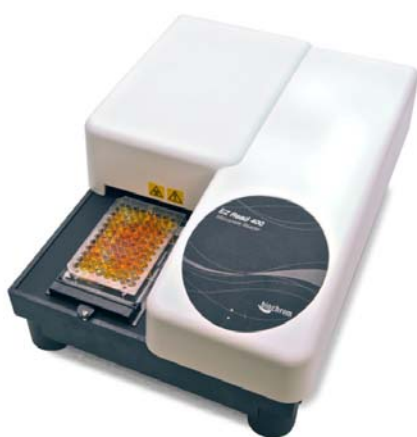


Biochrom EZ Read 400

Microplate Reader

User's Manual



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1 Declaration of Conformity for Biochrom Manufactured Products

This is to certify that the following Biochrom manufactured products conform to the requirements of the following Directives -:

EZ Read 400 Elisa (80-4001-40), EZ Read 400 Research (80-4001-41) and EZ Read 400 Flexi (80-4001-42)

2006/95/EC	Low voltage equipment safety directive
2004/108/EC	EMC directive
2002/96/EC & 2003/108/EC (WEEE)	EC Directive on Waste Electrical and Electronic Equipment
2002/95/EC	ROHS directive

Standards to which conformity is declared, where relevant, are as follows

EN61010-1:2010	Safety requirements for electrical equipment for measurement, control and laboratory use. General requirements
EN61326-1:2006	Electrical equipment for measurement, control and laboratory use -EMC Requirements
EN 12100-1,2:2003 (+A1:2009)	Safety of machinery – Basic concepts, general principles for design
EN 14121-1:2007	Safety of machinery, Risk assessment

For further information, including unpacking, positioning and installation of the products please refer to the user manual.

Signed:



Brian Clarkstone

Technical Director

Biochrom Ltd



2 Introduction and Intended Use

2.1 What to expect from the user's manual

This manual will allow the user to:

- ✓ Understand who should operate the instrument and why would be used.
- ✓ Understand all the important safety information when operating the instrument.
- ✓ How to safely unpack and install the instrument.
- ✓ Scope of supply
- ✓ Technical specifications
- ✓ A diagram of the outside of the instrument.
- ✓ A technical explanation of the workings of the instrument.
- ✓ How to use the instrument and the reader control software to perform basic measurements.
- ✓ Optional software and accessories that may be used with the instrument.
- ✓ Helpful hints for obtaining the best measurements using the instrument.

2.2 Instrument Use

The Biochrom EZ Read 400 Microplate Reader is used for microplate-based applications requiring endpoint or kinetic absorbance measurements from 400-750 nm in optically clear, flat-bottomed 96-well plates.

Only trained laboratory personnel should operate the Biochrom EZ Read 400 Microplate Reader. The Biochrom EZ Read 400 Microplate Reader is intended for general laboratory and research use only.



3 Safety Information

This symbol indicates that a potential for safety risk. Please carefully review the safety information provided below. If the instrument is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

3.1 Electrical Safety

To prevent electrically related injuries and property damage, properly inspect all electrical equipment prior to use and immediately report any electrical deficiencies. Contact a Biochrom service representative for instrument service requiring the removal of covers or panels.

3.1.1 Please note these particular electrical safety concerns:


- ✓ Voltages dangerous to human life are present in this device. Before removing any covers or panels disconnect the power supply from the power source.
- ✓ Ensure that only the power supply supplied with the unit is used.
- ✓ The power supply may only be inserted in a socket outlet provided with a protective ground (earth) contact. Use only the supplied mains lead cords with the instrument.
- ✓ The mains cord should be positioned in a way that enables disconnection in the event of an emergency
- ✓ Extensions cords should not be used with the instruments.
- ✓ Only a qualified service engineer should adjust or repair the instrument.



- ✓ Use the equipment only in the intended manner.

3.2 Chemical and Biological Safety

Normal operation of the Biochrom EZ Read 400 Microplate Reader may involve the use of materials that are toxic, flammable, infectious or otherwise biologically harmful.



