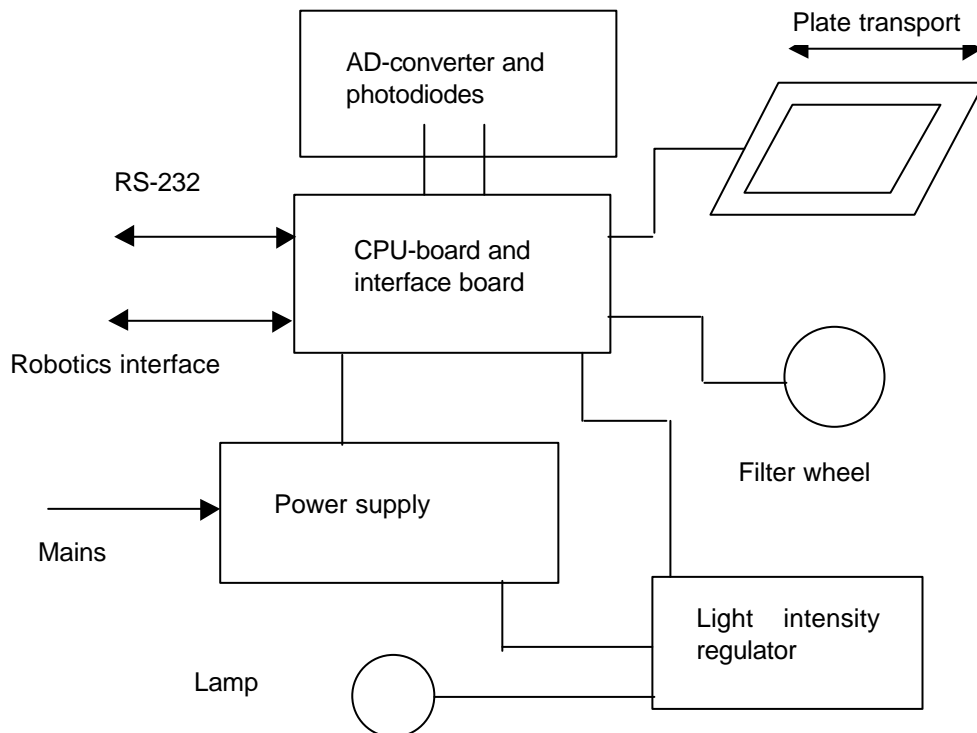
Theory of Operation

3.1 Introduction

This chapter gives the description of the main components, the optical system and describes the digital light control.

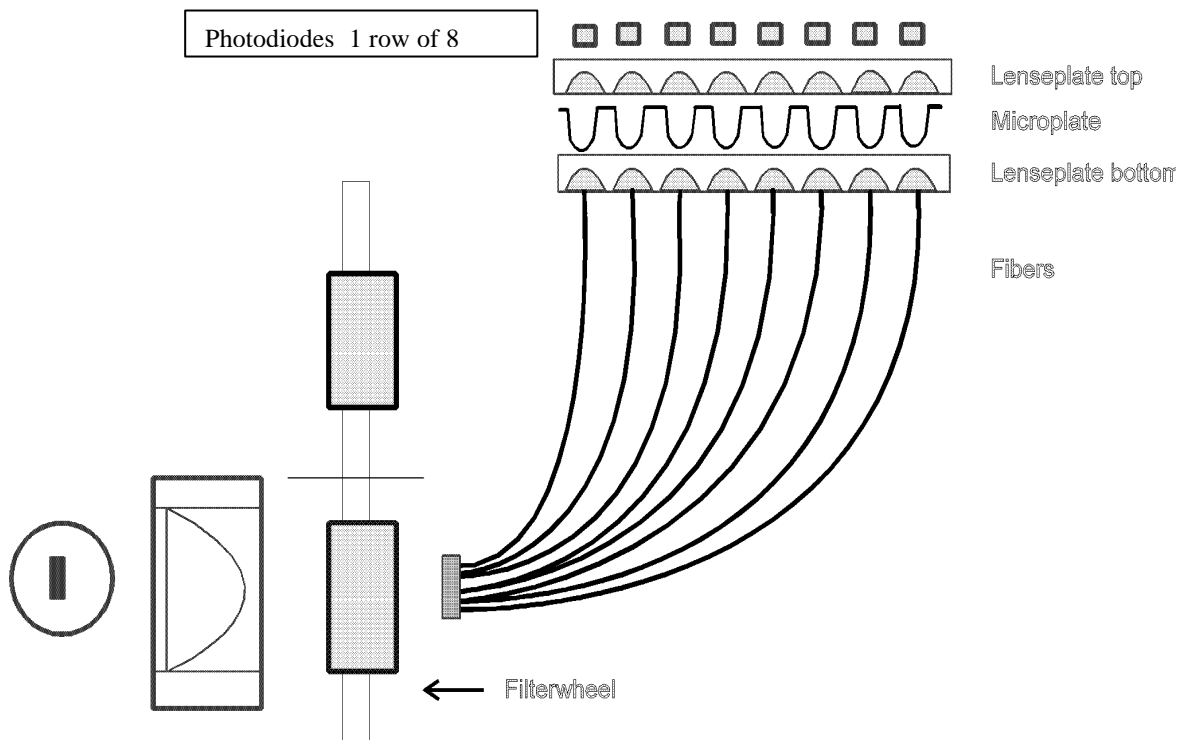
3.2 Main components

The main components of the reader are the CPU board, the Analog-Digital converter board with the photodiodes, the plate transport mechanism, the light source, the filterwheel and the power supply unit.



3.3 Optical system

The optical system consists of the lamp, the condenser lens, the interference filters on the six position filter wheel, the fibre bundle, a focusing lens for each of the eight measurement channels and eight silicon photodetectors with a focusing lens in front of each detector.



