BioTek®

Epoch 2

Microplate Spectrophotometer

INSTRUCTIONS FOR USE

BioTek Instruments, Inc.

1771011 Revision A

Contents

Preface

Notices

BioTek® Instruments, Inc.

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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 (98/79/EC) 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 operator’s manual.

Intended Use Statement

This instrument is intended for IVD use. The performance characteristics of the data reduction software have not been established with any laboratory diagnostic assay. Users must evaluate this instrument and PC-based software in conjunction with their specific assay(s). This evaluation must include the confirmation that performance characteristics for the specific assay(s) are met.

Quality Control

It is considered good laboratory practice to run laboratory samples according to instructions and specific recommendations included in the assay 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 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 model. See **Hazards** and **Precautions**.

Hazards

The following hazard warnings are provided to help avoid injury:

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

Warning! Power Rating. The instrument's power supply or power cord 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 cord 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! Lubricants. Do not apply lubricants to the microplate carrier or carrier track. Lubricant on the carrier mechanism or components in the carrier compartment will attract dust and other particles, which may obstruct the carrier path and cause the instrument to produce an error.

Warning! Liquids. Avoid spilling liquids on the instrument; fluid seepage into internal components creates a potential for shock hazard. 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. Contact BioTek Technical Assistance Center for assistance.

Warning! Unspecified Use. Failure to operate the 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 measurement data. All information displayed on the screen, sent to an attached printer, or exported via computer control must be thoroughly analyzed by the operator.

Warning! Potential Biohazards. Some assays or specimens may pose a biohazard. This hazard is noted by the symbol shown here. Adequate safety precautions should be taken as outlined in the assay's package insert. Always wear safety glasses and appropriate protective equipment, such as chemical-resistant rubber gloves and apron.

Precautions

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

Caution: Service. The instrument should be serviced by BioTek-authorized service personnel. Only qualified technical personnel should perform service procedures on internal components.

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

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

Caution: Power Supply. Use only the power supply shipped with the instrument. Operate this power supply within the range of line voltages listed on it.

Caution: Shipping Hardware. The shipping hardware must be removed before operating the instrument and reinstalled before repackaging the instrument for shipment.

Caution: Disposal. Dispose of the instrument according to Directive 2012/19/EU, "on waste electrical and electronic equipment (WEEE)" or local ordinances.

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

Caution: Electromagnetic Environment. Per IEC 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.

Caution: Touchscreen. Do not use sharp implements to operate the touchscreen.

CE Mark

Directive 2014/30/EU: 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 Radio Frequency (RF) Immunity
EN 61000-4-4, Electrical Fast Transient/Burst Immunity
EN 61000-4-5, Surge Immunity
EN 61000-4-6, Conducted RF Disturbance Immunity
EN 61000-4-11, Voltage Dips, Interruptions and Short Variations

Directive 2014/35/EU 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 61010-2-010. "Particular requirements for laboratory equipment for the heating of materials."

Directive 2012/19/EU: Waste Electrical and Electronic Equipment

Disposal Notice: Dispose of the instrument according to Directive 2012/19/EU, “on waste electrical and electronic equipment (WEEE)” or local ordinances.

Electromagnetic Interference and Susceptibility

Canadian Department of Communications Class A: This digital apparatus does not exceed Class A limits for radio emissions from digital apparatus set out in the Radio Interference Regulations of the Canada Department of Communications.

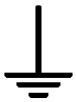
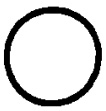
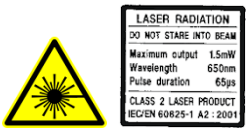
User Safety

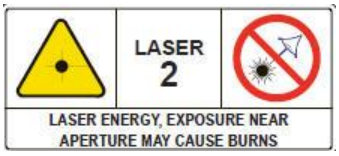
This device has been type-tested by an independent laboratory and found to meet the requirements of the following:

- Canadian Standards Association CAN/CSA C22.2 No. 61010-1, “Safety requirements for electrical equipment for measurement, control and laboratory use; Part 1: General requirements.”
- EN 61010 Standards, see **CE Mark** starting on page 8.

Safety Symbols

Some of these symbols appear on the instrument or accessories:

	Alternating current
	Both direct and alternating current
	Direct current
	Earth ground terminal
	Protective conductor terminal
	On (Supply)
	Off (Supply)
	Caution (refer to accompanying documents)
	Warning, risk of electric shock
	Warning, risk of crushing or pinching
	Warning, potential biohazards
	Warning, hot surface
	Laser radiation: Do not stare into beam

	Laser energy: Exposure near aperture may cause burns. Do not stare directly at the laser during operation.
	In vitro diagnostic medical device
	Separate collection for electrical and electronic equipment
	Consult instructions for use