This symbol denotes the potential for bio-hazardous material on or around the instrument. When using such materials, observe the following precautions:

- ✓ Handle infectious samples or dangerous materials in accordance with good laboratory practices.
- ✓ Wear protective clothing when using the instrument including but not limited to laboratory gloves, laboratory coat and safety glasses
- ✓ Observe all cautionary information printed on the original solutions containers prior to their use.
- ✓ Dispose of all waste solutions safely and in accordance with the policies and practices of your facility.
- ✓ Operate the Biochrom Anthos Microplate Reader in accordance with the instructions outlined in this manual.
- ✓ Use appropriate precautions when using pathological, toxic, or radioactive materials. Consult the MSDS of all materials used in the laboratory.
- ✓ Use an appropriately contained environment when using hazardous materials.
- ✓ 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. (See 6.4 Decontamination Instructions).

3.3 Safety issues regarding the use of a PC with the instrument:

This equipment may be connected and controlled from a PC. To preserve the integrity of the measuring equipment it is essential that the attached PC itself conforms to basic safety and EMC standards and is set up in accordance with the manufacturers' instructions. If in doubt consult the information that came with your PC. In common with all computer operation the following safety precautions are advised.

- ✓ To reduce the chance of eye strain, set up the PC display with the correct viewing position, free from glare and with appropriate brightness and contrast settings.
- ✓ To reduce the chance of cross contamination from biological samples, use appropriate personnel protection measures and disinfectant wipes on keyboard and mouse.

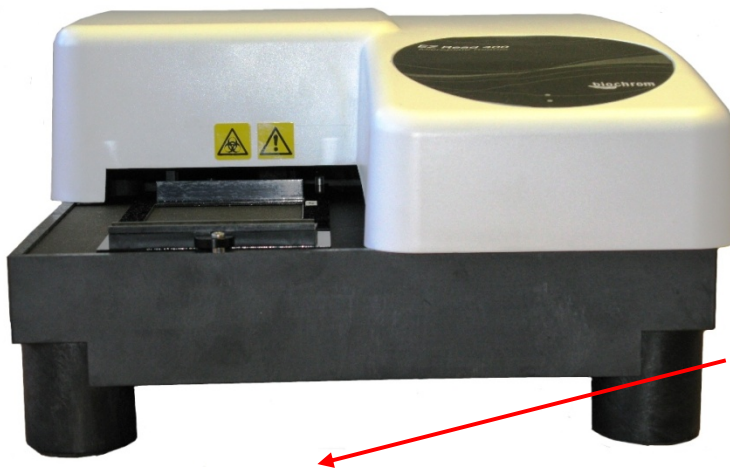
3.4 Safety concerns regarding moving parts:

- ✓ Do not touch the plate or the instrument during movement of the plate transport (risk of injury to the user or damage to the instrument).
- ✓ Keep the area around the microplate reader clear of clutter

3.5 Instrument Inputs and Outputs

Note the presence of Biohazardous and General safety signs present on the instrument.

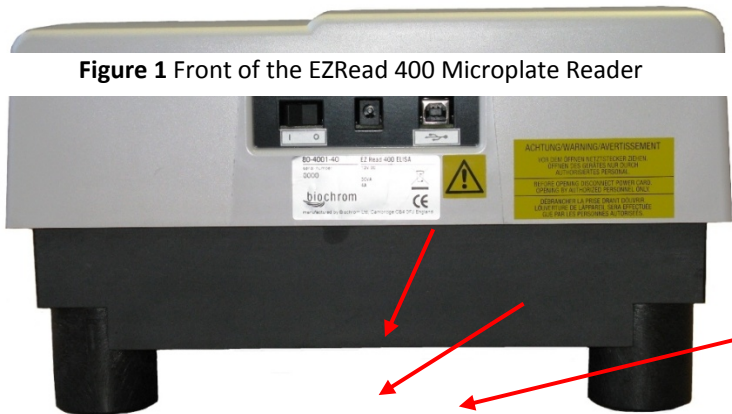
Review the safety information available in sections 2.1 and 2.2.
Place plate here prior to measurement.



Safety Symbol

Power Supply Input

Figure 1 Front of the EZRead 400 Microplate Reader



On/Off Switch

USB A to B cable Input

Figure 2 Back of the EZREAD 400 Microplate Reader



3.6 Instrument Validation

An optional check plate (see **6 Ordering Information** for details) can be purchased to ensure that the instrument is operating correctly. Validation with a check plate does not preclude the use of controls on the plate.

