Epoch™
Microplate Spectrophotometer

Instructions for Use

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Part Number 7201009
Revision C
BioTek® Instruments, Inc.

Notices

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Instructions for Use Requirements

This document fulfills the basic needs of persons operating this device, according to the requirements of the *In Vitro* Diagnostic Directive for "Instructions for Use." Some of the device's higher-level functions and features, as well as certain detailed maintenance and qualification routines, are described in the *Epoch Operator's Manual*.

Intended Use Statement

The Epoch is a single-channel, automated, benchtop, general-purpose microplate monochromator that performs optical density measurements of samples in a microplate format. The user must evaluate this instrument with PC-based software in conjunction with the specific assay. This evaluation must include the confirmation that performance characteristics for the specific assay are met.

If the instrument has an "IVD" label, it may be used for clinical and non-clinical purposes, including research and development. If there is no such label, the instrument may be used only for research and development or other non-clinical purposes.

Quality Control

It is considered good laboratory practice to run laboratory samples according to instructions and specific recommendations included in the package insert for the test to be conducted. Failure to conduct Quality Control checks could result in erroneous test data.

Warnings

Operate the instrument on a level,stable surface away from excessive humidity.

Bright sunlight or strong incandescent light can reduce the linear performance range of the instrument.

Measurement values may be affected by extraneous particles (such as dust) in the microplate wells. A clean work area is necessary to ensure accurate readings.

When operated in a safe environment according to the instructions in this document, there are no known hazards associated with the instrument. However, the operator should be aware of certain situations that could result in serious injury; these may vary depending on the instrument type. See **Hazards and Precautions**.

Hazards and Precautions

Hazards

The following hazards are provided to help avoid injury:

Warning! Power Rating. The instrument's power supply must be connected to a power receptacle that provides voltage and current within the specified rating for the system. Use of an incompatible power receptacle may produce electrical shock and fire hazards.

Warning! Electrical Grounding. Never use a plug adapter to connect primary power to the external power supply. Use of an adapter disconnects the utility ground, creating a severe shock hazard. Always connect the power supply directly to an appropriate receptacle with a functional ground.

Warning! Service. Only qualified technical personnel should perform service procedures on internal components.

Warning! Accessories. Only accessories that meet the manufacturer's specifications shall be used with the instrument.

Warning! Internal Voltage. Always turn off the power switch and unplug the power supply before cleaning the outer surface of the instrument.

Warning! Potential Biohazards. Some assays or specimens may pose a biohazard. Adequate safety precautions should be taken as outlined in the assay's package insert. Always wear safety glasses and appropriate protective equipment, such as chemically resistant rubber gloves and apron.

Warning! Liquids. Avoid spilling liquids on the reader; fluid seepage into internal components creates a potential for shock hazard or instrument damage. If a spill occurs while a program is running, abort the program and turn off the instrument. Wipe up all spills immediately. Do not operate the instrument if internal components have been exposed to fluid.

Warning! Unspecified Use. Failure to operate this equipment according to the guidelines and safeguards specified in this manual could result in a hazardous condition.

Warning! Software Quality Control. The operator must follow the manufacturer's assay package insert when modifying software parameters and establishing reading methods. **Failure to conduct quality control checks could result in erroneous test data.**

Warning! Reader Data Reduction Protocol. No limits are applied to the raw absorbance data. All information exported via computer control must be thoroughly analyzed by the operator.

Precautions

The following precautions are provided to help avoid damage to the instrument:

Caution: Environmental Conditions. Do not expose the system to temperature extremes. For proper operation, ambient temperatures should remain within the range listed in the **Specifications** chapter. Performance may be adversely affected if temperatures fluctuate above or below this range. Storage temperature limits are broader.

Caution: Spare Parts. Only approved spare parts should be used for maintenance. The use of unapproved spare parts and accessories may result in a loss of warranty and potentially impair instrument performance or cause damage to the instrument.

Caution: Service. The instrument should be serviced only by BioTek-authorized service personnel.

Caution: Sodium Hypochlorite. Do not expose any part of the instrument to the recommended diluted sodium hypochlorite solution (bleach) for more than 20 minutes. Prolonged contact may damage the instrument surfaces. Be certain to rinse and thoroughly wipe all surfaces.

Caution: Power Supply. Only use the power supply shipped with the instrument within the range of line voltages listed on it.

Caution: Carrier Shipping Bracket. The microplate carrier shipping bracket must be removed before operating the instrument and reinstalled before repackaging the instrument for shipment.

Caution: Disposal. This instrument contains printed circuit boards and wiring with lead solder. Dispose of the instrument according to Directive 2002/96/EC, "on waste electrical and electronic equipment (WEEE)" or local ordinances.

Caution: Warranty. Failure to follow preventive maintenance protocols may **void the warranty.** See the **Maintenance** chapter for preventive maintenance procedures.

Caution: Electromagnetic Environment. Per EN 61326-2-6 it is the user's responsibility to ensure that a compatible electromagnetic environment for this instrument is provided and maintained in order that the device will perform as intended.

