Storing of the Electrode

Short term storage (overnight): Immerse the electrode tip in electrolyte solution. Ensure the electrode cable plug is connected to the electrode port on the **EVOM2** meter and the meter is turned off, so that the system is short-circuited. This serves to maintain electrochemical symmetry.

Long term storage: When storing electrodes, rinse the electrode with distilled water and store it dry and in the dark.

Warranty

WPI (World Precision Instruments, Inc.) warrants to the original purchaser that this equipment, including its components and parts, shall be free from defects in material and workmanship for a period of 30 days from the date of receipt. WPI's obligation under this warranty shall be limited to repair or replacement, at WPI's option, of the equipment or defective components or parts upon receipt thereof f.o.b. WPI, Sarasota, Florida U.S.A. Return of a repaired instrument shall be f.o.b. Sarasota.

The above warranty is contingent upon normal usage and does not cover products which have been modified without WPI's approval or which have been subjected to unusual physical or electrical stress or on which the original identification marks have been removed or altered. The above warranty will not apply if adjustment, repair or parts replacement is required because of accident, neglect, misuse, failure of electric power, air conditioning, humidity control, or causes other than normal and ordinary usage.

To the extent that any of its equipment is furnished by a manufacturer other than WPI, the foregoing warranty shall be applicable only to the extent of the warranty furnished by such other manufacturer. This warranty will not apply to appearance terms, such as knobs, handles, dials or the like.

WPI makes no warranty of any kind, express or implied or statutory, including without limitation any warranties of merchantability and/or fitness for a particular purpose. WPI shall not be liable for any damages, whether direct, indirect, special or consequential arising from a failure of this product to operate in the manner desired by the user. WPI shall not be liable for any damage to data or property that may be caused directly or indirectly by use of this product.

Claims and Returns

• Inspect all shipments upon receipt. Missing cartons or obvious damage to cartons should be noted on the delivery receipt before signing. Concealed loss or damage should be reported at once to the carrier and an inspection requested. All claims for shortage or damage must be made within 10 days after receipt of shipment. Claims for lost shipments must be made within 30 days of invoice or other notification of shipment.

Please save damaged or pilfered cartons until claim settles. In some instances, photographic documentation may be required. Some items are time sensitive; WPI assumes no extended warranty or any liability for use beyond the date specified on the container.

• WPI cannot be held responsible for items damaged in shipment en route to us. Please enclose merchandise in its original shipping container to avoid damage from handling. We recommend that you insure merchandise when shipping. The customer is responsible for paying shipping expenses including adequate insurance on all items returned.

• Do not return any goods to WPI without obtaining prior approval and instructions (RMA#) from our returns department. Goods returned unauthorized or by collect freight may be refused. The RMA# must be clearly displayed on the outside of the box, or the package will not be accepted. Please contact the RMA department for a request form.

• Goods returned for repair must be reasonably clean and free of hazardous materials.

• A handling fee is charged for goods returned for exchange or credit. This fee may add up to 25% of the sale price depending on the condition of the item. Goods ordered in error are also subject to the handling fee.

• Equipment which was built as a special order cannot be returned.

• Always refer to the RMA# when contacting WPI to obtain a status of your returned item.

• For any other issues regarding a claim or return, please contact the RMA department

Warning: This equipment is not designed or intended for use on humans.

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INSTRUCTION MANUAL

STX2

for use with EVOM2 Epithelial Voltohmmeter

Serial No._____

www.wpiinc.com

120315

STX2 electrode can be used with the **EVOM2** and is designed to facilitate measurements of membrane voltage and resistance (TEER) of cultured epithelia directly in tissue culture wells. The electrode incorporates a fixed pair of probes, 4mm wide and 1mm in thickness. Each probe has an outer (voltage) and an inner (current) electrode.

Before making any measurements, charge the **EVOM2** overnight. Allow the unit to warm up for 20 minutes before making any measurements.

Positioning Electrode in a Culture Cup

Proper placement of the electrode in the cell is critical to making accurate measurements. The **STX2** electrode is designed to facilitate measurements of membrane voltage and resistance of cultured epithelia in tissue culture wells. The lengths of the electrodes are unequal allowing the longer (external) electrode to touch the bottom of the dish containing the external culture media while preventing the shorter (internal electrode) from reaching the bottom of the tissue culture cup or insert (see Fig. 1). This feature ensures proper positioning between the electrode and the cell layer in the cup during the trans membrane measurement. In addition, by positioning the longer tip so that it touches the bottom of the dish each time, the reproducibility of the measurements is significantly improved.

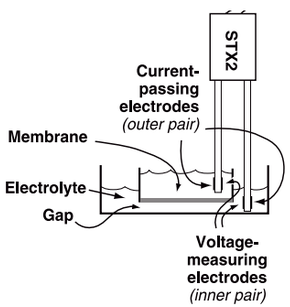

Fig. 1—(Right) Electrodes in solution.