3.7 Table 1: Rated Operating Conditions

Table 1: Rated Operating Conditions	
Ambient light	Precaution, avoid direct sunlight
Ambient temperature	15 °C to +40 °C operation -25 °C to +50 °C storage
Height over sea level (operation):	up to 2000 m
Installation Category	II
Measurement unit	Voltage input 12 VDC Current input 4 A Power 50 VA
Noise	45 dB
PC connection	USB A to B cable
Pollution Degree	2
Power supply unit	Voltage input rating 100 VAC to 240 VAC 50 or 60Hz Current max 1.5A @ 90 VAC & full rated output load Voltage output 12 VDC Current output maximum 5 A
Relative humidity (non condensing)	20% to 80% operation 10% to 90% storage
Spectral width at half maximum intensity	8 nm
Ventilation	There are no special ventilation requirements
Warming-up time	None required
Wavelength accuracy	2 nm
Weight	<6 kg. Does not require any special lifting or carrying instructions

3.8 Unpacking the EZ Read 400

Note: The original packing has been especially designed to protect the instrument during transportation. It is therefore recommended to keep the original carton with its foam parts and the accessories box for re-use in case of future shipments. Warranty claims may be void if improper packing results in damage during transport.

1. Check the box for any visible damage during transportation. In case of damage inform your supplier immediately and keep the damaged packing.
2. Place the device on a suitable working surface
3. Remove the transportation lock (foam part) from the plate holder

3.9 Powering up the EZ Read 400 Microplate Reader

1. Connect the USB A to B cable from the PC to the instrument.
2. Connect mains lead to the instrument mains inlet.

Please Note: Keep the area around the instrument free from clutter to allow for easy access to the mains lead.

3. Connect the mains lead to the power supply. Ensure the mains lead is completely connected to the power supply.
4. Connect the power supply to the mains socket.
5. Switch on the mains socket and then switch on the power to the instrument (at the back of the instrument).
6. The power indicator is located on the front left side of the unit.

3.10 Cleaning and Disinfecting the Instrument

For disinfection, please follow the procedure below. Only authorized trained personnel using personal protective equipment should perform the cleaning and disinfection procedures. Ensure cleaning and disinfection occurs in a well-ventilated room.

Please Note: Before the reader can be returned to base for service, it must be disinfected and a disinfection certificate must be completed (see 7.3 Returns procedure for more details).

1. Switch off the reader and disconnect it from the mains power supply and the PC.
2. Carefully wipe off the entire reader with lint-free tissues that have been moistened in a protein degrading mild detergent or a saline solution.
3. Carefully wipe off the entire reader with non-lint tissues that have been moistened in ethanol or a chlorine solution.
4. Soak non-lint tissues that have been moistened in ethanol or a chlorine solution onto the plate transport mechanism and let it soak for \pm 30 minutes.
5. If a chlorine solution has been used, carefully wipe off the entire reader with non-lint tissues that have been soaked in water.
6. Dry the reader by wiping it off with non-lint tissues.

3.11 Emergency Instructions

In the event of an emergency the instrument should be disconnected from the power supply, power source and PC.



3.12 Safe Disposal of the Instrument

This symbol can be found on the outside of the instrument. It means that the Biochrom EZ Read 400 microplate reader cannot be disposed of in municipal waste. The instrument must be decontaminated as detailed in part 2.8 of this section.



3.13 Regular Maintenance

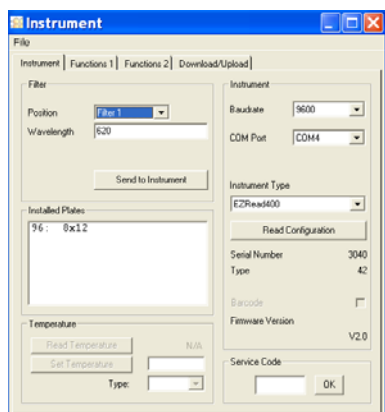
The EZ Read 400 microplate reader does not require regular maintenance for successful use unless it is used in a manner that is outside of the recommendations laid out in this manual or stored in an environment that is excessively dusty or humid. Please contact your distributor for any questions or concerns regarding the performance of the instrument.

4 Software Installation and Use

4.1 Software Installation

ADAP Basic is supplied with all EZ Read 400 instruments. The software can be used to control the reader to perform endpoint, kinetic and multiwavelength assays. Data analysis options are available with a software upgrade to ADAP Plus or ADAP Expert (See www.biochrom.co.uk for more information regarding ADAP Microplate Software).