Caution: Electromagnetic Compatibility. Do not use this device in close proximity to sources of strong electromagnetic radiation (e.g., unshielded intentional RF sources), because these may interfere with the proper operation.

CE Mark

Based on the testing described below and information contained herein, this instrument bears the CE mark.

❖ Refer to the Declaration of Conformity for specific details.

Directive 2004/108/EC: Electromagnetic Compatibility

Emissions—CLASS A

The system has been type-tested by an independent, accredited testing laboratory and found to meet the requirements of EN 61326-1: Class A for Radiated Emissions and Line Conducted Emissions. Verification of compliance was conducted to the limits and methods of EN 55011—CISPR 11, Class A. In a domestic environment it may cause radio interference, in which case you may need to mitigate the interference.

Immunity

The system has been type-tested by an independent, accredited testing laboratory and found to meet the requirements of EN 61326-1 and EN 61326-2-6 for Immunity. Verification of compliance was conducted to the limits and methods of the following:

EN 61000-4-2, Electrostatic Discharge

EN 61000-4-3, Radiated EM Fields

EN 61000-4-4, Electrical Fast Transient/Burst

EN 61000-4-5, Surge Immunity

EN 61000-4-6, Conducted Disturbances from RFI

EN 61000-4-11, Voltage Dips, Short Interruptions and Variations

Directive 2006/95/EC Low Voltage (Safety)

The system has been type-tested by an independent testing laboratory and was found to meet the requirements of this Directive. Verification of compliance was conducted to the limits and methods of the following:

EN 61010-1, "Safety requirement for electrical equipment for measurement, control and laboratory use. Part 1, General requirements."

EN 61010-2-81, "Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes."

Directive 2002/96/EC: Waste Electrical and Electronic Equipment

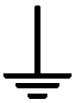
Disposal Notice: This instrument contains printed circuit boards and wiring with lead solder. Dispose of the instrument according to Directive 2002/96/EC, "on waste electrical and electronic equipment (WEEE)" or local ordinances.

Directive 98/79/EC: In Vitro Diagnostics (if labeled for this use)

- Product registration with competent authorities.
- Traceability to the U.S. National Institute of Standards and Technology (NIST).
- EN 61010-2-101, "Particular requirements for in vitro diagnostic (IVD) medical equipment."

Safety Symbols

Some of the following symbols may appear on the instrument:

	Alternating current Courant alternatif Wechselstrom Corriente alterna Corrente alternata		Both direct and alternating current Courant continu et courant alternatif Gleich - und Wechselstrom Corriente continua y corriente alterna Corrente continua e corrente alternata
	Direct current Courant continu Gleichstrom Corriente continua Corrente continua		Earth ground terminal Borne de terre Erde (Betriebserde) Borne de tierra Terra (di funzionamento)
	On (Supply) Marche (alimentation) Ein (Verbindung mit dem Netz) Conectado Chiuso		Protective conductor terminal Borne de terre de protection Schutzleiteranschluss Borne de tierra de protección Terra di protezione
	Off (Supply) Arrêt (alimentation) Aus (Trennung vom Netz) Desconectado Aperto (sconnessione dalla rete di alimentazione)		Caution (refer to accompanying documents) Attention (voir documents d'accompanement) Achtung siehe Begleitpapiere Atención (vease los documentos incluidos) Attenzione, consultare la doc annessa
	Warning, risk of electric shock Attention, risque de choc électrique Gefährliche elektrische schlag Precaución, riesgo de sacudida eléctrica Attenzione, rischio di scossa elettrica	 	Warning, risk of crushing or pinching Attention, risque d'écrasement et pincement Warnen, Gefahr des Zerquetschens und Klemmen Precaución, riesgo del machacamiento y sejeción Attenzione, rischio di schiacciare ed intrappolarsi

	Warning, hot surface Attention, surface chaude Warnen, heiße Oberfläche Precaución, superficie caliente Attenzione, superficie calda		Warning, potential biohazards Attention, risques biologiques potentiels Warnung! Moegliche biologische Giftstoffe Atención, riesgos biológicos Attenzione, rischio biologico
	In vitro diagnostic medical device Dispositif médical de diagnostic in vitro Medizinisches In-Vitro-Diagnostikum Dispositivo médico de diagnóstico in vitro Dispositivo medico diagnostico in vitro		Separate collection for electrical and electronic equipment Les équipements électriques et électroniques font l'objet d'une collecte sélective Getrennte Sammlung von Elektro- und Elektronikgeräten Recogida selectiva de aparatos eléctricos y electrónicos Raccolta separata delle apparecchiature elettriche ed elettroniche
	Consult instructions for use Consulter la notice d'emploi Gebrauchsanweisung beachten Consultar las instrucciones de uso Consultare le istruzioni per uso		

Installation

Package Contents and Accessories

Item	Part #
Epoch Operator's Manual	7201000
Power supply	01281
Power cord	varies according to country of use
USB cable with Virtual COM Driver Software	75108 7090204

1: Unpack and Inspect the Instrument

Save all packaging materials! If you need to ship the reader to BioTek for repair or replacement, you must use the original materials. Using other forms of commericially available packaging materials, or failure to follow the repackaging instructions, may void your warranty. If the original packaging materials have been damaged, replacements are available from BioTek.

