# PRODUCT CATALOG

## Advanced Products for Electrochemical Research

scribner

850 Fuel Cell Test System

600 Electrolyzer Controller

Electrolyzer Test System

857 Redox Cell Test System

# CONTENTS

# 850 MULTI-RANGE FUEL CELL TEST SYSTEM



The complete test system for operation and measurement of PEM, AEM & DM fuel cells.

## FEATURES

▶ Multiple current range electronic load choices: 5/25/50A or 10/50/100A, 100W, 20V

▶ *FuelCell®* software for user-friendly computer controlled cell operation & experimentation

▶ Temperature controlled high performance 316L stainless steel humidifiers, and heated gas transfer lines

▶ Automatic water fill for humidifiers

▶ Computer control of anode and cathode mass flow rates

▶ Up to five mass flow channels available

▶ Automatic control of $N_2$ purge gas to cell

▶ Detection of pressure loss for reactant and purge gasses

▶ Current, voltage or power control modes

▶ Continuous real time cell resistance and IR free voltage measurement by current interrupt

▶ Whole cell voltage plus two high-impedance reference inputs for half-cell data

▶ Cell main terminals and sense inputs tolerant of a non-isolated cell

▶ Safety features include detection of alarm conditions and automatic hardware shutdown
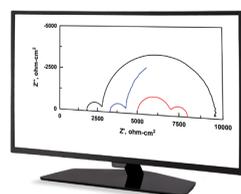
## OPTIONS



885 Fuel Cell Potentiostat/Galvanostat



Auto MultiGas Selector



Fuel Cell Fixture



881 Impedance Analyzer for EIS & HFR



Back Pressure



Liquid Pump

# 840 ADVANCED FUEL CELL TEST SYSTEM



840 Fuel Cell Test System

The 840 is a fully integrated test system for short stacks and large area single cell testing.

## FEATURES

▶ 890 Electronic Load: 500W (12/62/125A or 25/125/250A) or 1kW (50/250/500A), 20V

▶ *FuelCell*® software for user-friendly computer controlled cell operation & experimentation

▶ 892 Data Acquisition Module: 16 channels of voltage/ temperature measurement integrated with FuelCell® software

▶ Dual anode & cathode mass flow controllers for enhanced accuracy over a wide flow range

▶ Gas selector valves for automated switching between up to 3 anode and 3 cathode gases

▶ Automated humidifier by-pass for wet/dry cycling

▶ Large capacity Anode & Cathode SS humidifiers with automatic water fill

▶ Flexible SS temperature controlled heated gas transfer lines

▶ Constant or stoichiometric-controlled reactant flow rate

▶ Current, voltage or power control modes

▶ Continuous real time cell resistance and IR-free voltage measurement by current interrupt

▶ Whole cell voltage plus two high-impedance reference inputs for half-cell data

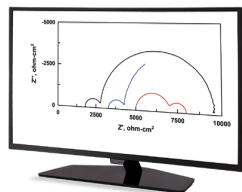▶ Safety features include detection of alarm conditions and automatic hardware shutdown for safe, reliable operation

## OPTIONS



Automatic Backpressure



885 Potentiostat



881 Impedance Analyzer for EIS & HFR



Fuel Cell Fixture

# 855 SOFC/SOEC TEST SYSTEM



The complete test station for operation and measurement of solid oxide fuel cells suitable for button cells and planar cells.

## FEATURES

▶ Multi-range electronic load 5/25/50A, 100W, 20V

▶ Voltage Booster for zero volt capability

▶ *FuelCell®* software for user-friendly computer controlled cell operation & experimentation

▶ Stainless steel anode humidifier with bypass valve and auto waterfill

▶ Up to five mass flow channels available

▶ Constant or stoichiometric-controlled reactant flow rate

▶ Includes furnace control hardware with redundant over-temperature protection

▶ Current, voltage or power control mode

▶ Continuous real time cell resistance and IR-free voltage measurement by current interrupt

▶ Whole cell voltage plus two high-impedance reference inputs for half-cell data

▶ Cell main terminals & sense inputs tolerant of non-isolated cell

▶ Optional 100 A/5V Power Supply for SOEC operation with automated switching between modes.