1. **To turn on the instrument:** Connect instrument to a power source using the appropriate main lead to the power supply. Turn on the instrument using the switch at the back of the instrument.
2. **To connect the instrument to a PC:** Connect to the PC via serial port to serial port or a serial to USB port adaptor. Determine the communication port (com) used by the instrument. In the **Start** menu of the PC, go to **Control Panel\System\Hardware\Device Manager\Ports**.
3. **To connect instrument to ADAP software:** Insert the CD supplied with the instrument into PC, install ADAP. Open ADAP. ADAP will prompt for a user ID and password. Login using the pre-set ID and password: **sadmin/sadmin**. Once logged in, specific user IDs, passwords and administrative rights may be set.



4. Select **Setup>Instrument** in the menu bar. A dialogue box will open. Under the **Instrument** tab, select:

Baudrate: 9600

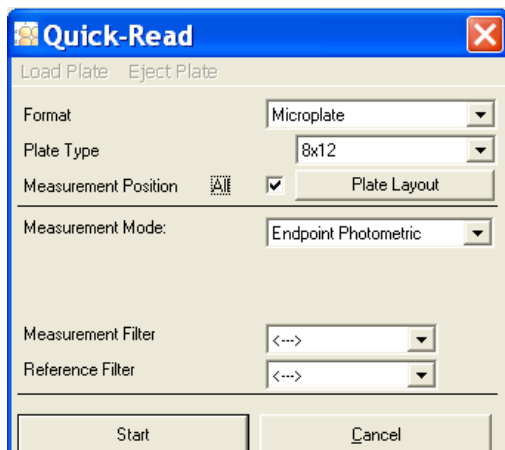
COM Port: select port (as determined in step 2) or Auto Sense

Instrument Type: EZRead400

5. To confirm that the instrument is connected with the computer, select the **Read Configuration** button. The serial number of the instrument should now appear in the **Setup>Instrument** dialogue box along with compatible plate types. Select **File>Save** to save settings.

6. The instrument is now ready for use

4.2 Endpoint Measurements



1. **To measure a plate:** Go to **Reading>Quick** or select the **R** button in the menu bar.

In the **Quick Read** dialogue box: Confirm that the correct format and plate type are selected.

Select **All** in **Measurement Position** to measure the entire plate.

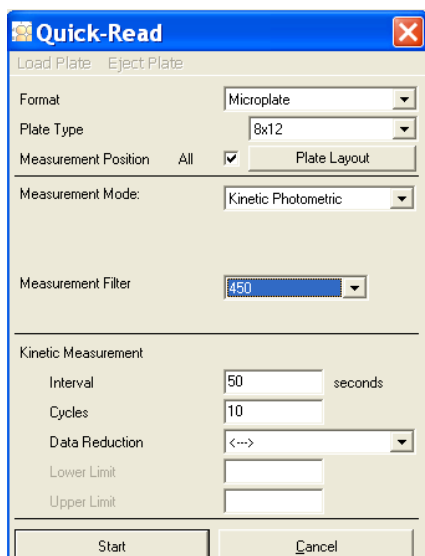
Select **Endpoint Photometric** for basic measurements using a measurement and reference filter.

Please Note: It is important to use a reference filter to account for optical inference resulting from the plate surface.

2. Place plate in the plate transporter. Select **Start**. Absorbance measurements will appear in the open matrix in ADAP. When prompted, enter a plate ID. Data can be exported to data analysis software using the **Copy** icon. Data will paste as a matrix with filter wavelength, with time and date.

4.3 Kinetic Measurements

The **Quick Read** menu is also used for other measurement modes, including kinetic reads. To access these additional modes, select **Quick Read**: Select **Kinetic Photometric** from the **Measurement Mode** drop-down menu.



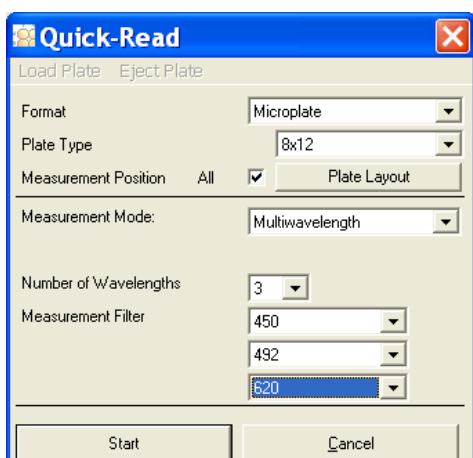
Select **Interval** time (seconds) between successive measurements (the minimum interval time is 45 seconds).