3.4 Description of the Digital Light Control

The CPU of the Expert96 reader can control the lamp intensity by means of a 16-bit Digital-Analog converter in combination with the lamp power-supply. At any time the microcontroller "knows" the status of the light control, so that measurement errors caused by undetected light control problems are prevented.

3.4.1 Calibration run

The calibration run is initiated any time a filter wavelength is to be changed or by specific request of the user. During the calibration run the lamp intensity for each wavelength is adjusted to a value that guaranties optimum measurement conditions and highest resolution.

3.4.2 Measurement

After the initial calibration run, the required light intensity for each wavelength is known by the system, this means that for any subsequent measurements the light intensity is set to the stored value and only a check is to be done.

Now the output for each of the sixteen channels, known as the 100% values, is stored and the plate transport starts moving. Several measurements are taken in the center of each well. After the measurement is finished, the absorbance is calculated under consideration of the 100% values and the so-called 'zero-measurement'. The results are then transmitted to the controlling PC.

This digital light control system prevents any drift out of the optimum operating range, known to current analogue light control systems.

The digital light control makes it possible to detect a lamp failure before the lamp has reached the end of its lifetime.

Another important feature is the active filter detection. If light intensity for a wavelength is different to the value in the memory, an error message will be displayed. Any wrong inserted or defective filter will cause therefore an error message.

Chapter 4

Maintenance

4.1 Introduction

This chapter gives the instructions on how to maintain, clean and disinfect the Expert 96.

4.2 Cleaning the Instrument

This instrument is a precision instrument and the requires regular cleaning to ensure the continued precision.

Liquid Spills

If any liquid is spilled in the instrument, it should be IMMEDIATELY removed so that the liquid does not run in to the Optical System and causes a loss of accuracy.

Regular cleaning

The housing of the instrument should be cleaned regularly with a mild household cleaning agent.

Warning: Do not use aggressive solutions

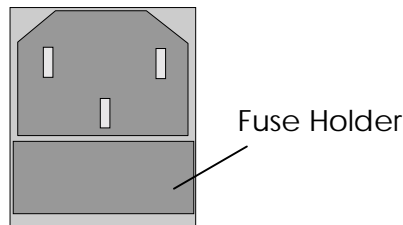
4.3 Changing the Fuses

The following steps must be performed to replace the fuse, which is located above the power cable connection, in the rear panel of the instrument.

WARNING

Before replacing fuses, disconnect the power cord. To avoid risk of fire, replace fuses only with same type and rating

1. Switch off the instrument and unplug the power cord.
2. Open the plastic cover of the fuse compartment, by inserting a screw driver into the slots at both sides of the cover and pushing the cover out.



3. Pull the fuse holder away from the instrument.
4. Replace the fuses only with the same type and rating.

Ensure that the fuses have the correct rating.

0.8 Amp slow blow (T type)

5. Replace the fuse holder.
6. Reconnect the power cord and switch the instrument on

WARNING: If the fuse continues to blow, please call for service.

4.4 Changing the Filters

The instrument is supplied with a filter wheel that contains up to 6 changeable filters.

To replace one or more of these filters, please perform the following procedure:

1. Switch off the instrument.
2. Slide the filter compartment cover plate at the right side of the instrument backwards.
3. Rotate the filter wheel, until the required filter or filter position is at the front.

The filter position one is marked with a yellow sticker. Filter position two is located *above* the filter one.

4. Pull the filter which is to be changed, out of the filter wheel.
5. Carefully insert the 'new' filter in to the filter wheel.

CAUTION:

Carefully hold the filter only by the edges to avoid any finger prints on filters.

6. Close the filter compartment cover.
7. Switch the instrument on.
8. After changing a filter, a calibration run is required. Please see Chapter 2 in this manual.

4.5 Cleaning an interference filter

If an interference filter is dirty it needs to be cleaned. For the cleaning procedure you need low-lint cotton-tipped swabs and a lens cleaning solution or reagent-grade isopropyl alcohol. First blow off dust and dirt with pressurized gas. Apply a few drops of the cleaner on both sides of the filter and wipe-off the dirt with the cotton swabs. Allow the cleaner to evaporate and then visually check the filter surface for streaks or spots. If there are any repeat the procedure.

When streaks or spots are visible which cannot be removed by the procedure as described above most probably they are inside the filter. In such a case the filter must be replaced.

Note: Interference filters do have a limited lifetime of a few years, depending on the humidity and ambient temperature. Under tropical conditions a filter may get unusable within less than two years.

4.6 Instrument Disinfection

All parts of the instrument that come into contact with patient sera or positive controls must be treated as potentially infectious.

It is very important that the instrument is thoroughly disinfected before it is removed from the Laboratory or any servicing is performed on it.

4.6.1 Disinfection Procedure

If the laboratory has no specific disinfection procedure, the following procedure should be used to disinfect the instrument.

The instrument should be disinfected using a suitable disinfection solution.

1. Disconnect the instrument from the mains power supply.
2. Disconnect the instrument from the computer.
3. Carefully wipe all the outside surfaces of the instrument and the plate support area with a wad of cotton wool that has been soaked in the disinfection solution.

Ensure that disposable gloves are worn.

4. Place the instrument in to a large plastic bag.
5. Place a wad of cotton wool that has been soaked in the disinfection solution in to the plastic bag.

Ensure that the wad is not touching the instrument.

6. Close and seal the plastic bag.
7. Leave the instrument to stand in the plastic bag for at least 24 hours.
8. After the standing time, remove the instrument from the plastic bag and wipe all the outside surfaces of the instrument and the plate support area with a wad of cotton wool which has been soaked in a 50% Alcohol solution.
9. Repeat the disinfection procedure on any accessories which are also being moved or returned.