▶ Safety features include detection of alarm conditions and automatic hardware shutdown for safe, reliable operation.
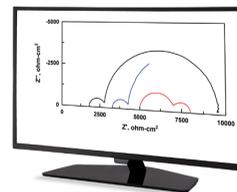
## OPTIONS



Gas Mixing



*FuelCell®* Software



885 Fuel Cell Potentiostat



Auto MultiGas Selector


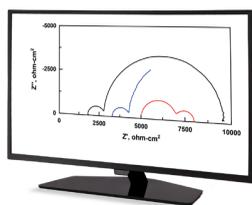
881 Impedance Analyzer for EIS & HFR

# 890 FUEL CELL TEST LOADS



### VARIOUS SIZES

▸ 125W; 10/50/100A; 20V

▸ 500W; 12/62/125A; 25/125/25A; 20V

▸ 1kW; 50/250/500A; 20V

▸ 2kW; 100/500/100A; 20V

## OPTIONS



881 Impedance Analyzer for EIS & HFR



885 Potentiostat



892 Data Expansion

The 890 is an air-cooled, multi-range programmable electronic load with ultra-low internal resistance for full-voltage range evaluation of single cells.

## FEATURES

▸ Electronic load with three current ranges for accurate measurement over a wide dynamic range

▸ Control signals for two (2) main mass flow controllers plus five (5) additional mass flow controllers

▸ Continuous real-time cell resistance and IR-free voltage measurement by current interrupt

• Whole cell voltage plus two high-impedance reference electrode inputs for half-cell data

▸ Optional internal impedance analyzer for EIS and continuous real-time high frequency resistance (HFR)

▸ Simultaneous 3 channel impedance measurement using whole cell and half-cell

▸ Cell main terminals and sense inputs tolerant of non-isolated cell

▸ Three (3) internal controllers for anode and cathode humidifier and cell temperatures

▸ Constant current, voltage or power control mode

▸ Contact inputs for three pressure sensors and external alarm

▸ Low voltage output signal to control purge gas valves and to indicate alarm condition

▸ RS485 digital interface for external temperature controllers

▸ Safety features include detection of alarm conditions and automatic hardware shutdown for safe, reliable operation

# 890ZV ADVANCED SOFC FUEL CELL TEST LOADS



The 890ZV is an air-cooled, multi-range programmable electronic load with integrated Zero Volt Boost Supply.

## FEATURES

▶ Electronic load with two current ranges: 5/25A, 10V, 50W including Zero Volt boost supply

▶ Ramping cell/furnace temperature control

▶ Control signals for two (2) main mass flow controllers plus five (5) additional mass flow controllers

▶ Continuous real-time cell resistance and IR-free voltage measurement by current interrupt

▶ Whole cell voltage plus two high-impedance reference electrode inputs for half-cell data

▶ Optional internal impedance analyzer for EIS and continuous real-time high frequency resistance (HFR)

▶ Cell main terminals and sense inputs tolerant of non-isolated cell

▶ Three (3) internal controllers for anode and cathode humidifier and cell temperatures

▶ Current, voltage or power control mode

▶ Contact inputs for three pressure sensors or alarms

▶ Low voltage output signal to control purge gas valves and to indicate alarm condition

▶ RS485 digital interface for supported external devices

▶ The 890ZV requires a custom or third-party fuel management unit to make a complete test station.

▶ Safety features include detection of alarm conditions and automatic hardware shutdown for safe, reliable operation
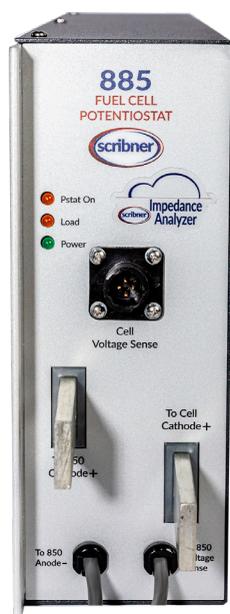
## OPTIONS
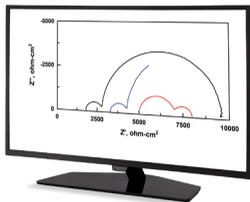


881 Impedance Analyzer for EIS & HFR



885 Potentiostat



892 Data Expansion

# FUEL CELL TEST ACCESSORIES

## POTENTIOSTAT/GALVANOSTAT



The 885 Fuel Cell Potentiostat / Galvanotstat is designed for automated diagnostic & durability testing when combined with a Scribner Fuel Cell Test System.