Place the electrode into the well so the tips just touch the bottom of the wells ***without flexing*** the electrode. See Fig. 2.

Variance of the angle (Fig. 3) ***or depth of immersion (Fig. 4) of the electrode will affect resistance measurements.***

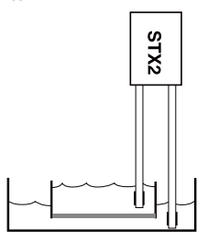

Fig. 2—Correct

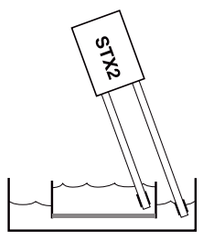

Fig. 3—Angle variance

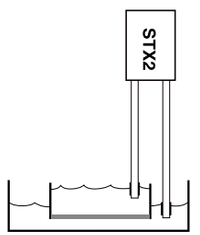

Fig. 4—Depth variance

NOTE: To obtain reproducible results in the same cup, the position of the electrodes must remain constant. To improve the reproducibility and stability of the measurement, it is important to steady the electrode while measuring. You may either touch or hover, but for consistent results, you must use the same methodology each time.

CAUTION: When moving the electrodes from one sample cup to another, it is best **not** to rinse the electrodes with distilled water. Silver/silver chloride electrodes may take several minutes to recover from exposure to distilled water, during which time the potential may drift by a few millivolts. If it is necessary to wash the electrodes between measurements to avoid carryover of one sample into the next, the electrodes should be rinsed with the experimental culture media.

Making Measurements

Refer to the **EVOM2** manual for complete instructions on making measurements.

FOR RESISTANCE MEASUREMENTS

1. Disconnect the **EVOM2** from the charge and turn the **Power** on (I).
2. Sterilize the electrode.
3. Connect the electrode to the meter.
4. Precondition the electrode in growth media.
5. Set the **Function** switch to **Ohms**.
6. Measure the blank resistance and record the value.
7. Perform the measurements. To obtain the actual tissue reading, subtract the blank resistance value.
8. Clean, dry and store the electrode.

FOR VOLTAGE MEASUREMENTS:

1. Sterilize the electrode.
2. Connect the electrodes to the **EVOM2** and leave the power off.
3. Equilibrate the electrode in growth media with the **EVOM2** power off and the **Function** switch set to **Ohms**.
   NOTE: Electrode tips must be immersed in solution to equilibrate.
4. Disconnect the **EVOM2** from the charger and set the **Function** switch to **Millivolts.**
5. Turn the **Power** on (I).
6. Measure the blank voltage and record the value.
7. Make your voltage measurements across the membranes you are testing. To obtain the actual tissue reading, subtract the blank voltage value.
8. Clean, dry and store the electrode.

Cleaning the STX2 Electrode

With use, the electrode surface can become coated with protein or other foreign materials. This build-up, or contamination, can degrade the performance of the system. After every use, rinse the STX electrodes with distilled water and store them dry. Periodically clean your STX electrodes with Tergazyme, a proteolytic detergent manufactured by Alconox.

1. Rinse with the electrodes with distilled water and dry them.
2. Make a 1% solution of Tergazyme according to the manufacturer's instructions.
3. Suspend the tips of the electrodes in the Tergazyme solution, with the exposed electrode surfaces fully immersed. During soaking, the surfaces of the electrodes may be brushed with a soft brush (like a tooth brush), if desired. The soaking time varies according to your maintenance schedule and the frequency of your cleaning.
   - Soak overnight when electrodes have not been on a routine maintenance cleaning schedule.
   - Soak 30–60 minutes if you are on a weekly cleaning schedule.
   - Soak 5 minutes if you clean your electrodes daily.
4. Rinse well with distilled or de-ionized water. Allow them to air dry and store the electrodes dry away from exposure to sunlight.

Disinfecting the STX Electrode

The STX electrodes are resistant to most methods of low temperature chemical disinfection. A solution of 5% sodium hypochlorite (undiluted household bleach) is a good choice. Ortho-phthaladehyde (Cidex OPA or Rapicide OPA), ethanol or isopropyl alcohol are also acceptable.

CAUTION: NEVER leave the electrode in alcohol for more than 30 minutes at a time. Continuously soaking the electrode in alcohol will weaken the protective coating on the electrode and shorten its life.

CAUTION: Ammonia is NOT recommended, because the silver chloride electrodes dissolve in ammonia.

Sterilizing the STX2 Electrode

The **STX2** electrodes are non-sterile as supplied. Acceptable low temperature sterilization methods for the electrodes include gamma irradiation, hydrogen peroxide plasma and ethylene oxide gas (ETO).

CAUTION: Do NOT autoclave the electrode.

CAUTION: Do NOT expose the electrodes to ultra-violet light, because UV light decomposes silver/silver chloride electrodes.