Inspect the shipping box, packaging, instrument, and accessories for signs of damage. If the reader is damaged, notify the carrier and your manufacturer's representative. Keep the shipping cartons and packing material for the carrier's inspection. The manufacturer will arrange for repair or replacement of your instrument immediately.

2: Remove the Shipping Hardware

The Epoch is shipped with shipping hardware that must be removed before the reader is used, and saved in case the instrument needs to be repackaged for shipment. See **Figure 1**.

1. Using a screwdriver, remove the shipping screw (PN 19502) and o-ring (PN 19608) assembly.
2. Using your fingers, remove the rubber plug (PN 19610).
3. Install the plug in the hole where the shipping screw was originally located, and insert the screw and o-ring in the hole where the plug was originally located. See **Figure 2**.

❖ The plug prevents light from entering the test chamber during operation.

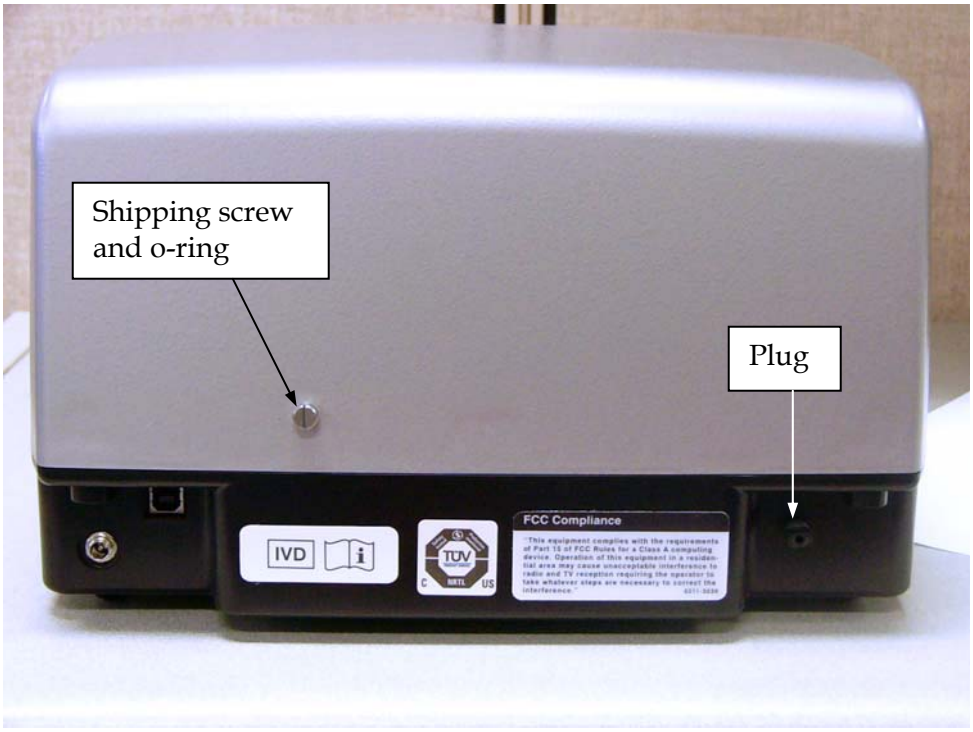


Figure 1

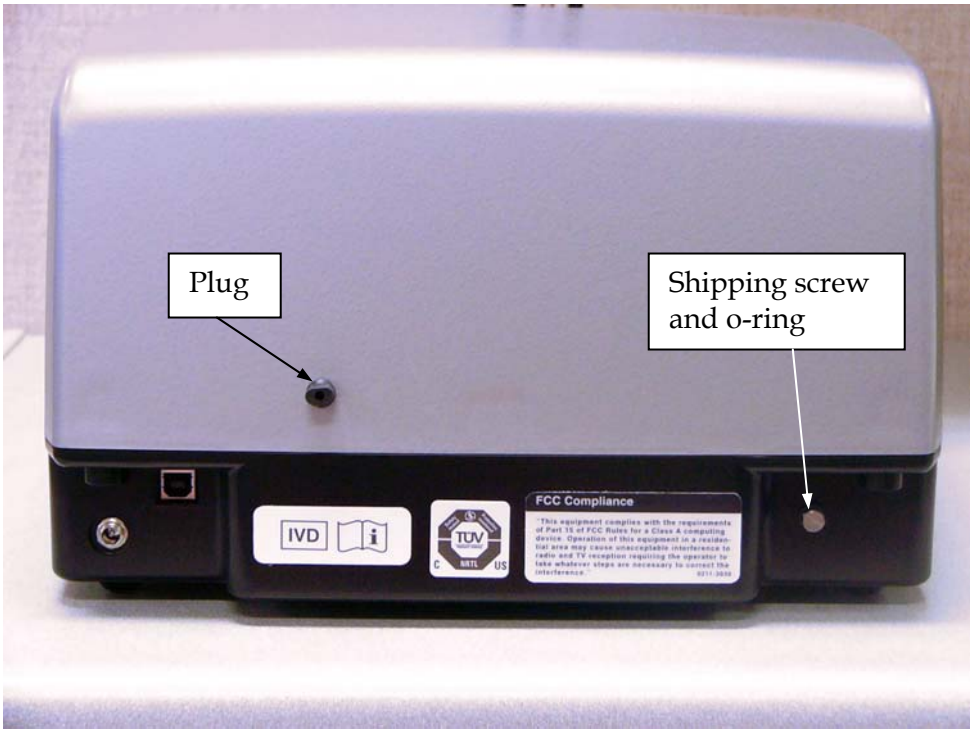


Figure 2

3: Select an Appropriate Location

Install the Epoch on a clean, level surface in an area where ambient temperatures between 18°C (64°F) and 40°C (104°F) can be maintained. The reader is sensitive to extreme environmental conditions. Avoid the following conditions:

- **Excessive humidity:** Condensation directly on the sensitive electronic circuits can cause the instrument to fail internal self-checks. The humidity must be in the range of 10% to 85%, non-condensing.
- **Excessive ambient light:** Bright light can reduce the linear performance range and affect the instrument's readings.
- **Dust:** Readings may be affected by extraneous particles (such as dust) in the microplate wells. A clean work area is necessary to ensure accurate readings.
- **Excessive vibration:** Do not place the reader on a surface that is shared with machines that cause the surface to vibrate.

4: Connect the Power Supply

Power Rating. The instrument's power supply must be connected to a power receptacle that provides voltage and current within the specified rating for the system. Use of an incompatible power receptacle may produce electrical shock and fire hazards.

Electrical Grounding. Never use a plug adapter to connect primary power to the external power supply. Use of an adapter disconnects the utility ground, creating a severe shock hazard. Always connect the power supply directly to an appropriate receptacle with a functional ground.

1. Connect the power cord to the external 24-volt power supply.
2. Connect the power supply's outlet plug to the 24-VDC connector on the rear of the instrument.
3. Tighten the plug barrel to retain the plug.
4. Plug the other end of the power cord into an appropriate power receptacle.

5: Connect the Host Computer