### FEATURES

▶ Integrated potentiostat/galvanostat for 840 /850 / 855 Series Fuel Cell Test Systems / 890 Series Fuel Cell Test Loads

▶ Perform automated experiments within *FuelCell*®

▶ 3 current ranges for maximum flexibility and current accuracy (0.02/0.2/2 A or 0.05/0.5/5 A)

▶ Voltage and current control modes - constant, sweep, step-stair

▶ Automated switching between load and potentiostat operation

    ▶ No need to swap cell leads to use potentiostat functions

▶ Combine with the 850 Auto MultiGas Unit for automated switching between normal fuel cell operation and diagnostic mode (CV/LSV)

▶ Voltammetry for in-situ fuel crossover & electrochemical surface area measurement

▶ Potentiostatic mode for electrode and catalyst support durability test

▶ Fine current resolution for high accuracy Tafel experiments

▶ Quick & easy Installation

▶ Data analysis with *FCView*® and *ZView*™ software

▶ Optional integrated FRA for Open Circuit impedance and catalyst layer electrolyte resistance measurement

### SOFTWARE



Experiment Setup



Data Analysis



885 combined with 850

## 881 IMPEDANCE ANALYZER FOR EIS & HFR



ZView® Software

The 881 integrates with the electronic load used in Scribner's 840/850/855/890 series fuel cell test products. It is also available in the 857 Flow Cell Test System and the 600/620/670 Electrolyzer Test System.

### FEATURES

▶ The Model 881 Frequency Response Analyzer (FRA) is available for integration with the 850/855/890/857/600/620 test systems.

▶ The 881 FRA meets or exceeds the performance and accuracy requirements needed for fuel cell testing applications.

▶ The 881 FRA and *FuelCell*® software provides continuous, single-frequency high frequency resistance (HFR) and electrochemical impedance spectroscopy (EIS) analysis of an operating fuel cell.

▶ HFR can be performed concurrently with current interrupt (IR drop) measurement for orthogonal determination of the cell internal or ohmic resistance.

## AUTO MULTIGAS GAS INLET SELECTOR



The 850 Auto MulitGas Unit provides automated inlet gas switching to enhance unattended testing capability.

### FEATURES

▶ Automatic selection of input gases from *FuelCell*® software

▶ Select 1 of 3 gases each for anode & cathode

▶ Combine with 885 Potentiostat for fully automated crossover, ECSA & other diagnostics

▶ Easy installation & set-up

▶ Compatible with all 850/855 Fuel Cell Test Systems

# BACK PRESSURE MANUAL OR AUTOMATIC



For accurate, independent control, and measurement of anode and cathode pressure, Scribner offers two back pressure systems: Manual and Automatic.

## FEATURES

▶ All stainless steel construction – regulators, condensate collection tanks, tubing and fittings

▶ Dual channel with isolated flow paths

▶ Designated for use with gas with dew point up to 120°C at 10 SLM*

▶ Independently control or balance anode & cathode pressure*

▶ Accurate pressure control (±3.5 kPa or 0.5 psi) & stability from 0.1 – 10 SLM*

▶ Precision pressure transducers*

▶ Flexible pressure control through *FuelCell®**

▶ Control excess gas flow during pressure increases*

▶ Maximum back pressure & differential pressure set points and alarm triggers*

▶ Program pressure profiles using change pressure experiment or arbitrary control experiment*
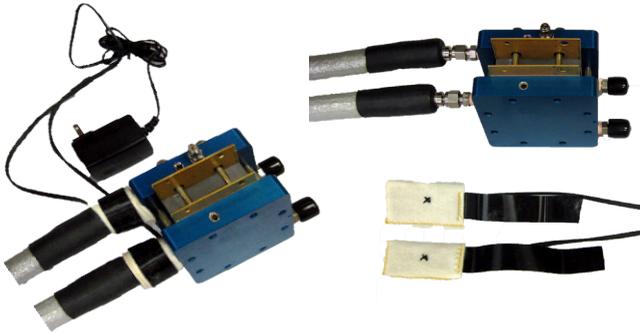
*Automatic Back Pressure

## OPTIONS



Manual Back Pressure



Automatic Back Pressure

# HEATED CUFFS
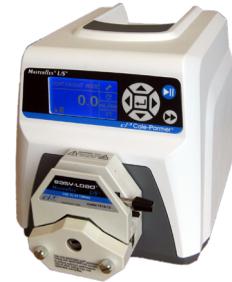


Non-heated exposed fittings can be a source of cold spots, resulting in condensation and instability in cell performance.

## FEATURES

▶ Eliminate cold spots that cause condensation

▶ Easy-to-install

▶ Low power and safe

▶ Designed for 850/840 Fuel Cell Test Systems & PEMFC hardware

▶ Universal power supply (100-240V, 50-60 Hz)

Heated cuffs:  **ON**          **OFF**          **ON**
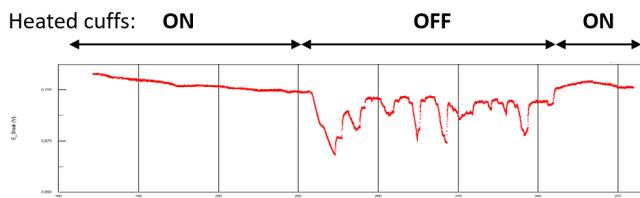


# PUMP
## FOR LIQUID FUELED CELLS



A pump may be used with Scribner's line of Fuel Cell Test Systems (840 / 850 / 855 / 890) for liquid fueled fuel cell testing.