Installation

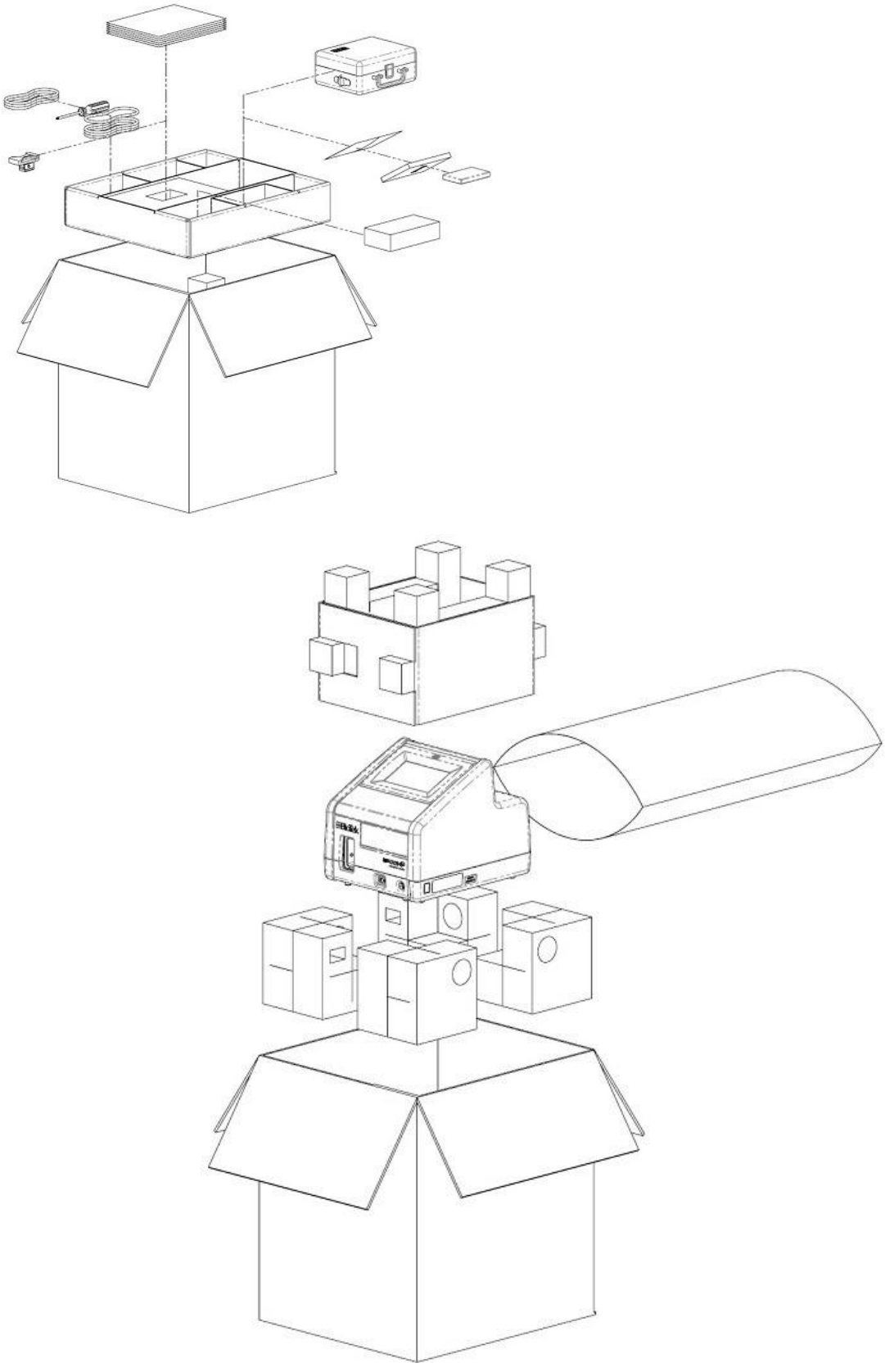
Models

Model	Touchscreen	Cuvette Port
EPOCH2NS		
EPOCH2NSC		•
EPOCH2TS	•	
EPOCH2TSC	•	•

Package Contents

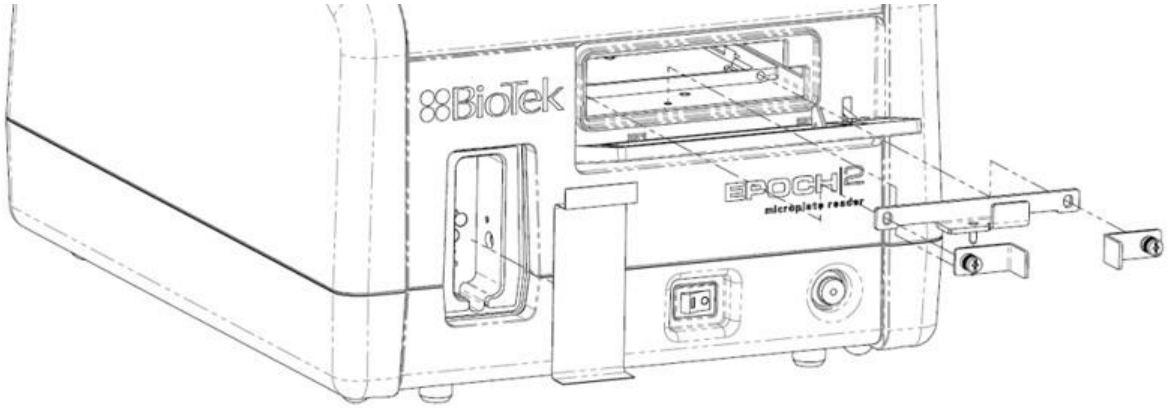
Item	Notes
A specific model of an Epoch 2 instrument per sales order	
All required accessories to power the instrument	
Interface cables, if required	
User manual and/or instructions	
Optional accessories per sales order, unless shipped separately	

Unpack the Box



Remove the Shipping Hardware

	Do not turn on the reader before the shipping hardware is removed!



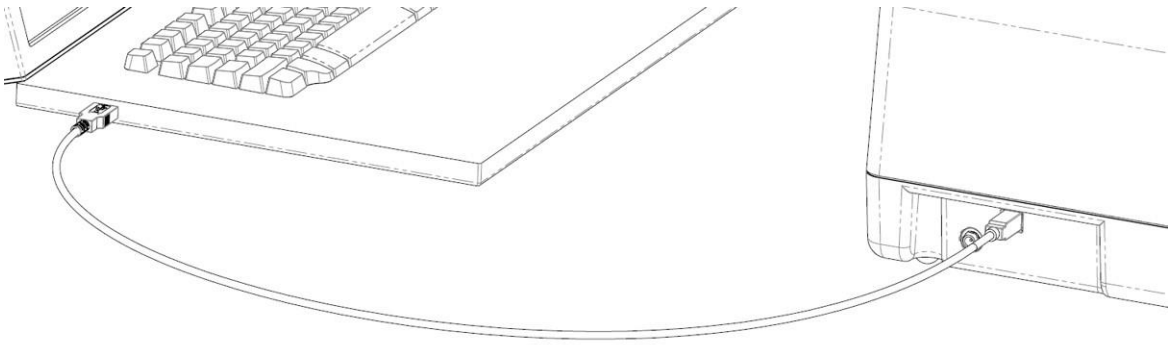
Select an Appropriate Location

Install the reader on a level, stable surface. For models without a touchscreen, select an area where temperatures between 18°C and 40°C can be maintained. For models with a touchscreen, the temperature must be between 18°C and 30°C. The reader is sensitive to extreme environmental conditions. Avoid excessive humidity, excessive ambient light, and dust.

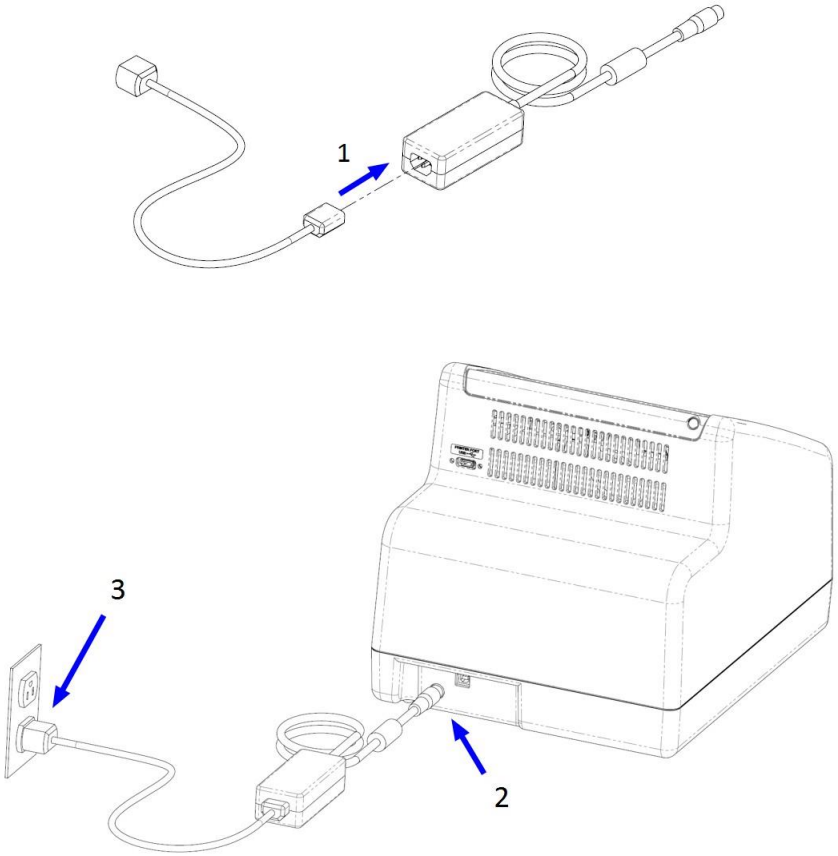
(Gen5 control only) Prepare the Host Computer

❖ Follow instructions in the *Gen5 Getting Started Guide* to install the software.