1. Turn the computer off. If the reader is on, turn it off.
2. Using the supplied USB cable, connect one end of the cable to the USB port on the computer.
3. Connect the other end of the cable to the USB port on the rear of the reader.

6: Install the Software on the Host Computer

Turn on the computer and install Gen5 software on the computer. Refer to the *Gen5 Getting Started Guide* for software installation (and registration) instructions.

7: Turn on the Reader

1. Locate the power on/off switch on the front of the instrument, next to the carrier eject button.
2. Turn on the power. The reader will perform an internal Self-Test and carrier-homing sequence. The reader will then eject the carrier outside the reader, then retract it to its home position inside the reader before it ejects it again.

Repackaging and Shipping

❖ Refer to the *Epoch Operator's Manual* for complete instructions for repackaging and shipping the reader.

Decontaminate the reader to minimize the risk to all who come in contact with the reader during shipping, handling, and servicing. Decontamination prior to shipping is required by the U.S. Department of Transportation regulations. See the **Maintenance** chapter for decontamination instructions.

The instrument's packaging design is subject to change over time. If the instructions in this section do not appear to apply to the packaging materials you are using, please contact BioTek's Technical Assistance Center for guidance.

Replace the shipping hardware before repackaging the reader for shipment. Please contact BioTek if you have misplaced any of the hardware and order part number 7203003.

If you need to ship the Epoch to BioTek for service or repair, be sure to use the original packaging materials. Other forms of commercially available packaging are not recommended and can void the warranty.

The shipping materials are designed to be used no more than five times. If the original materials have been damaged, lost, or used more than five times, contact BioTek to order replacements.

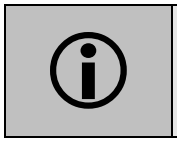
Getting Started

Overview

The Epoch is a completely computer-controlled instrument. Gen5 is the primary operating software.

For users requiring a custom interface to the Epoch, there are other methods of computer-controlling the reader. A typical example of this requirement is the need to integrate the Epoch into an automated system.

Controlling the Reader with Gen5



Before installing Gen5, verify that your computer meets the minimum system requirements specified in the *Gen5 Getting Started Guide*.

Setting Up Gen5

The following instructions **briefly** show you how to set up Gen5 for operation of the reader. Refer to the *Gen5 Getting Started Guide* or Help system for more detailed instructions.