Liquid fuels include methanol and other alcohols, ethylene glycol, formic acid, ammonia, and others.

Any pump with an analog input control signal (0 to 5V) can be used.

Control liquid flow rate through *FuelCell*® software.

Peristaltic pumps such as the MasterFlex L/S are commonly used for chemical compatibility with agressive reactants.

## FEATURES

▶ Flow rates from < 1 to 1,000 mL/min

▶ Turndown ratio up to 6000-to-1 allows for extremely broad flow range with one tubing size

▶ Further refine flow range by tubing size selection

▶ Wide selection of tubing types to match the test solution

▶ Change tubing quickly and easily

▶ Tubing retainers built into the pump head

▶ Plug-and-play with Scribner fuel cell test systems

▶ Pump fluid in either direction with reversible motor

▶ Self-priming pump can withstand back pressure

# 892 DATA EXPANSION SYSTEM



The 892 provides additional signal inputs making it ideal for pressure and flow monitoring as well as individual cell voltages and temperatures in a stack.

The 892 works with the 840, 850, 855, 890, 857, and 600 series test systems.

## FEATURES

- ▶ 8 thermocouple inputs
- ▶ 8 analog inputs, voltage or current
- ▶ Pass-through RS485 connector for ease of integration
- ▶ 2U 19" rack-mount enclosure
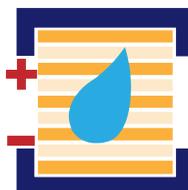- ▶ Directly supported by *FuelCell*® and *FlowCell*® software

## OPTIONS



Flow Meters



Pressure Tranducers



Thermocouples



Display & Record data in
*FuelCell*® and *FlowCell*® Software

# FUEL CELL FIXTURE



Our versatile fuel cell hardware is perfect for PEM, AEM and DMFC research. Interchangeable end-plates and flow fields for dual use option—saving money and providing you more options.

## FEATURES

▸ Fuel Cell Test Fixture is suitable for use with 5 and 25 $cm^2$ area cells

▸ Configuration for liquid fuels available

▸ Gold-plated copper current collectors (2)

▸ Anodized aluminum end plates (2) with reactant input/output ports, stainless steel *Swagelok®* compression fittings, cartridge heaters and thermocouple well

▸ Optional liquid end-plates have a non-metallic and chemically resistant flow path

▸ 60 cm heavy-gauge copper conductor load cables

▸ Gaskets – 51, 152 and 254 $\mu$m (0.002, 0.006 and 0.01 inch)

▸ Templates for preparation of gaskets

▸ Additional hardware such as bolts, washers, fittings and o-rings

▸ Compatible with BekkTech in-plane conductivity cell (BT - 112)

▸ Operating temperature up to 200 °C

▸ 115 V or 230 V cell heaters available

▸ Flow field channel designs - serpentine, interdigitated, parallel and differential

## OPTIONS
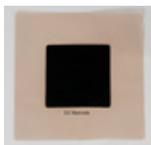


Membrane Electrode Assembly



Red end plate for Liquid Fuels



Interdigitated Flow Field



Gas Diffusion Media



Triple Serpentine Flow Field



Platinized Titanium Interdigitated Flow Field

# GAS MIXING INTERFACE



The Gas Mixing Interface provides additional mounting for up to 5 mass flow controllers (MFCs).
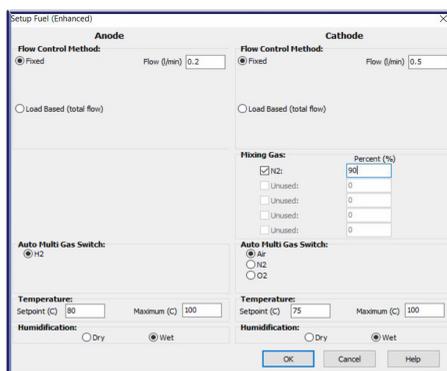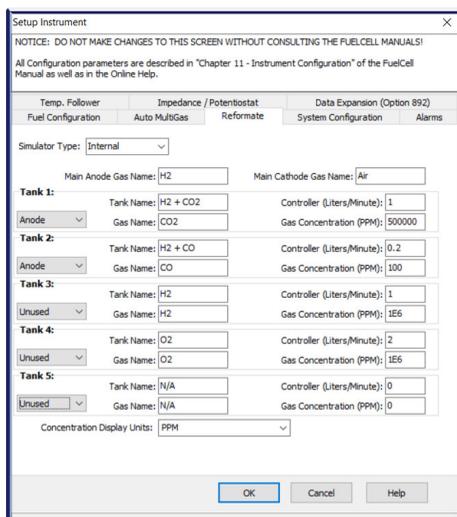
## FEATURES