(Gen5 control only) Connect the Host Computer and Reader

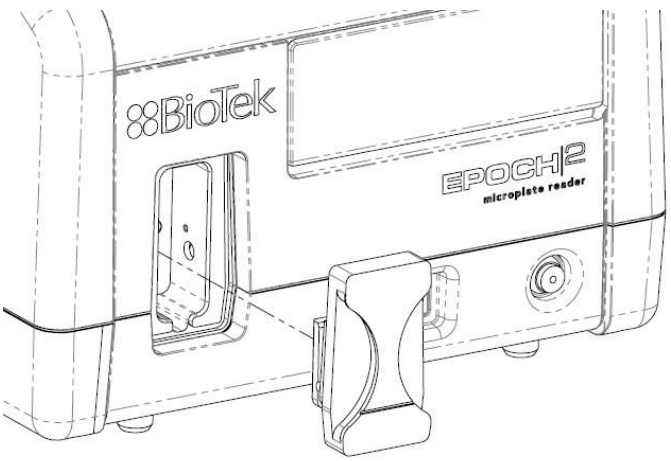


Install the Power Supply



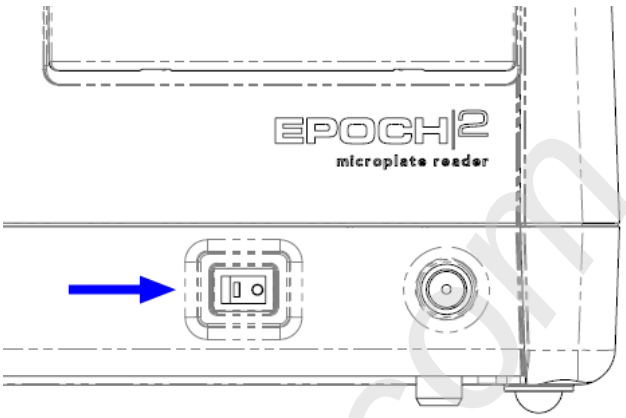
Install the Cuvette Holder

Models with a cuvette port



Turn on the Reader and Run the Power-Up System Test

Allow the reader to settle at room temperature before you turn it on.



(Gen5 control only) Start Gen5 and Test Communication

1. Start Gen5. If prompted to add a reader, click **Yes**. Otherwise, select **System > Instrument Configuration > Add Reader**.
2. Select **Epoch 2** and click **OK**. The reader name and serial number appear. Click on the reader name and then click **Test Communications**. The message, "The reader is communicating!" should appear.

If the communication attempt is not successful: Make sure the reader is turned on and the USB cable is secure on both ends. Consult the *Gen5 Getting Started Guide* (supplied as a PDF on the Gen5 software USB flash drive) for additional troubleshooting information.

Repackage the Instrument (if needed)

	If the reader has been exposed to potentially hazardous material, decontaminate it 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** section for instructions. Remove any labware from the carrier and, if used cuvette, before shipment. Spilled fluids can contaminate the optics and damage the instrument.
	Replace the shipping hardware before repackaging the reader.

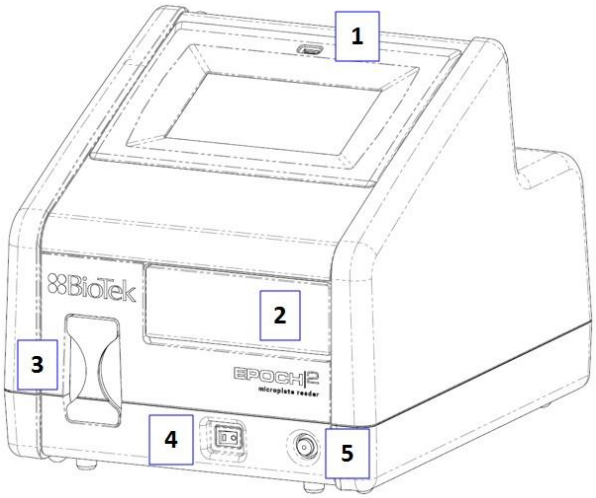
Reverse unpacking instructions.

Getting Started

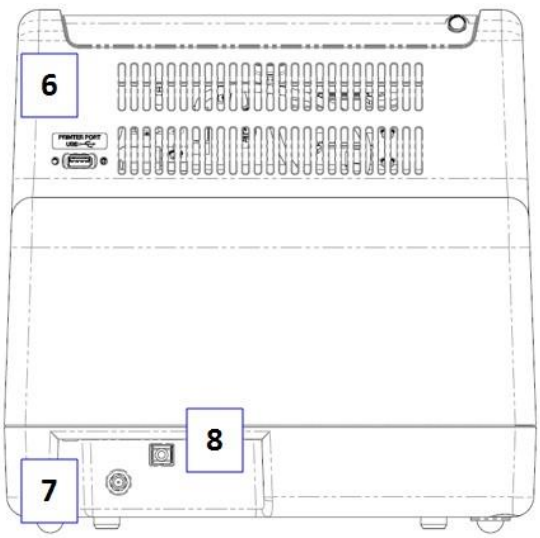
External Components

Touchscreen Models

1. USB port for data output
2. microplate carrier access door
3. cuvette holder (if equipped)
4. power on/off
5. carrier in/out, status LED

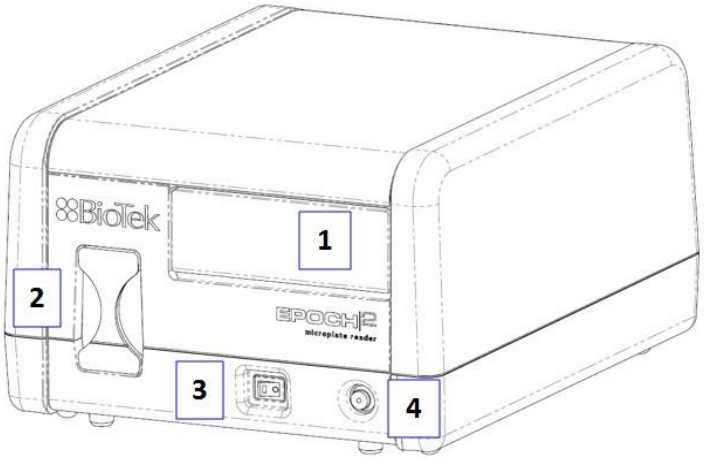


6. USB port for printer
7. power inlet
8. USB port for host computer (if used)

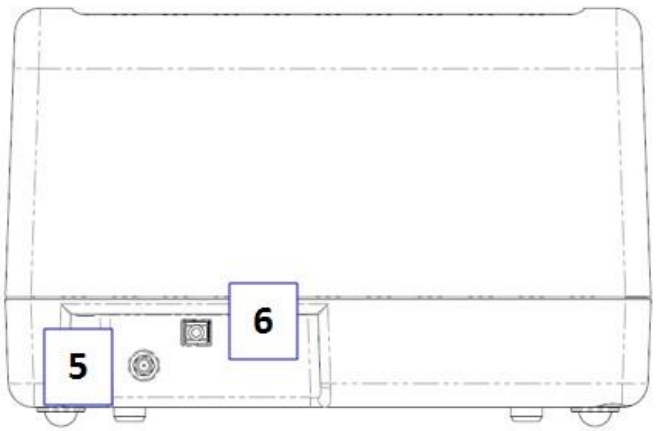


Non-Touchscreen Models

1. microplate carrier access door
2. cuvette holder (if equipped)
3. power on/off
4. carrier in/out, status LED



5. power inlet
6. USB port for host computer



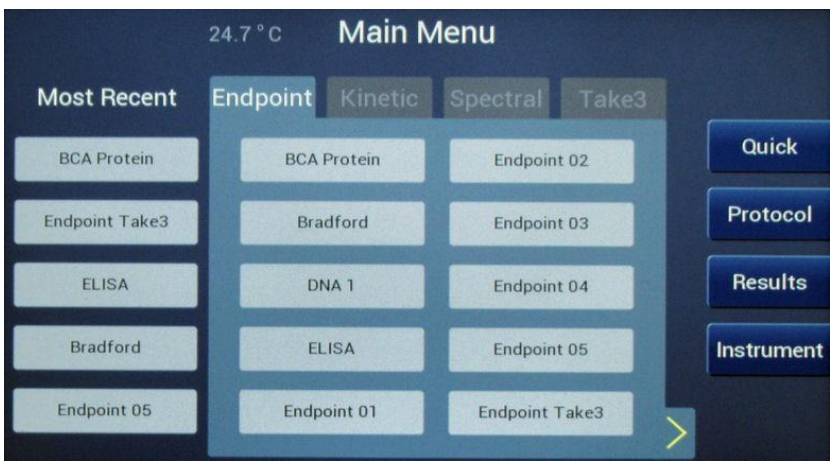
Optional Printer

Refer to the printer's manual for installation and setup instructions.

Using the Touchscreen

Use your fingertip to operate the touchscreen. A sharp stylus or pencil will damage the surface. You can use a stylus designed for resistive touchscreens.