1. Turn off the computer and the reader. Connect the USB cable (PN 75108) between the two machines, then turn on both machines.
2. Install Gen5 on the computer's hard drive and register the software with BioTek.
3. Refer to the instructions that shipped with the "USB Virtual COM Driver Software" CD to install the necessary drivers.
4. Start Gen5.
5. (Gen5 Secure) Log in if prompted. The default System Administrator password is **admin**.
6. From the Gen5 main screen, select **System > Instrument Configuration > Add**.
7. Set the Reader Type to **Epoch**.
8. Select **Plug & Play**.

❖ An Epoch must be connected to the computer and turned on to appear in the Available Plug & Play Readers list.

9. Click **Test Comm**. Gen5 attempts to communicate with the reader.

- If you receive "The Reader is communicating!" message, click **OK**, and then click **OK** again to save the settings. Click **Close** at the Reader Configuration dialog to return to the main screen.
- If the test is not successful and you receive an error message, refer to the **Troubleshooting** section of the Gen5 Help system for assistance.
- **Gen5 Secure only:** An Audit Trail dialog will appear after exiting Reader Configuration, whenever you add, modify, or delete a reader. If desired, enter any comments, then click **Close**.

Getting Started with Gen5

The following instructions briefly show you how to perform a read in Gen5. If the reading is part of an experiment or assay that you will perform numerous times, create a new protocol (in Gen5 v2.0 and higher, in the Task Manager click **Protocol > Create New**; in Gen5 v1.09 through Gen5 v1.11, click **File > New Protocol**).

❖ The plate the user is using must match the plate defined in Gen5. Otherwise, the results of the read may be invalid. For example, if a 96-well plate is defined for a procedure, a 96-well plate must be used when running an experiment based on that procedure.

In Gen5 v2.0 and higher:

1. In the Gen5 Task Manager, select **Read Now**.
2. Click **New**. Gen5 opens the Experiment workspace.
3. Define the parameters for the read.

❖ You can also click **Existing protocol** from the Task Manager to read a plate using an already defined protocol.

4. Gen5 reads the plate, then prompts you to save the experiment and export the results.

In Gen5 v1.09 through Gen5 v1.11:

1. From the Gen5 main screen, click **File > New Experiment**.
2. Select **Default Protocol**, then click **OK**.
3. Select **Plate > Read**.
4. In the Procedure dialog, select a plate type.
5. Click **Read** and select a Read Type and define the parameters for the read.
6. When finished, click **OK**.

❖ Click **Validate** if you would like Gen5 to verify the defined parameters. If all parameters are valid, you will receive confirmation. If any parameters are invalid, Gen5 provides information for correcting the problem. Refer also to the **Troubleshooting** section of the Help system.

7. In the Plate Reading dialog, enter any desired information, place the plate on the carrier, then click **READ**.
8. In the Save As dialog, select a file location and click **Save**.
9. Click **OK** when the Load Plate dialog appears. The plate is read.

Maintenance

Overview

A general Preventive Maintenance (PM) regimen for the Epoch includes periodically cleaning all exposed surfaces and decontaminating the instrument before storage or shipment.

Recommended Maintenance Schedule

MAINTENANCE		
TASK	**As Needed**	**Before Storage or Shipment**
Clean plate carrier and all exposed surfaces	✓	
Decontaminate the instrument		✓

Required Materials

- Mild detergent
- Deionized or distilled water
- Clean, lint-free cotton cloths
- Sodium hypochlorite (NaClO, or bleach) (decontamination only)
- Safety glasses
- Surgical mask
- Protective gloves
- Lab coat
- Biohazard trash bags
- 125-mL beakers
- Cotton swabs or paper towels

Warnings and Precautions

Please read the following before performing any maintenance procedures.

	**Warning! Internal Voltage.** Turn off and disconnect the Epoch from its power supply for all cleaning and decontamination operations.
	**Warning!** Wear prophylactic gloves when handling contaminated instruments. Gloved hands should be considered contaminated at all times; keep gloved hands away from eyes, mouth, nose, and ears. Eating and drinking while decontaminating instruments is not advised.
	**Warning!** Mucous membranes are considered prime entry routes for infectious agents. Wear eye protection and a surgical mask when there is a possibility of aerosol contamination. Intact skin is generally considered an effective barrier against infectious organisms; however, small abrasions and cuts may not always be visible. Wear protective gloves when handling contaminated instruments.
	**Important!** Do not immerse the instrument, spray it with liquid, or use a "wet" cloth. Do not allow water or other cleaning solution to run into the interior of the instrument. If this happens, contact BioTek's Technical Assistance Center.

Routine Cleaning Procedure

	Turn off the Epoch and disconnect it from the power supply for the cleaning procedure.

A regular cleaning regimen is recommended to keep the instrument free from dust and particulates that can cause erroneous readings. Exposed surfaces may be cleaned (not decontaminated) with a cloth moistened (not soaked) with water or water and a mild detergent.