▶ Mounting for up to 5 mass flow controllers (MFCs)

▶ Control signals for up to 3 MFCs

▶ Plug-and-play accessory for 850/855 Fuel Cell Test Systems

▶ Integrated control of gas mixture type and composition in *FuelCell*® software

▶ Industry standard connector for connection of serial / RS485 devices

▶ Connector for external alarm input

▶ Connections for factory options including furnace control, burp valve control and others

## OPTIONS

Configuration of FuelCell® software for a Gas Mixing Interface for dilution of Air with $N_2$ for $O_2$ mass transport limiting and transport resistance measurements.

### Additional MFCs facilitate gas mixing for

▶ Reformate simulation – Humidified mix of $H_2$, $CO_2$ & CO

▶ Mass transport limiting studies – Air/$O_2$ and $N_2$ mixing for low $p_{O_2}$

▶ Impurities and contaminants investigations

## STAND-ALONE HUMIDIFIER

Based on the 850's proven humidifier design, this system is an excellent choice for stable and accurate dew point control.

### FEATURES

▶ Humidification of an additional gas supply

▶ Ideal for gas mixing experiments including reformate simulation and contaminant/poison studies

▶ Ideal for use with gases that may contaminate the fuel cell test system

▶ *FuelCell®* software for user-friendly computer controlled operation & experimentation

▶ Designed for flows up to 5 SLPM

▶ Automatic water filling

▶ Stainless steel humidifier with integrated heated & insulated flexible *Swagelok®* gas transfer line

▶ Requires mass flow controller

▶ **Integrated Heated Gas Transfer Lines and all Stainless Steel Construction**

▶ **Prevent contamination in the main test system plumbing**

## DI WATER TANK

### FEATURES

▶ Cost-effective solution for pressurized water delivery

▶ Compatible with Scribner 600/620/670/740/840/850/855 Test Systems

▶ Uses existing purge gas supply

▶ Tank regulator, pressure gauge & over-pressure safety relief valve

▶ Large capacity 19 L (5 gal) means infrequent refilling

▶ Stainless steel construction

▶ Easy installation and operation

▶ Large opening for easy filling

▶ Inert gas blanket preserves water purity

▶ **Does your lab lack a source of pressurized DI water? We have the perfect low-cost solution.**

▶ **Our DI Water Tank povides pressurized delivery of an existing DI water source. Pressurized DI water delivery is required for Auto Water Fill function of Humidifiers.**

# MEMBRANE CONDUCTIVITY

## 740 MEMBRANE TEST SYSTEM



The 740 MTS is ideally suited for development of new ionomers and solid electrolytes.

### FEATURES

▶ Custom MTS4 Software for complete measurement process control and data acquisition

▶ *CorrWare®, ZPlot®, MultiStat®, ZPlot·Lab™ & ZView®* software for measurement and analysis of sample impedance

▶ Wet and dry gas mixing for accurate and precise RH control and rapid RH cycling

▶ Test chamber backpressure control, condenser and collection tank for high-temperature operation

▶ In-situ sample temperature and dew point measurement for real-time RH monitoring

▶ Uses bare (non-catalyzed) membranes

▶ Small sample size 6 mm x 30 mm

▶ Spring-loaded sample compression—easy, repeatable sample loading up to 400 PSI (2.76 MPa)

▶ Control and monitoring of multiple process temperatures

▶ Rapid, easy cell assembly with accurate and repeatable sample compression

▶ Cell lock-feature for safe operation at elevated temperature, pressure and $H_2$ gas

▶ Automatic shutdown and $N_2$ purge on alarm condition

▶ Detailed cell assembly instructions and data analysis procedure

▶ Native USB interface to PC for easy set-up

▶ Safety features include alarm conditions and automatic hardware shutdown for safe, reliable operation

### OPTIONS



BT-710 Cell Head



MTS Cell Head

## BT-710 IN-PLANE CONDUCTIVITY CELL



The BT-710 Conductivity Cell is used with the 740 MTS to measure in-plane membrane resistance and ionic conductivity.

