



## Easy Start:

- Place cell-free transwells into the TEER24 well assembly
- Place the TEER24 well assembly into the TEER24 Station
- Press Zero to get cell-free resistance values.
- Seed cells into transwells
- Return the TEER24 well assembly to the TEER24 Station
- Press Start to begin continuous TEER measurements

The ECIS TEER24 uses multiple AC frequencies to determine the TEER value of cell layers on filter substrates. The measurement consists of two phases; a zero set phase and a data collection phase. During the zero set phase, the resistance of the ECIS electrodes, solution, and filter is measured and stored in memory as the zero-point reference. During data collection the resistance is measured, and TEER is calculated by subtracting the zero-point reference and scaling for the surface area of the filter.



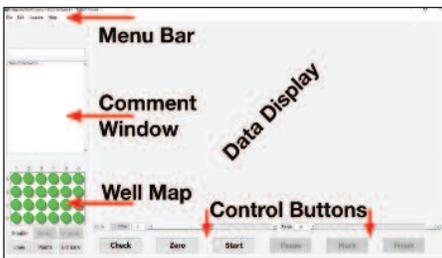
## Setting up the TEER24:



Station Controller back



TEER24 Station back



**Note:** For connecting two TEER24 stations to a single Station Controller, First follow steps 6 – 11 for Station A. Leave the TEER24-A software running and connect the second station to **ECIS Instrument UNIT B** port. Repeat steps 7 - 11 for Station B using the **TEER24-B** software.

The ECIS TEER24 Instrument consists of three main components

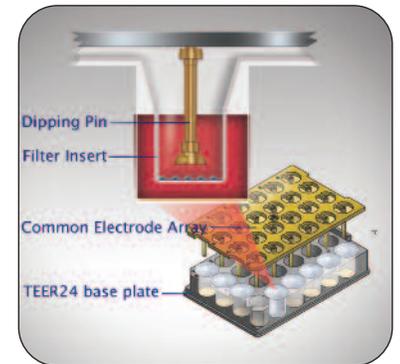
- the TEER24 Station,
- the ECIS Station Controller,
- and the Windows 10 laptop PC.

1. Put the TEER24 Station into the supplied poly bag and place this in the incubator space. Allow the station to reach incubator temperature. About 1 – 2 hours.
2. Connect the power cable to the Station Controller and plug the power supply into a wall outlet. If you are concerned about the quality of power in your laboratory, an Uninterruptible Power Supply (UPS) is recommended.
3. Connect power to the laptop.
4. Power up the laptop. When the login prompt appears, login with the username: ECIS User. (A password is not needed for ECIS User)
5. Use any USB port on the laptop to connect it to the **Computer USB** port on the Station Controller.
6. Once the TEER24 Station is at incubator temperature, remove it from the poly bag and connect a USB cable to the **USB** port on the back panel. Run the USB cable out of the incubator either by the glass door seal or an incubator port (if available). Plug the USB cable into the **ECIS Instrument UNIT A** port of the Station Controller.
7. Mount the Validation plate in the TEER24 station. Slide the two retaining clips to the outside of the device, and insert the TEER24 Validation plate in the device being certain the orientation is correct. Push down on one side of the plate and slide the retaining clip inward to hold the plate down. Repeat on the opposite side.
8. Start the **TEER24-A** Software by double clicking on the **TEER24-A** icon. During the startup, the software will look for the TEER24 at port A and check for attached wells.
9. All 24 wells of the well map should appear green. If one or more wells appear red then reseal the Validation plate and press **Check**.
10. Repeat until all wells are green. Once all wells are green select **Acquire > Validate** from the menu bar.
11. Press **Start** and the software will read the Validation plate and report the measured values. These values should be compared to the values listed on the Validation plate to confirm proper operation.