Main Menu



Up to 60 uniquely named protocols can be saved on the reader at one time, excluding the predefined Take3 protocols.

Protocols created through the touchscreen are limited to a single read step and, for Endpoint, Kinetic, and Take3 protocols, up to 12 blank wells. Use Gen5 if your assays require more complex reading methods or plate layouts.

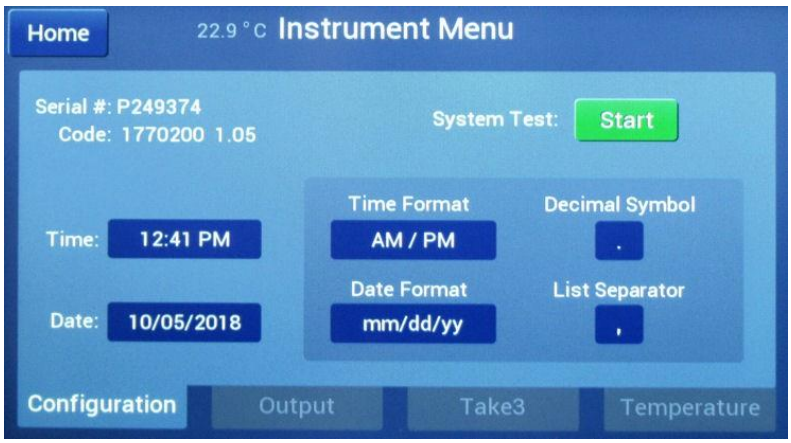
The left side of the Main Menu lists the five most recently used protocols. The tabbed sections in the middle contain the protocols created for each protocol type, and the Take3 plate (if used). To run an existing protocol, tap its name, define the wells to be read if fewer than the full plate, and tap **Start**.

The right side of the Main Menu provides access to the following features:

- **Quick:** Define and run an Endpoint read, perform a standalone shake, or incubate a plate. Quick reads do not support shake or delay actions, and they read the full plate.
- **Protocol:** Edit, create (and save), delete, and copy protocols. Through this menu option, protocols support shake and delay actions.
- **Results:** Provides access to results for the 12 most recently run protocols. Tap a protocol name to view its results, and then tap the screen to cycle through the available data sets (e.g., Raw data, Delta OD, Blanked data).
- **Instrument:** Run a system test, define date/time settings, enable output to a printer and/or USB flash drive, configure a Take3 plate, and control temperature.

Confirm or Set the Time and Date

From the Main Menu, tap **Instrument** and select the **Configuration** tab.



- Tap the **Time** / **Time Format** and **Date** / **Date Format** fields to change the current settings.
- Set the **Decimal Symbol** to a period or comma.
- Set the **List Separator**, used in exported .csv files, to a comma or semicolon.

Define Output Formats for Results Data

From the Main Menu, tap **Instrument** and select the **Output** tab.

Output Types:

- To print results (Endpoint only), select **Print** or **Save&Print**.
- To save results to a USB flash drive, select **Save to USB** or **Save&Print**.

Data types:

- **Raw**: The raw measurement value for each well.
- **Delta OD**: Applicable when a secondary wavelength is selected in an absorbance protocol. This is the calculated value for each well of the primary wavelength measurement minus the secondary wavelength measurement.
- **Blanked**: The calculated value for each well, after subtracting the average of the blank well(s).

Save Format options:

- **Report**: .csv file containing raw data, Delta OD, and/or blanked data, as available. This file can be opened in Excel or other spreadsheet software.
- **Gen5 Input**: .txt file containing only raw data. This file can be opened in Gen5 using the Read from File option.
- **Prompt**: Choose an output format after the plate has been read.

Define and Start a Quick Endpoint Read

From the Main Menu, tap **Quick**.

1. Select the **Plate** type and define the appropriate settings for your assay.
2. Place the plate on the carrier and tap **Start** to run the protocol.
3. When the read is finished, the results are displayed and ready for output according to the settings defined under **Instrument > Output**.

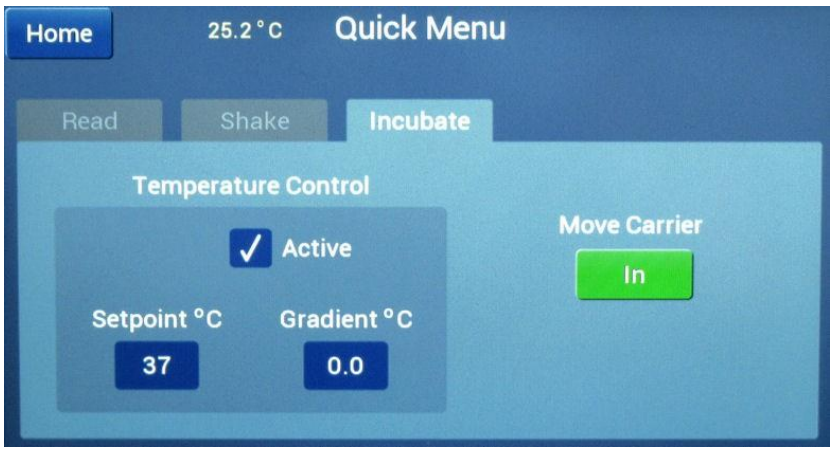
Define and Start a Standalone Shake

From the Main Menu, tap **Quick** and select the **Shake** tab.

1. Set **Shake Mode** to Linear (side-to-side), Orbital (circle), or Double Orbital (figure 8).
2. Set the **Duration**, from 1 second to 2 hours 45 minutes.
3. For Orbital shake modes, set the **Speed** to Slow or Fast.
4. Adjust the **Frequency**, if needed. The cycles per minute updates as the slider moves. The measurement in mm indicates the distance the carrier travels during the shake.
5. Place the plate on the carrier and tap **Start** to shake the plate.

Incubate a Plate

From the Main Menu, tap **Quick** and select the **Incubate** tab.



1. Check the **Active** box.
2. Define a **Set point** from 18°C to 65°C (64.4°F to 149°F). Heating begins immediately.
3. Move the plate carrier in, if it is currently out.
4. When the temperature displayed at the top of the screen reaches the set point, move the carrier out, insert the plate, and move the carrier back in.

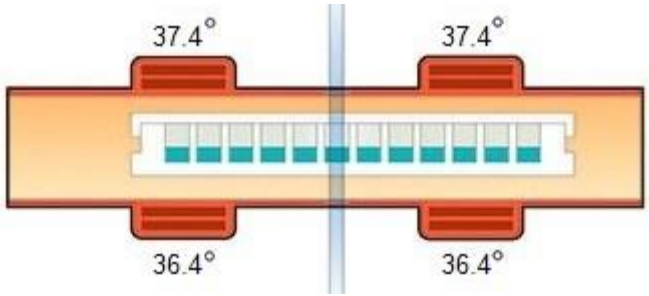
The minimum set point must be ambient room temperature plus 4°C.

Condensation Control™

A temperature **Gradient** can be applied to reduce the risk of condensation when using microplate lids. When no gradient (0) is applied, the heaters above and below the plate operate at the same (setpoint) temperature. This is recommended if the plate has no lid, or condensation is not a problem when lids are used.

When a gradient (0.1 to 2.0) is applied, the heaters above the plate operate slightly higher than the set point and the heaters below the plate operate slightly lower than the set point. The gradient represents the temperature separation between the top and bottom heaters. This differential should serve to reduce or eliminate condensation.

In the example below, the Set point is 37°C and the Gradient is 1.0:



Some experimentation with the gradient setting may be necessary to achieve optimal results with your assay.

Create and Save a Protocol

1. From the Main Menu, tap **Protocol** > **Create**.
2. Use the onscreen keyboard to enter a name for the protocol, then tap **Save**. Note that the protocol name is limited to 18 characters.
3. Set the **Read Mode** to Endpoint, Kinetic, or Spectral.
4. Define the protocol parameters and then tap **Save**.