### FEATURES

▶ Designed for use with the 740 MTS

▶ Test bare membrane samples - fabrication of a catalyzed sample (CCM or MEA) is not required

▶ True 4-electrode technique

▶ Small sample size - 25 mm x 3 mm

▶ Temperatures up to 180 °C

▶ Simple DC measurement and data interpretation

▶ Compare in-plane and through-plane conductivity for materials anisotropy

▶ Valuable time and money can be saved by analyzing ion charge transport resistance prior to catalyzation of the membrane and assembly of the MEA into a fuel cell

The advantage of the 4-electrode measurement is the ability to measure resistance due only to charge transport while excluding interfacial and charge transfer resistances. By measuring only the resistance due to ion transport, accurate assessment of in-plane membrane conductivity can be made.

### OPTIONS



BekkTech



BT-710 w/GDL

# BT-11x MEMBRANE CONDUCTIVITY HARDWARE



## OPTIONS



BT-110                          BT-112



BT-115 with
Electrochem Cell Hardware

## FEATURES

**BT-11x Membrane Conductivity Hardware:**

Use the BekkTech Conductivity Cell or Clamp to obtain in-plane ionic conductivity data on your bare membrane sample.

**BT-110 Conductivity Clamp:**

The Conductivity Clamp is designed to be used in a humidity chamber or in a beaker. The advantage of the 4-electrode measurement is the ability to measure resistance due only to charge transport while excluding interfacial and charge transfer resistances. By measuring only the resistance due to ion transport, accurate assessment of in-plane membrane conductivity can be made.

Valuable time and money can be saved by analyzing ion charge transport resistance prior to catalyzation of the membrane and assembly of the MEA into a fuel cell.
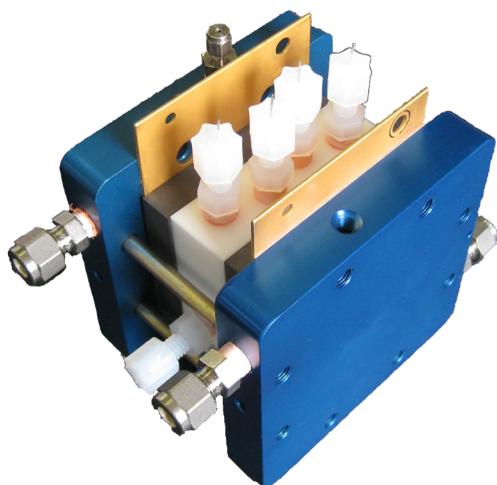
**BT-112 Conductivity Cell:**

Assemble your bare membrane sample into the Conductivity Cell. The Conductivity Cell is then assembled into your Scribner or Fuel Cell Technologies, Inc. fuel cell hardware.

Connect the fuel cell hardware to your test stand to control the temperature, humidity, gas type, and pressure of the membrane sample under test.

**BT-115 Conductivity Cell:**

Assemble your bare membrane sample into the Conductivity Cell. The Conductivity Cell is then assembled into your ElectroChem, Inc. fuel cell hardware. Connect the fuel cell hardware to your test stand to control the temperature, humidity, gas type, and pressure of the membrane sample under test.
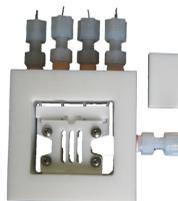
## 580 BATTERY TEST SYSTEM

The 580 Battery Test system was designed to meet the specific demands of our customers. The 580 is used to test single cell batteries as well as super-capacitors.



### FEATURES

▶ 6 current ranges: 1A, 100mA, 10mA, 1mA, 100$\mu$A, 10$\mu$A (Auto)

▶ 5 terminal measurement

▶ Control modes: current, voltage, power

▶ HFR for internal resistance

▶ 100 pts/sec sample rate

▶ *BCycle* and *BView*® Software   user-friendly, powerful, and flexible
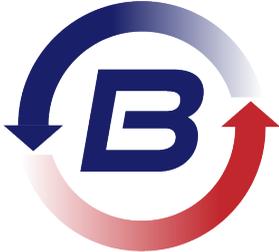
### OPTIONS



Coin Battery Holder



Dual Battery Holder



Cell Cables Available



*BCycle* Software

# 585 BATTERY TEST SYSTEM

The 585 Advanced 8 Channel Battery Cycler is an excellent choice for battery and supercapacitor testing. The 585 is suitable for small to medium sized cells.