Select **Cycles** for the number of measurements that will be made in total.

Select **Data Reduction** method for analysis and **Smoothing points, Upper and Lower Limit**.*

Explanation of kinetics measurement data reduction methods including smoothing points and limits are discussed in detail in the ADAP Operator's Manual, Configuring the Data Reduction Parameter.

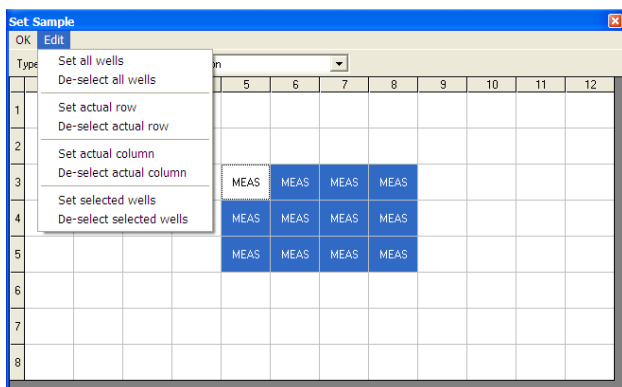
4.4 Multiwavelength Measurements



The Quick Read menu can also be used to perform multiwavelength measurements. Up to 8 wavelengths can be selected if all 8 positions are installed with interference filters.


Select as many Measurement Filters as desired.

4.5 Additional Features



The **Quick Read** menu can also be used to measure only selected wells on the plate. Use the **Edit** menu to select specific rows, columns for measurement. Specific wells can also be selected by highlighting the desired wells and then selecting **Set Selected Wells**. If the incorrect wells were selected simply select **De-select all wells** to start again.





4.6 **Calibrating the Instrument**

The EZ Read 400 performs an automatic calibration of the lamp energy before it measures each well. However if the user would like additional confirmation of the performance of the instrument; a calibration plate containing a series of neutral density filters with known optical density can be purchased to verify reader performance. See Section 6 Ordering for order details



5 General features

5.1 Measurement modes

Single, dual and multi-wavelength and kinetics measurements with absorbance data output in OD on display.

5.2 Integrated quality control

- ✓ Post-sample filtering to eliminate ambient light.
- ✓ Automatic calibration prior to each measurement.
- ✓ Plate centering system positions all flat-bottomed 96-well microplate conforming to ANSI SBS 1_2004 accurately under the optical path.

5.3 Scope of supply

- ✓ Instrument
- ✓ CD containing user's manual, ADAP Basic Software and ADAP operating manual
- ✓ USB A to B cable
- ✓ Dust cover
- ✓ Power supply
- ✓ Mains power cord

Please Note Only use the power supply and mains power cord supplied with the instrument.

5.4 Liability

In its original condition, the instrument meets all safety regulations for safe operation. If the instrument is used in a manner not specified in this user's manual, safety and performance may be affected. Biochrom is not liable for damages or costs caused by unauthorized alterations, repairs or modifications of the equipment.

6 Ordering Information and Accessories

Table 2 Ordering Information

Table 2: ORDERING INFORMATION	
80-4001-40	Biochrom EZ Read 400 ELISA Microplate Reader
80-4001-41	Biochrom EZ Read 400 Research Microplate Reader
80-4001-42	Biochrom EZ Read 400 Flexi Microplate Reader
B032082	ADAP Plus Software
B032083	ADAP Expert Software
S01087	Anthos 2010 Reader Check Plate

See www.biochrom.co.uk for a list of filters that are available for purchase.