1. Turn on the Epoch and press the carrier eject button to eject the microplate carrier.
2. Turn off and unplug the reader from the power supply.
3. Moisten a clean, lint-free cloth with water, or with water and the mild detergent. **Do not soak the cloth.**

4. Wipe the plate carrier and all exposed surfaces of the instrument.
5. If detergent was used, wipe all surfaces with a cloth moistened with water.
6. Use a clean, dry lint-free cloth to dry all wet surfaces.

❖ If liquid is spilled inside the reader, call BioTek TAC for cleanup instructions.

Decontamination

Any laboratory instrument that has been used for research or clinical analysis is considered a biohazard and requires decontamination prior to handling.

Decontamination minimizes the risk to all who come in contact with the instrument during shipping, handling, and servicing. Decontamination is required by the U.S. Department of Transportation regulations.

Persons performing the decontamination process must be familiar with the basic setup and operation of the instrument.

	BioTek Instruments, Inc., recommends the use of the following decontamination solutions and methods based on our knowledge of the instrument and recommendations of the Centers for Disease Control and Prevention (CDC). Neither BioTek nor the CDC assumes any liability for the adequacy of these solutions and methods. Each laboratory must ensure that decontamination procedures are adequate for the Biohazard(s) they handle.
	**Internal Voltage.** Turn off and unplug the instrument for the decontamination procedure.
	The bleach solution is caustic; wear gloves and eye protection when handling the solution.

1. Turn on the Epoch and press the carrier eject button to eject the carrier.
2. Turn off and unplug the reader from the power supply.
3. Prepare an aqueous solution of 0.5% sodium hypochlorite (NaClO, or bleach).
   - Check the percent NaClO of the bleach you are using. Commercial bleach is typically 10% NaClO; prepare a 1:20 dilution. Household bleach is typically 5% NaClO; prepare a 1:10 dilution.
4. Moisten a clean, lint-free cloth with the bleach solution. Do not soak the cloth.

5. Wipe the plate carrier and all exposed surfaces of the instrument.
6. Allow the instrument to dry for 20 minutes for thorough decontamination by the bleach.
7. Moisten a cloth with deionized or distilled water and wipe all surfaces of the instrument that have been cleaned with the bleach solution.
8. Use a clean, dry lint-free cloth to dry all wet surfaces.
9. Discard the used gloves and cloths, using a biohazard trash bag and an approved biohazard container.

Instrument Testing

System Test

The Epoch automatically runs an internal System Test each time it is powered on. This test confirms that the light levels and electronic noise at all set wavelengths fall within factory acceptance criteria, and accomplishes this by measuring the air and dark readings and evaluating them to ensure they fall within specified ranges.

If the carrier shipping hardware has not been removed from the carrier, the power-on System Test is not initiated and the instrument beeps.

If the reader fails the Self-Test, note any error messages displayed in Gen5, and refer to the *Gen5 Getting Started Guide* for a list of possible error codes.

To obtain a report of the System Test values for either periodic testing documentation or troubleshooting, follow the instructions in the *Gen5 Getting Started Guide* or the Gen5 Help system.

Absorbance Plate Test

Description

This test uses BioTek's 7-Filter Absorbance Test Plate (PN 7260522) to confirm the mechanical alignment; optical density accuracy, linearity, and repeatability; and wavelength accuracy to NIST-traceable values. The Absorbance Plate Test compares the reader's optical density and wavelength measurements to NIST-traceable values.

Test Plate Certificates

To run this test on the Epoch, you will need BioTek's 7-Filter Absorbance Test Plate (PN 7260522) with its accompanying certificates.

The Absorbance OD Standards section contains NIST-traceable standard OD values for the filters at several different wavelengths. We recommend testing at six wavelengths—those at or close to the wavelengths used in your assays.

The Wavelength Accuracy Standards section contains Expected Peak wavelength values for the filter in position C6 on the plate. Each value has a valid test range and expected peak range recorded on the accompanying data sheet. For example, an Expected Peak value may be 586 nm with tolerance values of –6/+4 (or a test range of 580 to 590).

Define the Absorbance Test Plate Parameters

1. Obtain the certificates that came with the Test Plate.
2. Start Gen5 and from the Gen5 main screen, click **System > Diagnostics > Test Plates > Add/Modify Plates**.
3. Click **Add**. The Absorbance Test Plate dialog appears.
4. Select the appropriate plate type and enter the plate's serial number.
5. Enter the last and next certification dates, found on the calibration sticker on the Test Plate.

> ❖ Click **Help** for guidance when setting the wavelengths and entering the OD and peak wavelength values.

6. Review the values you entered, and then click **OK** to save the data.

The wavelengths and corresponding calibration data that have been entered will now be available in Gen5 each time the Absorbance Plate Test is performed.

Procedure

1. From the Gen5 main screen, click **System > Diagnostics > Test Plates > Run**.
2. If prompted, select the desired Test Plate and click **OK**.
3. When the Absorbance Test Plate Options dialog appears, select **Perform Peak Wavelength Test**, if it is not already selected.
4. Highlight the wavelength or wavelengths to be included in this test.

> ❖ You need to select only those wavelengths that are most appropriate for your use of the reader.