Endpoint Protocols

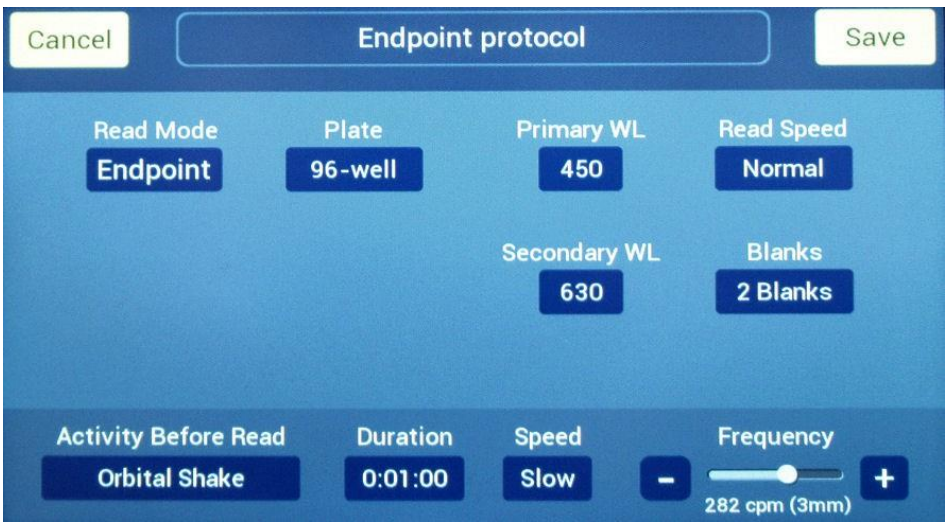


Plate: Options include standard 6-, 12-, 24-, 48-, 96-, and 384-well plates, Cuvette (if equipped), and Take3 (if configured).

Primary WL and (optional) **Secondary WL:** Define the primary and (optional) secondary wavelength in the range 200 to 999 nm.

Microplates and Take3 only:

Read Speed: Select Normal (optimum performance) or Sweep (optimum speed). See ***Specifications*** to compare the performance and timing specifications.

Blanks: Tap to open a plate matrix and select up to 12 Blank wells. For a 384-well plate, the matrix is displayed in quadrants; tap the 1-2-3-4 box to change the view.

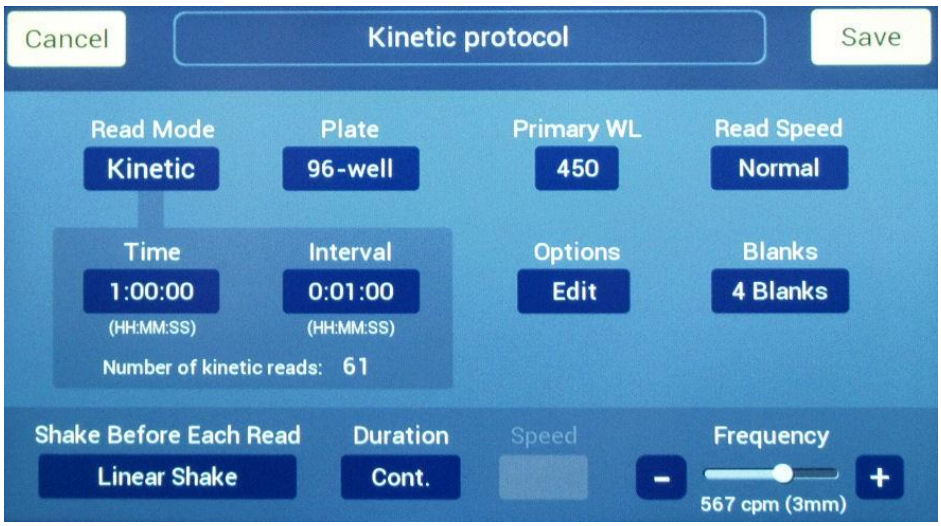
Activity Before Read options:

- Set a delay (up to 2 hours, 45 minutes) before the read.
- Select a shake mode of Linear (side-to-side), Orbital (circle), or Double Orbital (figure 8). Set a Duration (up to 2 hours 45 minutes) to shake the plate before the read begins. Adjust the Frequency, if needed. The cycles per minute updates as the slider moves. The measurement in mm indicates the distance the carrier travels during the shake.

When finished, tap **Save**. The protocol name is added to the Main Menu.

If your Endpoint assay requires incubation, activate Temperature Control before reading the plate. From the Main Menu, select **Instrument** and tap the **Temperature** tab.

Kinetic Protocols



Time: Specify the full duration of the kinetic analysis, up to 272:15:00 (hh:mm:ss). Note: You can stop a protocol while it is running, before the Time expires; results will be saved.

Interval: Specify the interval (delay) between reads, up to 2:45:00 (hh:mm:ss). The Interval must be shorter than the Time.

Number of kinetic reads: Calculated automatically, based on the Time and Interval settings. Cannot exceed 100 reads.

Considerations: The Interval must be long enough to support the protocol parameters and the number of microplate wells selected for reading. If a shake is specified, its Duration may result in a longer interval than defined in the protocol. To test the

settings, save the protocol and return to the Main Menu. Tap the protocol to run it, select the wells if not reading the full plate, and tap **Start**. The Minimum Kinetic Interval will display if the defined Interval is too short. Run the protocol using the displayed interval, or return to the protocol and modify its parameters.

Plate: Options include standard 6-, 12-, 24-, 48-, 96-, and 384-well microplates, Cuvette (if equipped), and Take3 (if configured).

Primary WL: Define a wavelength in the range 200-999 nm. Only one wavelength is supported through the touchscreen; use Gen5 if your assay has other requirements.

Microplates and Take3 only:

Read Speed: Select Normal (optimum performance) or Sweep (optimum speed). See ***Specifications*** to compare performance and timing specifications.

Blanks: Tap to open a plate matrix and select up to 12 Blank wells. For a 384-well plate, the matrix is displayed in quadrants; tap the 1-2-3-4 box to change the view.

Options (tap **Edit**):

If applicable, check **Eject the plate when done**. If unchecked, the plate will remain in the chamber after the last kinetic read.

If the assay requires incubation:

1. Check the **Active** box.
2. Define a **Setpoint** from 18°C to 65°C. Heating will begin when you start to run the protocol.
3. Check **Turn off when done** to turn the incubator off after the last kinetic read is completed.

The minimum setpoint must be ambient room temperature plus 4°C. See ***Specifications*** for more information on temperature control.

Shake Before Each Read: Select a shake mode of Linear (side-to-side), Orbital (circle), or Double Orbital (a figure 8). Set a **Duration** (up to 2 hours 45 minutes) to shake the plate before each kinetic read or select **Continuous** to shake the plate whenever it is not being read. Adjust the **Frequency**, if needed. The cycles per minute updates as the slider moves. The measurement in mm indicates the distance the carrier travels during the shake.

- Continuous shaking typically results in higher ODs and lower CVs.
- To define a kinetic protocol with a shake before the first read only, use Gen5.

When finished, tap **Save**. The protocol name is added to the Main Menu.