7 Contact Information

7.1 Table 3 Contact Information

Table 3: Contact Information		
Department	Email contact	Telephone contact
Sales	enquiries@biochrom.co.uk	+44 (0) 1223 423723
Technical Support	support@biochrom.co.uk	+44 (0) 1223 427890
Orders	orders@biochrom.co.uk	+44 (0) 1223 427861 +44 (0) 1223 420 164 (Fax)
Returns	returns@biochrom.co.uk	+44 (0) 1223 427861
Human Resources	hr@biochrom.co.uk	
Accounts	accounts@biochrom.co.uk	+44 (0) 1223 427816



8 Appendix:

8.1 Helpful Hints for Successful Microplate Assays

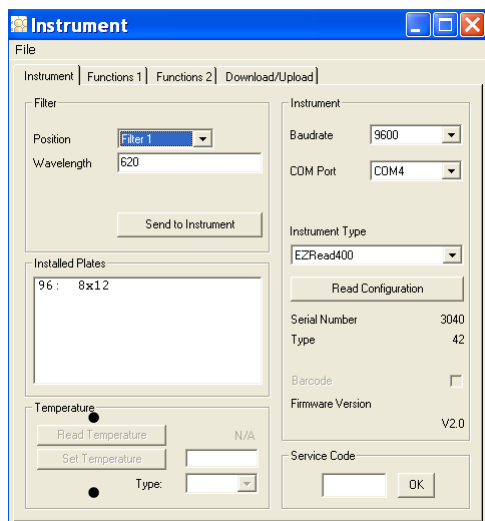
- ✓ Always insert the plate with well A1 on the upper left position.
- ✓ Keep plates clean: measurements in microplates are made through the surface of the plate and thus the surface should be as free as possible of debris, scratches and smudges. Wipe the plate clean with a lint-free tissue if necessary.
- ✓ Measurements may be affected by uneven or heterogeneous well contents. Visually inspect the plate for foaming, uneven meniscuses, bubbles or particles in the well, all of which can interfere with absorption. Centrifuge the plate if necessary to obtain a homogeneous solution in the wells.
- ✓ Use a reference measurement for reducing measurement error caused by interference from the plate material or contamination. (Use a reference wavelength at which your molecule of interest does not absorb. Many assays recommend a reference measurement at 620 nm.
- ✓ When using plate frames for column/row strips or single wells (breakable strips) check that all strips and wells are pushed down completely and are level with the frame.
- ✓ Keep the bottom of the plate dry. If liquid has contaminated the well bottoms or if condensation is present, dry the surface with a lint-free tissue.
- ✓ Use optically clear microplates with flat wells for the best results. Other microplates can be used as well: consult the Biochrom website for a list of microplates that are approved for use with the Biochrom EZ Read 400 Microplate Reader.

8.2 Quick Start Guide

Print this guide and keep in the lab with the Biochrom EZ Read 400 Microplate Reader for easy reference.

To turn on the instrument:

1. Connect instrument to a power source using the appropriate power cord. Turn on the instrument using the switch at the back of the instrument.
2. Check user's manual for important safety information.
3. To connect the instrument to a PC:
4. Connect to the PC via USB port. Determine the communication port (com) used by the instrument. In the Start menu of the PC, go to Control Panel\System\Hardware\Device Manager\Ports.
5. To connect instrument to ADAP software: Insert the CD supplied with the instrument into PC, install ADAP. Open ADAP. ADAP will prompt for a user ID and password. Login using the pre-set ID and password: sadmin/sadmin. Once logged as sadmin, specific user IDs, passwords and administrative rights may be set.



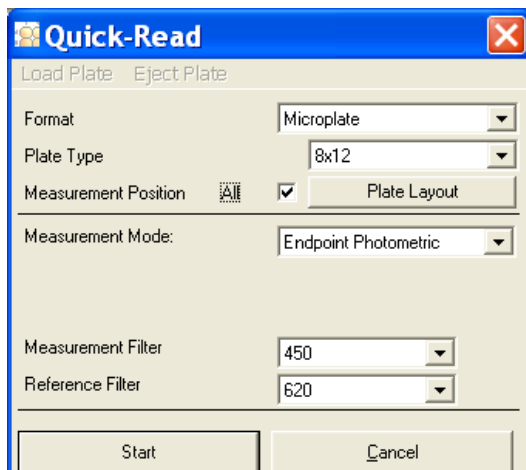
select 2010

6. Select **Setup/Instrument** in the task bar. A dialogue box will open:

Under the Instrument tab:

- In **Baudrate**, select 9600
- In **COM Port**, select port
- In **Instrument Type**,

7. To confirm that the instrument is connected with the computer, select the **Read Configuration** button. The serial number of the instrument should now appear in the Setup/Instrument dialogue box along with compatible plate types. Select File\Save to save these settings.



readings

8. To measure a plate: Go to **Reading/Quick** or the R button in the menu bar.

In the Quick-Read dialogue box: Confirm that the correct format and plate type are selected.