5. Enter any comments, if desired.
6. Click **Start Test**.
7. Place the Test Plate in the microplate carrier so that well A1 is in the left-rear corner of the carrier (as you are facing the carrier).
8. Click **OK** to run the test.
9. When the test is completed, the results report appears. Scroll through the report; every result should show PASS.

Results and Troubleshooting Tips

- **Peak Absorbance:** When the test is performed, the C6 filter is scanned at the test range(s) defined by the user in the Absorbance Test Plate dialog. To verify wavelength accuracy, the wavelength of the maximum absorbance is compared with the peak wavelength value entered in the software, which

comes from the certificate supplied with the Test Plate. The accuracy of the wavelength should be ± 3 nm (± 2 nm instrument, ± 1 nm filter allowance).

If the reader fails this test:

- Make sure the information entered into Gen5 matches the information on the Test Plate's certificate.
- Verify that the Test Plate actually has a filter in location C6.
- Check the C6 filter to make sure it is clean. If needed, clean it with lens paper.

❖ Do not remove the filter from the Test Plate, and do not use alcohol or other cleaning agents.

- Make sure the Test Plate is within its calibration certification period. The calibration sticker is affixed directly to the plate. If it is out of date, contact BioTek to schedule a recertification.
- Check the microplate carrier to ensure it is clear of debris.

- **Alignment:** This portion of the test measures the alignment of the microplate carrier with the optical path. A reading greater than 0.015 OD represents an out-of-alignment condition.

  If the reader fails this test:

  - Ensure that the Test Plate is correctly seated in the microplate carrier.
  - Check the four alignment holes (B2, B12, G1, and G11) to ensure they are clear of debris.
  - Check the microplate carrier to ensure it is clear of debris.

- **Accuracy:** Accuracy is a measure of the optical density of Test Plate wells C1, D4, E2, F5, G3, and H6 as compared with known standard values contained in the certificate that accompanies each Test Plate.

  If the reader fails this test:

  - Verify that the filter calibration values entered in Gen5 are the same as those on the Test Plate's certificate.
  - Check the neutral-density filters on the Test Plate to ensure they are clean. If necessary, clean them with lens paper.

❖ Do not remove the filter from the Test Plate, and do not use alcohol or other cleaning agents.

- Verify that the Test Plate is within its calibration certification period. The calibration sticker is affixed directly to the plate. If it is out of date, contact BioTek to schedule a recertification.

- **Repeatability:** Repeatability is a measure of the instrument's ability to read the same well with minimum variation between two reads with the well in the same location.

  If the reader fails this test:

  - Check the neutral-density filters on the Test Plate to ensure there is no debris that may have shifted between readings and caused changes.
  - Check the microplate carrier to ensure it is clear of debris.

Liquid Testing

The Absorbance Liquid Test confirms repeatability and alignment of the reader when a solution is used in the microplate. If the test passes, then the lens placement and optical system cleanliness are proven.

Materials

- New 96-well, flat-bottom microplates (Corning Costar #3590 is recommended)
- Stock Solution A or B, which can be formulated by diluting a dye solution available from BioTek (A) or from the ingredients listed below (B).

Solution A

- BioTek QC Check Solution No. 1 (PN 7120779, 25 mL; or 7120782, 125 mL)
- Deionized water
- 5-mL Class A volumetric pipette
- 100-mL volumetric flask

1. Pipette a 5-mL aliquot of BioTek QC Check Solution No. 1 into a 100-mL volumetric flask.
2. Add 95 mL of DI water; cap and shake well. The solution should measure approximately 2.000 OD when using 200 µL in a flat-bottom microwell.

   This should create a solution with an absorbance of about 2.000 OD when using 200 µL in a flat-bottom microwell.

Solution B

- Deionized water
- FD&C Yellow No. 5 dye powder (typically 90% pure)
- Tween 20 (polyoxyethylene (20) sorbitan monolaurate) or BioTek wetting agent, PN 7773002 (a 10% Tween solution)
- Precision balance with readability of 0.001 g
- 1-liter volumetric flask
- Weigh boat

1. Weigh out 0.092 gram of FD&C No. 5 yellow dye powder into a weigh boat.
2. Rinse the contents into a 1-liter volumetric flask.
3. Add 0.5 mL of Tween 20, or 5 mL of BioTek's wetting agent.

4. Make up to 1 liter with DI water; cap and shake well. The solution should have an absorbance of about 2.000 OD when using 200 µL in a flat-bottom microwell.