## FEATURES

▶ Each channel is an independent potentiostat/galvanostat

▶ 6 current ranges - 5A, 500mA, 50mA, 5mA, 500$\mu$A, 50$\mu$A (Auto)

▶ Gang channels up to 20A (2 channels)

▶ 5 or 6 terminal measurement

▶ Control modes: current, voltage, power

▶ HFR for internal resistance

▶ 100 pts/sec sample rate

▶ *BCycle* and *BView*® Software: user-Friendly, powerful, and flexible
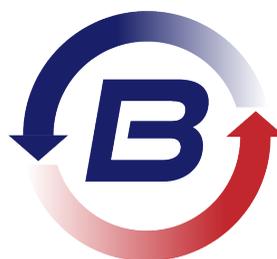
## OPTIONS

Coin Battery Holder

Dual Battery Holder

Cell Cables Available

*BCycle* Software

# 600 ELECTROLYZER TEST STATION



A bench-top fully-integrated instrument for R&D testing. The 600 (ETS) is ideal for labs requiring detailed control, diagnostics and analysis of PEM electrolyzer cells.

## OPTIONS



Gas Sensors



Electrolyzer Cell Fixture with Pt-Ti Flow Field



Pt-Ti Mesh and MEA

## FEATURES

▶ 4 current range potentiostat $\pm$0.07 / 0.7 / 7 / 20A, $\pm$5V, 100W

▶ Integrated power supply for operation up to 100A, 5V, 500W

▶ Automated switching between Potentiostat and Power Supply mode

▶ *FlowCell-ETS®* application software for complete system control, experiment sequencing, graphing and data acquisition

▶ Mass flow meters for real-time $O_2$ and $H_2$ product flow rate monitoring

▶ EIS and HFR in potentiostat mode

▶ EIS data compatible with *ZView®*, the world's leading impedance analysis & equivalent circuit modeling software

▶ Whole cell voltage plus two high-impedance reference electrode inputs for half-cell data

▶ Integrated back pressure to 2 $bar_g$

▶ $N_2$ purge on cathode with supplemental $N_2$ on anode

▶ Anode feed water recycling or once-thru operating mode

▶ In-line high-temperature ion exchange cartridge to maintain Anode feed water purity in recycle mode

▶ Integrated 892 Data Expansion Module for additional 8 temperature + 8 analog inputs, e.g., pressure transducers

▶ Safety features: E-stop, Over Voltage/Current, Over Temperature, Product Gas Cross-Contamination

# 620 WATER ELECTROLYSIS TEST STATION



The 620 Electrolyzer Test Station (ETS) is ideal for labs requiring detailed control, diagnostics and analysis of electrolysis cells operating on DI water or alkaline solutions.

## FEATURES

▶ 4 current range Potentiostat ±0.07 / 0.7 / 7 / 20 A, ±5 V, 100 W

▶ Integrated Power Supply for operation up to 100 A, 5 V, 500 W

▶ Automated switching between Potentiostat and Power Supply mode

▶ *FlowCell-ETS®* application software for complete system control, experiment sequencing, graphing and data acquisition

▶ Mass flow meters for real-time $O_2$ and $H_2$ product flow rate monitoring

▶ EIS and HFR in Potentiostat mode

▶ EIS data compatible with *ZView®*, the world's leading impedance analysis & equivalent circuit modelling software

▶ Whole cell voltage plus two high-impedance reference electrode inputs for half-cell data

▶ Independent, dual heated liquid feeds for cell positive and negative electrodes

▶ Integrated back pressure to 2 bar$_g$

▶ Compatible with DI Water and Alkaline Feed Stocks

▶ $N_2$ purge on Cathode with Supplemental $N_2$ on Anode

▶ Recirculating or single-pass operating mode

▶ Automated feed tank level and concentration balancing

▶ In-line high-temperature Ion Exchange cartridge to maintain DI water purity

▶ Integrated 892 Data Expansion Module for additional 8 temperature +8 analog inputs, e.g., pressure transducers

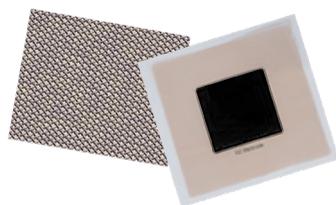▶ Safety features: E-Stop, Over Voltage/Current, Over Temperature, Product Gas Cross-Contamination
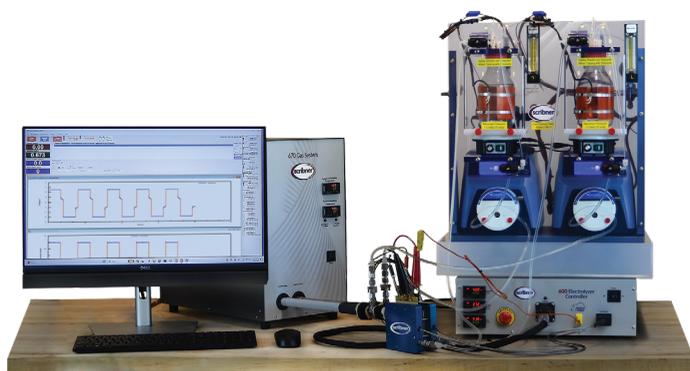
## OPTIONS