Spectral Scan Protocols

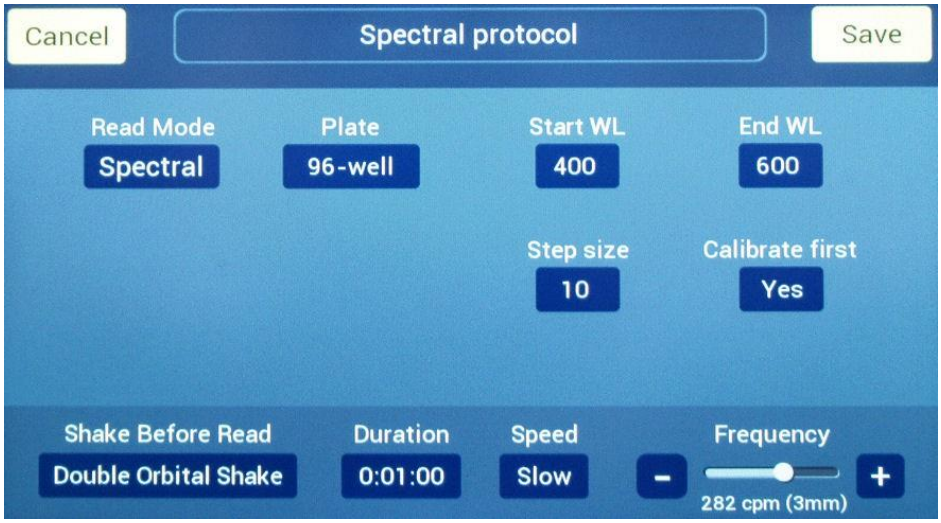


Plate: Options include standard 6-, 12-, 24-, 48-, 96-, and 384-well plates, Cuvette (if equipped), and Take3 (if configured).

Start WL and **End WL**: Define the start and end wavelengths. The full spectral range is 200 to 999 nm.

Step Size: Define an increment (in nm) for measurement. For example, if the Start WL is 200 and the Step Size is 10, measurements are taken at 200, 210, 220, and so on until the End WL is reached.

The number of spectral data points cannot exceed 100.

Microplates and Take3 only:

Calibrate first: Set to **Yes** (optimum performance) to perform calibration at all of the specified wavelengths when a plate read is initiated. Set to **No** (optimum speed) to perform calibration at only those wavelengths not yet calibrated since the reader was turned on.

Shake Before Read: Select a shake mode of Linear (side-to-side), Orbital (circle), or Double Orbital (figure 8). Set a **Duration** (up to 2 hours 45 minutes) to shake the plate before spectral scanning begins. Adjust the **Frequency**, if needed. The cycles per minute updates as the slider moves. The measurement in mm indicates the distance the carrier travels during the shake.

When finished, tap **Save**. The protocol name is added to the Main Menu.

Run a Protocol

Kinetic protocols: If a temperature set point is defined in the protocol, you can turn the incubator on manually by selecting **Instrument > Temperature**. Otherwise, the incubator will turn on when you start the protocol. Wait until the set point is reached, or tap **Override** to read the plate.

1. From the Main Menu, tap a protocol in the Most Recent list or under one of the available tabs. The Run Protocol screen displays the defined parameters:

2. To read a partial plate, tap **Full Plate** and select the well(s) to read. Tap **Save**.
3. Press the blue lighted button on the front of the reader to eject the plate carrier.
4. Place the microplate on the carrier and tap **Start**.

When the read is finished, the results are displayed and ready for output according to the settings defined under **Instrument > Output**.

The reader saves results for the last 10 Endpoint/Take3 and last 2 Kinetic/Spectral protocols that were run. The next set of saved results will overwrite the oldest set for the read mode only with your acknowledgment.

Edit, Delete, or Copy a Protocol

Edit a Protocol

1. In the Main Menu, tap **Protocol**.
2. Tap the protocol that you want to modify, then tap **Edit**.
3. Make any desired changes, then tap **Save**.

Delete a Protocol

1. From the Main Menu, tap **Protocol**.

2. Tap the protocol you want to delete, then tap **Delete**.

Copy a Protocol

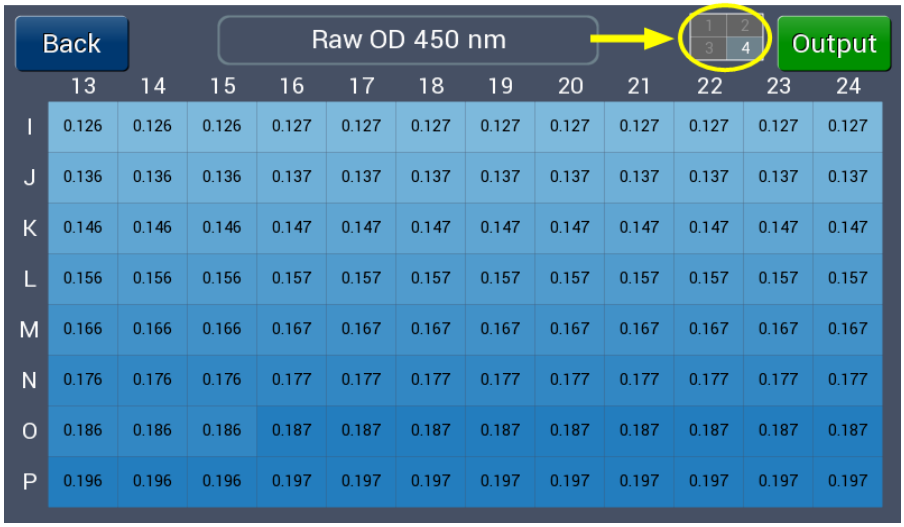
1. In the Main Menu, tap **Protocol**.
2. Tap the protocol you want to copy, then tap **Copy**.
3. Enter a name for the new protocol, then tap **Save**.
4. Make any desired changes, then tap **Save**.

View or Output Results Stored on the Reader

1. In the Main Menu, tap **Results**. Results for the last 10 Endpoint/Take3 and last 2 Kinetic/Spectral protocols are listed by read mode/file name. Tap the protocol for which you want to view or output results. The results are displayed on the touchscreen.

    - Tap the data set name at the top of the screen to view protocol details, including the start date/time, final status, and protocol parameters.
    - Endpoint: Tap the screen to toggle through the available data sets.
    - Kinetic/Spectral: Tap a well to view its kinetic curve or spectral scan.
    - If a well displays "OVR," the measurement exceeds (overflow) the maximum absorbance measurement range: 4.000 OD (normal read speed, or cuvette); 3.000 OD (sweep read speed).
    - If a well displays "???," a result (for example, blank subtraction) could not be calculated.

2. Tap the **green** button in the upper-right corner of the display. The results are printed and/or saved to the USB flash drive, depending on the read mode and defined output format.



Run a Take3 Session

Using the Touchscreen

The Epoch 2 is preprogrammed with seven Take3 protocols, available for use after a Take3 plate has been defined and aligned on the reader.

The protocols measure at 260, 280, and 320 nm and cannot be edited. For the nucleic acid protocols, a secondary wavelength of 230 nm can be selected at run time. For all seven protocols, a spectral scan may also be selected.

Protocol name	Mass Extinction coefficient	Secondary Ratio WL (run time option)	Spectral Scan (run time option)
dsDNA	50	230 nm	240–300 nm
RNA	40	230 nm	240–300 nm
ssDNA	33	230 nm	240–300 nm
1 Abs@1cm = 1 mg/mL	10	-	260–320 nm
BSA	6.7	-	260–320 nm
IgG	13.7	-	260–320 nm
Lysozyme	26.4	-	260–320 nm

Define and Align a Take3 Plate

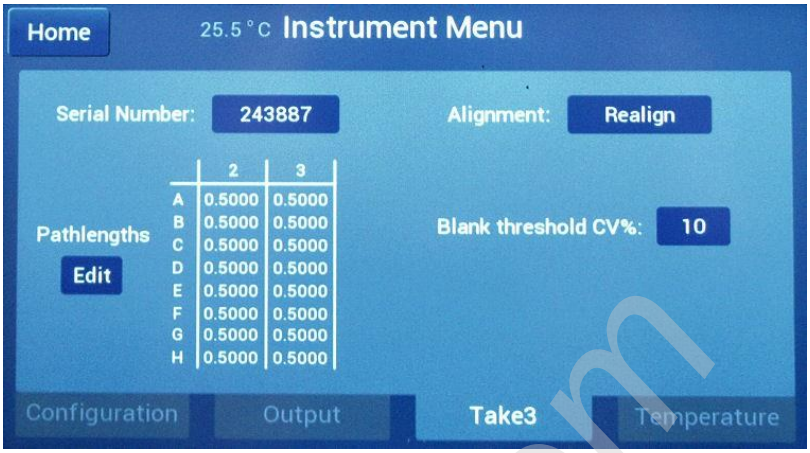
Ensure that the glass slide is clean before running the alignment procedure. Refer to the ***Take3*/*Take3 Trio* User Guide** for cleaning instructions.