Select All in Measurement Position to read the entire plate.

Select Endpoint Photometric for basic

Select the measurement filter and the reference filter from the drop-down menu.

Please Note: It is important to use a reference filter to account for optical inference from the plate.

9. Place plate in the plate transporter. Select Start. Absorbance measurements will appear in the open matrix in ADAP. When prompted, enter a plate ID. Data can be exported to data analysis software using the Copy icon. Data will paste as a matrix with filter wavelength, with time and date.

8.3 Troubleshooting and Frequently Asked Questions

Please contact your distributor with any questions that you may have regarding the performance of your instrument.

Below is a list of frequently asked questions and answers:

1. What is the indication range of the EZ Read 400 and how does this specification differ from the linear range?

The Biochrom EZ Read 400 has an indication range of 0.000-3.300 OD and a linear range of 0.100-2.500 OD. We recommend that the broader indication range should be used only for relative determinations but not for determining the quantity of the absorbing material. Only measurements made within the linear range should be used for quantitative calculations.

2. If a measurement is made by the Biochrom EZ Read 400 that exceeds the maximum indication range, how is that measurement represented?

If a well measurement at a particular wavelength is greater than 3.300 OD, then the well will be represented as 9.999 in ADAP


3. When using ADAP software to control the Biochrom EZ Read 400, can specific wells be designated as blanks and can those values be automatically subtracted from the remaining wells?

The Biochrom EZ Read 400 comes with standard software, ADAP Basic which does not allow the user to define specific wells as it is only capable of basic reader control for endpoint and kinetic measurements with no analytic capabilities. The user can upgrade to ADAP Plus or ADAP Expert which allows many options for plate definition including designating the position of blanks, controls, standards, CAG strips and samples as well as the definition of a method to instantly analyze the data using the defined blanks, standards or controls.

4. Which Microsoft Windows operating systems are ADAP compatible with?

All Microsoft Windows operating systems are compatible with all ADAP modules: Basic, Plus and Expert.

5. Why do I get different readings from the same sample in different wells in the microplate?



There are many possible sources of assay imprecision. Among these, the quality of the microplate is paramount to the quality of the measurements because a microplate reader sends light through a sample vertically, either from top to bottom or bottom to top. Use of a high quality, optically clear microplate is important for reproducibility of sample measurements.

In addition, it is important to use a reference wavelength when measuring a microplate. Microplates may have smudges, scratches, lids and other forms of optical interference which may obstruct the light beam. A reference wavelength allows for a well by well control of imperfections in the plate.

When choosing a reference wavelength, use a wavelength at which the sample of interest does not absorb. 620nm is a frequently used reference wavelength in many absorbance applications in the visible range. Check the product data sheet for recommended reference wavelength for your specific assay.

6. How can I connect the instrument to ADAP?

The COM port number must be 1 – 9 in order to work correctly.

If the COM port number is not 1 – 9:

- a. Follow steps 1 & 2 above.
- b. Right click on the port which the instrument is connected to and select **'Properties'**.
- c. Click on the **'Port Settings'** tab.
- d. Click on the **'Advanced'** button.
- e. Change the COM port number to anything between 1 and 9, do not use number which say (in use).
- f. Click **OK** to save and exit back to the Device Manager window. The change to COM port number may not show until you close and re-open Device Manager (step 1).

Now that you know the COM port number and have successfully set it between 1 and 9, you need to instruct the measurement software to communicate on that COM port number.

To set COM port number from the software:

- a. Open ADAP (default username/password is 'sadmin/sadmin')
- b. Select **Setup > Instrument**, wait for the program as it may try communicating at this point, ignore any possible error.
- c. A window appears titled **'Instrument'**
- d. On the right hand side, set the **Baud Rate to 9600**
- e. Set the **COM** port number to that set in the above steps
- f. Set the instrument type to that of your instrument.

- g. Click on **'Read Configuration'** button
- h. If the serial number and type values below the button are filled with numbers of the instrument, communication is successful
- i. Click **File > Save**. All settings should now remain saved for future use.

7. I mistakenly placed my plate in the plate transporter after I started the measurement and now I can't get the plate back. How can I return the plate transporter to its original position?



now I can't get the plate back. How can I return the plate transporter to its original position?

Go to **Setup>Instrument** and select the **Functions 1** tab. Select initialize and wait a few minutes for the plate transporter to return to the home position