# TEER24 MANUAL

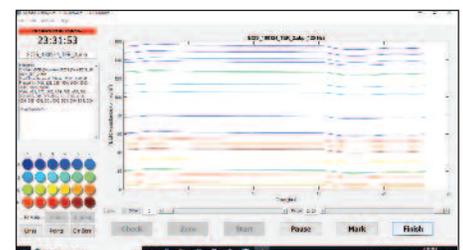
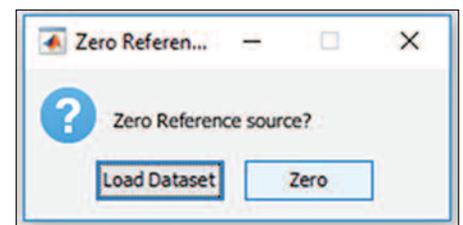
## To run an experiment:

1. Fill the TEER24 base plate wells with 1 ml of medium. Insert a blank transwell filter into each well to be measured and fill the top chamber of the transwells with 0.2 ml of medium. (Quantities are for Corning-Costar 3413 Transwells.)
2. Carefully place the common electrode array (CEA) with dipping pins onto the TEER24 base plate using the three guide pins to insure proper alignment.
3. Place the plate lid on top of the CEA. Set the complete TEER24 well assembly into the TEER24 Station within the incubator following step 7 of the Set-up instructions  
**WARNING!** To avoid leaks in the bottom plate do not press down on the lid, but rather insert the TEER24 well assembly by using the sides of the base plate.
4. Start the ECIS TEER24 Software and during start up a quick check is automatically made to determine connected wells. All wells that contain medium should appear Green. Wells that do not contain medium or are not connected appropriately will appear red.
5. If necessary reseal the TEER plate and push the **Check** button.
6. Repeat until all wells containing medium appear green.
7. Allow the TEER24 well assembly time to reach equilibrium with incubator conditions. Press **Zero** to set the Zero reference. A pop up window will allow you to choose one of two options:
  - **Load Dataset:** the zero reference is set from a previous datafile that you will select and open.
  - **Zero:** a new zero reference is measured and stored in a new file. Choose a filename (a unique name is suggested) and click **Save**. A progress bar will reflect the time left in the Zero reference set measurement.
8. Once the zero reference has been set, the **Start** button becomes active and the system is ready to begin TEER measurements.
9. Remove the TEER24 well assembly from the station and, under aseptic conditions, either add cells to the filter inserts or replace the empty inserts with ones containing cells.
10. Return the TEER24 well assembly to the station and press **Check** to check that the plate is connected properly.
11. Assuming all active wells are green, press **Start** to begin recording data.
12. If **Load Dataset** was previously selected to set the zero reference, a pop-up window will ask for a new file name for the TEER data. Enter a file name, (a default name is suggested), and press **Save** to begin data collection.
13. During the experiment you may **Pause**, to add compounds or exchange medium. To end the experiment, press the **Finish** button.



**Note: TEERplate and Filter pre-conditioning.** The ECIS TEER plate electrodes and the filter inserts will experience drift in their electrical properties over time when soaking in medium. The ECIS Electrodes can be stabilized by adding 1.5 ml of 10mM Cysteine solution into each well and inserting the common electrode array in the base plate. Incubate the assembly at RT for an hour or more just prior to use.

**Note:** The TEER calculation uses a default filter area of 0.33cm<sup>2</sup>. To change this value select **Acquire > Set Filter Area** and enter a new value in the pop-up window.



## Commands

### Commands during data collection:

To pause an experiment during data collection press the Pause button.

To resume a paused experiment press the Resume button.

To mark a time point as significant press the Mark button.

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### Menu bar commands

#### FILE

Load	Loads a previous experiment to allow new data to be appended to it
Export Data	Exports the current experiment to a csv file
Export Graph	Exports the current graph in a figure format (jpg, tif, png, ...)
Quit	Ends the program

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#### EDIT

Color Map	Allows editing of well colors
Groups	Edit how groups are defined
Error Bar	Selects error bars as SD or SEM

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#### ACQUIRE

Set Filter Area	Sets the area of the filter. Defaults to 0.33 cm <sup>2</sup>
Set Frequency	Manually sets the Frequency at which TEER is calculated
TEER Mode	Selects the TEER mode of instrument
Validate	Selects the Validation mode of instrument

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#### HELP

Manual	Opens PDF version of manual
About	Gives software version and author
Biophysics.com	Opens the Applied BioPhysics website

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