If you remove or replace the glass slide, perform the Pathlength Calibration procedure described in the ***Take3*/*Take3 Trio* User Guide** and then run the alignment procedure described below. Update the Pathlength Values on the touchscreen with the new values generated through the Pathlength Correction procedure described in the user guide.

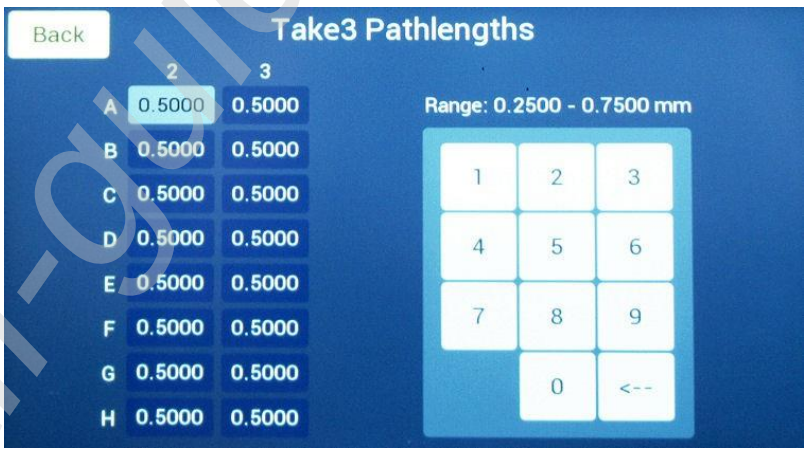
The reader can be configured with only one Take3 plate at a time.

This procedure ensures that the Take3 slide's microspot positions are captured correctly in the reader's software. Upon completion, the Take3 tab appears on the Main Menu and contains the preprogrammed Take3 protocols.

1. From the Main Menu, tap **Instrument** and select the **Take3** tab.



2. Enter the plate's **Serial Number**.
3. Place the plate on the carrier. Tap **Required** (or **Realign**) and then **Start** to perform the alignment. The process takes several minutes to complete.
4. Change the **Blank threshold CV%** if the default value does not meet your assay requirements. This setting compares all replicates of a blank to determine cleanliness of the microspots (dirty microspots can skew the %CV). Set the value smaller to have a tighter tolerance on the deviation of cleanliness of the microspots, or set it higher to relax the tolerance.
5. Tap **Edit** and enter the pathlength values that either came with the Take3 plate or were generated through the Pathlength Correction procedure in the ***Take3 User Guide***.



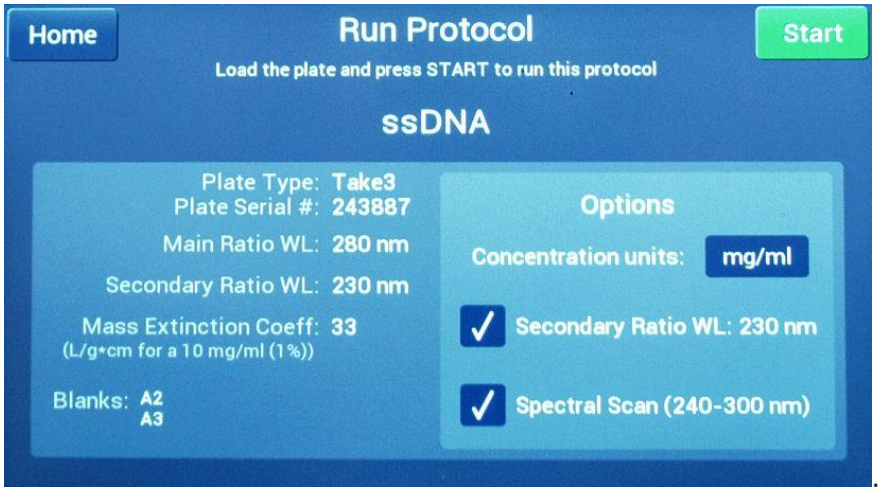
6. When finished, tap **Back** and **Home** to return to the Main Menu.

Run a Take3 Protocol

1. On the Main Menu, tap the **Take3** tab and select the protocol to run.
2. Select 1 to 12 wells as Blank and tap **Continue**.
3. On the Run Protocol screen, select options as applicable:

   - **Concentration units**: Select the unit of measure for the export file.
   - **Secondary Ratio WL** (230 nm): Available for nucleic acid protocols.

- **Spectral Scan**: Perform a spectral scan for the wavelength range displayed (1 nm step size), in addition to the endpoint reads.



4. Place the Take3 plate on the carrier and tap **Start**.

   - If the Take3 Blank Masking screen appears and reports that the CV Status is DIVERGING, the %CV of the blank wells is higher than the Blank threshold CV% defined for the plate. Invalid blank wells are highlighted in red. Tap a well to mask (exclude) it from blank average and %CV calculations. When the remaining unmasked blank wells are valid, the Approve button illuminates. If the number of valid blank wells is sufficient for the assay, tap **Approve**, otherwise select **Cancel** and address the problem (e.g., clean the slides).
   - At least one blank well is required. If all blank wells are masked, the CV Status is INVALID.
   - Each masked blank well will be flagged with an asterisk in the printed and exported results.

5. When the read is finished, the results are displayed and ready for output according to the settings under **Instrument > Output**.

Maintenance

Schedule

Task	Frequency
Clean external surfaces	As needed
Inspect/clean touchscreen	As needed
Decontamination	Before shipment or storage

Clean Exposed Surfaces

Materials

- Deionized or distilled water
- Mild detergent
- Clean, lint-free cotton cloths
- Protective gloves
- Lab coat
- Biohazard trash bags
- Safety glasses
- Surgical mask

Procedure

1. Eject the plate carrier and then turn off and unplug the instrument.
2. Moisten a clean cotton cloth with water, or with water and mild detergent. Wring out the cloth so that liquid does not drip from it. **Do not soak the cloth.**
3. Wipe the plate carrier, the inside of the plate carrier door, and all exposed surfaces of the instrument.
4. If the reader is equipped with a cuvette holder, remove the holder and clean its exposed surfaces.
5. If detergent was used, wipe all surfaces with a cloth moistened, not soaked, with water.
6. Use a clean, dry, lint-free cloth to dry all wet surfaces.

If liquid is spilled inside the reader, contact BioTek Technical Assistance Center.

Clean the Touchscreen

Do not use:

- Strong solvents, such as alcohol, acetone, ammonium chloride, methylene chloride, and hydrocarbons, which can permanently damage the surface of the touchscreen.
- Fibrous materials, such as paper towels, which can scratch the touchscreen. Over time, dirt particles and cleaning agents can get trapped in the scratches.

Materials

- Dish soap or other mild cleaner
- Deionized or distilled water
- Lint-free disposable towels
- Protective gloves
- Lab coat
- Biohazard trash bags
- Safety glasses
- Surgical mask

Procedure

Do not spray or soak the touchscreen! This will cause damage.

1. Eject the plate carrier and then turn off and unplug the instrument.
2. Moisten a clean lint-free disposable towel with water, or with water and dish soap. Wring out the towel so that liquid does not drip from it. **Do not soak the towel.**
3. Wipe the touchscreen gently with the moist towel.
4. If detergent was used, wipe the touchscreen with a towel moistened, not soaked, with water.
5. Dry the screen gently using another towel.

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 into 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 of the instrument.