Procedure

1. Using a freshly prepared stock solution (Solution A or B), prepare a 1:2 dilution using deionized water (one part stock, one part deionized water; the resulting solution is a 1:2 dilution).
2. Pipette 200 µL of the **concentrated** solution (A or B) into column **1**.
3. Pipette 200 µL of the **diluted** solution into column **2**
4. Using Gen5, read the microplate five times at 405 nm using normal reading mode, single wavelength, no blanking. Save the data after each read ("Normal" plate position).
5. Without delay, rotate the microplate 180 degrees so that well A1 is in the H12 position. Read the plate five more times ("Turnaround" plate position), saving the data after each read.
6. Print out the ten sets of raw data, or export them to an Excel spreadsheet.
7. Calculate the results:
   - Calculate the mean value for each physical well location in columns 1 and 2 for the five reads in the Normal position, and then again for the five reads in the Turnaround position. This will result in 32 mean values.
   - Perform a mathematical comparison of the mean values for each microwell in its Normal and Turnaround positions (A1/H12, A2/H11, B1/G12, B2/G11, and so on). In order to pass this test, the differences in the compared mean values must be within the accuracy specification for the instrument.

     For example: If the mean value for well A1 in the Normal position is 1.902, where the specified accuracy is ± 1% ± 0.010 OD, then the expected range for the mean of the same well in its Turnaround (H12) position is 1.873 to 1.931 OD.

     1.902 * 0.01 + 0.010 = 0.029; 1.902 – 0.029 = **1.873**; 1.902 + 0.029 = **1.931**

     Accuracy Specification:

     For comparison in this test, the following accuracy specifications are applied, using Normal reading mode and a 96-well microplate.

     ± 1% ± 0.010 OD from 0.000 OD to 2.000 OD

     ± 3% ± 0.010 OD from 2.000 OD to 3.000 OD

Specifications

General Specifications

Microplates
The Epoch accommodates standard 6-, 12-, 24-, 48-, 96-, and 384-well microplates with 128 x 86 mm geometry; and the BioTek Take3 and Take3 Trio Micro-Volume Plates.

Hardware & Environmental	
Light Source	Xenon flash light source, 10W maximum average power (not user-changeable)
Dimensions	12.5" D x 12" W x 7.7" H 31.8 cm D x 30.5 cm W x 19.6 cm H
Weight	< 15 lbs. (6.804 kg) (without power supply)
Environment	Operational temperature 18ºC to 40°C (65ºF–104ºF)
Humidity	10% to 85% relative humidity (non-condensing)
Power Supply	24-volt external power supply compatible with 100–240 V~; +/- 10% @50–60 Hz
Power Consumption	< 40W maximum

Read Specifications

❖ All read speeds are +/– 2 seconds.

Endpoint Measurements			
96 Well			
Mode	**Delay Time**	**630 nm**	**630/450 nm**
Normal	100 msec	49	95
Normal	0 msec	38	75
Sweep	N/A	15	30
384 Well			
Mode	**Delay Time**	**630 nm**	**630/450 nm**
Normal	100 msec	169	333
Normal	0 msec	131	257
Sweep	N/A	31	56

Kinetic Measurements		
96 Well		
Mode	**Delay Time**	**630 nm**
Normal	100 msec	50
Normal	0 msec	42
Sweep	N/A	13
Mode	**Delay Time**	**630 nm**
Normal	100 msec	169
Normal	0 msec	129
Sweep	N/A	30

Optical Performance

Accuracy, Linearity, Repeatability
All qualifications were conducted using 96-/384-well, flat-bottom and round-bottom microplates. *For the performance described here, the Gain on the Optics Test should be equal to or less than 5.0.*
Measurement Range: 0.000 to 4.000 OD **Resolution:** 0.0001 OD
Accuracy **96-well plate, normal read speed, 100-ms delay after plate movement** 0.000–2.000 OD +/-1% +/-0.010 OD 2.000–2.500 OD +/-3% +/-0.010 OD **384-well plate, normal read speed, 100-ms delay after plate movement** 0.000–1.500 OD +/-2% +/-0.010 OD 1.500–2.000 OD +/-5% +/-0.010 OD **96-well and 384-well plate, sweep read speed** 0.000–1.000 OD +/-1% +/-0.010 OD
Linearity **96-well plate, normal read speed, 100-ms delay after plate movement** 0.000–2.000 OD +/-1% +/-0.010 OD 2.000–2.500 OD +/-3% +/-0.010 OD **384-well plate, normal read speed, 100-ms delay after plate movement** 0.000–1.500 OD +/-2% +/-0.010 OD 1.500–2.000 OD +/-5% +/-0.010 OD **96-well and 384-well plate, sweep read speed** 0.000–1.000 OD +/-1% +/-0.010 OD

Repeatability

96-well plate, normal read speed, 100-ms delay after plate movement

0.000–2.000 OD +/-1% +/-0.005 OD
2.000–2.500 OD +/-3% +/-0.005 OD

384-well plate, normal read speed, 100-ms delay after plate movement

0.000–1.500 OD +/-1% +/-0.005 OD
1.500–2.000 OD +/-3% +/-0.005 OD

96-well and 384-well plate, sweep read speed

0.000–1.000 OD +/-2% +/-0.010 OD

Optics	
λ range	200 to 999 nm
λ accuracy	± 2 nm
λ repeatability	± 0.2 nm
λ bandpass	5 nm
Detector	Photodiodes (2). Measurements are reference channel-corrected for light source fluctuation.