	Turn off and unplug the instrument for the decontamination procedure.
	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.
	Wear prophylactic gloves when handling contaminated instruments. Gloved hands should be considered contaminated at all times; keep gloved hands away from eyes, mouth, and nose. Eating and drinking while decontaminating instruments is not advised.
	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 performing the decontamination procedure.
	**Touchscreen models:** Do not spray the sodium hypochlorite solution or alcohol solution directly on the touchscreen. Avoid fibrous materials that can scratch the touchscreen surface. Do not use a stronger cleaning solution than recommended.

Materials

- Sodium hypochlorite (NaClO) or 70% isopropyl alcohol
- Deionized or distilled water
- 125-mL beakers
- Clean, lint-free cotton cloths
- Protective gloves
- Lab coat

- Biohazard trash bags
- Safety glasses
- Surgical mask

Procedure

1. Eject the plate carrier and then turn off and unplug the instrument.
2. Prepare an aqueous solution of 0.5% sodium hypochlorite (NaClO). If the effects of sodium hypochlorite are a concern, 70% isopropyl alcohol may be used.
3. Moisten a clean, lint-free cloth with the cleaning solution. Wring out the cloth so that liquid does not drip from it. **Do not soak the cloth.**
4. Wipe the plate carrier and all exposed surfaces of the instrument, including the inside of the microplate carrier access door and, if equipped, the cuvette holder.
5. If the instrument is equipped with a touchscreen, place the moistened cloth on the touchscreen and it let rest there for 15 minutes, then remove it.
6. Allow the instrument to dry for 20 minutes for thorough decontamination.
7. Moisten a cloth with deionized or distilled water and wipe all surfaces of the instrument that have been cleaned with the solution. **Do not soak the cloth.**
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

Each time the Epoch 2 is turned on, it automatically performs a series of tests on the reader's motors, lamp, and various subsystems. This test can take a few minutes to complete. If all tests pass, the microplate carrier is ejected and the green LED on the power switch remains on. The Main Menu appears on the touchscreen (if equipped). You can also initiate a system test through the touchscreen or Gen5.

If any test fails, the reader beeps repeatedly and, if equipped, an error message appears on the touchscreen. If this occurs, either press the carrier eject button, or, if equipped, tap **OK** on the touchscreen to stop the beeping. If necessary, start another system test to try to retrieve an error code from the reader.

Absorbance Test Plates

Gen5 software is required for this test.

Absorbance Test Plate Part Number 7260522 uses NIST-traceable neutral density filters to confirm absorbance specifications in the visible range (400–800 nm). This test plate also contains precision-machined holes to verify mechanical alignment.

Absorbance Test Plate Part Number 7260551 uses NIST-traceable neutral density filters to test performance at 340 nm.

Define the Absorbance Test Plate Parameters

Before the Absorbance Plate Test can be performed, the wavelength settings and the calibration data for each wavelength selected must be initially entered into Gen5. Use the data sheet included with the Absorbance Test Plate for the following:

- Select **System > Diagnostics > Test Plates > Add/Modify Plates**, then click **Add**. Click **Help** for guidance when setting the wavelengths and entering the OD and peak wavelength values.

Run the Absorbance Plate Test

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

5. Click **Start Test**.
6. Place the Absorbance Test Plate on the microplate carrier, with well A1 in the proper location.
7. Click **OK** to run the test.
8. When the test is complete, the results report appears. Scroll through the report; every result should show "PASS."

Specifications

General Specifications

Microplates
The Epoch 2 accommodates standard 6-, 12-, 24-, 48-, 96-, and 384-well microplates with 128 x 86 mm geometry and the Take3 Micro-Volume Plate. If using Gen5, the Take3 Trio Micro-Volume plate and BioCell are also supported. Maximum plate height: 20.32 mm

Hardware and Environmental	
Weight:	Fully configured weight ~11.3 kg
Dimensions:	Touchscreen models: 31.8 cm x 32.4 cm x 39.4 cm Non-touchscreen models: 21.6 cm x 32.4 cm x 39.4 cm
Operational Temperature Range:	Touchscreen models: 18°C to 30°C Non-touchscreen models: 18°C to 40°C
Humidity:	10% to 85% relative humidity (non-condensing)
Power Consumption:	Powered from an external 120W (minimum), 24VDC power supply compatible with 100-240 volts AC @50-60Hz.

Temperature Control	
Range:	Maximum incubation temperature 65°C. Minimum setpoint must be ambient room temperature plus 4°C. For incubation setpoints > 60°C, ambient room temperature must be at least 22°C.
Uniformity:	+/- 0.5°C at 37°C, tested with Innovative Instruments, Inc. temperature test plate.

Absorbance Specifications

For the performance specifications described in this section, the gain on the optics test should be < 8.

Unless indicated otherwise, the specifications in the table below apply to both microplate and cuvette.

Wavelength Selection System:	Monochromator
Detectors:	2 photodiodes (measurement & reference) each for the plate channel and the cuvette channel
Wavelength Range:	200–999 nm
Bandpass:	< 5 nm (microplate & cuvette)
Measurement Range:	0.000–4.000 OD (microplate normal mode, cuvette) 0.000–3.000 OD (microplate sweep mode)
Resolution:	0.001 OD (touchscreen control only) 0.0001 OD (Gen5 control only)
Increment:	1 nm
Wavelength Accuracy:	± 2 nm
Wavelength Precision	0.2 nm (standard deviation)

Accuracy

Tested with certified neutral density glass

96-well plate normal read speed delay after plate movement = 100 ms	0.000 to 2.000 OD: ±1.0% ±0.010 OD 2.000 to 2.500 OD: ±3.0% ±0.010 OD
384-well plate normal read speed delay after plate movement = 100 ms	0.000 to 1.500 OD: ±2.0% ±0.010 OD 1.500 to 2.000 OD: ±5.0% ±0.010 OD
96- and 384-well plate sweep read speed	0.000 to 1.000 OD: ±1.0% ±0.010 OD

Linearity

By liquid dilution, 200 µL volume in 96-well plate, 80 µL volume in 384-well plate

96-well plate normal read speed delay after plate movement = 100 ms	0.000 to 2.000 OD: ±1.0% ±0.010 OD 2.000 to 2.500 OD: ±3.0% ±0.010 OD
384-well plate normal read speed delay after plate movement = 100 ms	0.000 to 1.500 OD: ±2.0% ±0.010 OD 1.500 to 2.000 OD: ±5.0% ±0.010 OD
96- and 384-well plate sweep read speed	0.000 to 1.000 OD: ±1.0% ±0.010 OD

Repeatability (Standard Deviation [STD])

Tested with certified neutral density glass, measured by one standard deviation (8 measurements/data point)

96-well plate normal read speed delay after plate movement = 100 ms	0.000 to 2.000 OD: ±1.0% ±0.005 OD 2.000 to 2.500 OD: ±3.0% ±0.005 OD
384-well plate normal read speed delay after plate movement = 100 ms	0.000 to 1.500 OD: ±1.0% ±0.005 OD 1.500 to 2.000 OD: ±3.0% ±0.005 OD
96- and 384-well plate sweep read speed	0.000 to 1.000 OD: ±2.0% ±0.010 OD

Assay Validation

Using a Take3 plate

260 nm dsDNA detection limit: < 5 ng/µL

Cuvette

Absorbance performance of measurements made via cuvette shall satisfy the requirements given above for accuracy, linearity. and repeatability in a 96 well-plate, normal read speed, 100 ms delay after movement.

Reading Speeds

Endpoint

Start of plate motion to stop of plate motion

96 well	450 nm [sec] MAX	Delay Time [msec]
Normal Mode	74	100
Normal Mode, Min Delay Time	64	0
Sweep	35	0 (at end of row)
384 well		
Normal Mode	192	100
Normal Mode, Min Delay Time	154	0
Sweep	42	0 (at end of row)

Kinetic

A1 to A1

96 well	450 nm [sec] MAX	Delay Time [msec]
Normal Mode	50	100
Normal Mode, Min Delay Time	40	0
Sweep	8	0 (at end of row)
384 well		
Normal Mode	170	100
Normal Mode, Min Delay Time	131	0
Sweep	14	0 (at end of row)