Gas Sensors

Electrolyzer Cell Fixture with Pt-Ti Flow Field



Pt-Ti Mesh and MEA

# 670 ELECTROLYSIS WORKSTATION



The 670 Electrolysis Workstation is a turn-key, customizable platform that can accommodate both liquid and gas on one or both of the electrodes. It boasts a multi-range, high current (±20 Amp) potentiostat for high accuracy over a broad range of reaction rates and cell sizes. Included in the system is the powerful, user friendly *FlowCell*® software for system operation and experimentation. Perfect for investigating a wide range of Electrolysis processes. The 670 was designed and built to be chemistry agnostic. The 670 is compatible with a broad range of chemistries: Acids, bases, water-based solutions or organic-based solutions, and a wide range of gases.

**Broad Range of Applications**

**$CO_2$ Reduction, Ammonia Production, Power-to-Fuels, Organic Electrosynthesis, etc.**

## OPTIONS



**892 Expansion Unit**



Cell Fixture



Platinized Titanium Interdigitated Flow Field



Back Pressure Unit

## FEATURES

- *FlowCell-ETS*® application software for complete system control, experiment sequencing, graphing and data acquisition
- Multi-range potentiostat – ±70mA/700mA/7A/20A, ±5V
- Integrated 881 FRA for EIS & HFR
- Heated & Temperature Controlled Pyrex Bottles – 100, 250, 500 & 1,000 mL
- Teflon Stir Bar in both positive and negative tanks
- Custom Flow Bench Includes:
  - Software Controlled Peristaltic Pumps
  - Heated Pressure-rated Duran Bottles
  - Designed for easy removal, fill, purge, rinse and drain
  - $N_2$ Reservoir Backfill & System Purge w/ Check Valves
  - All Non-Metal Wetted Parts
  - Taps For Sampling
  - Dry or Humidified Gas
  - Auto MultiGas for switching between gasses
  - Includes *BView*® and *ZView*® software for data analysis

## ELECTROLYZER FIXTURE



Cell fixture is compatible with the 600/620/670 Electrolyzer Test Stations.

### FEATURES

▶ Available as a Dual Area Electrolyzer fixture-suitable for use with 5 and 25 cm² active area

▶ Anodized aluminum end-plates

▶ Stainless steel end-plates available for KOH compatibility

▶ Platinized titanium flow field and porous media for positive ($O_2$) electrode

▶ Sealed high-purity POCO graphite flow field and carbon diffusion media for negative ($H_2$) electrode

▶ Cell heaters available for 115 V or 230 V operation

▶ Operating temperature up to 200 °C

### INCLUDED



Electrolyzer Cell Kit



5cm² and 25cm² Pt-Ti flow fields



Carbon Gas Diffusion Media



Electrolyzer Membrane Electrode Assembly

### COMPONENTS

▶ Flow fields with precision machined serpentine or interdigitated flow pattern (custom flow patterns available)

▶ Gold-plated copper current collectors

▶ End plates with reactant input/output ports, stainless steel *Swagelok®* compression fittings, cartridge heaters and thermocouple well

▶ 60 cm (24 in.) heavy-gauge copper conductor load cables

▶ Gaskets, gasket templates and additional hardware such as bolts, washers, fittings and o-rings

▶ Optional Stainless Steel end-plates increase chemical compatibility while retaining robust interconnects.

# 857 REDOX FLOW CELL TEST SYSTEM

The ideal solution for R & D of single RFB cells. The 857 includes *FlowCell®* software and features a multi-range potentiostat for high accuracy current measurement, as well as real-time state-of-charge monitoring.

## FEATURES

▶ *FlowCell®* software for complete system control, experiment sequencing, graphic & data acquisition

▶ 0.07A, 0.7A, 7A, 20A current ranges

▶ High-current, multi-range potentiostat operates in current- or voltage-controlled operation

▶ ± 5 V operation for non-aqueous electrolytes

▶ Charge / discharge cycling & performance characterization

▶ Four reservoir sizes 100 mL, 250 mL, 500 mL, and 1L

▶ Whole and half-cell voltage, EIS and HFR measurement

▶ Impedance analyzer for EIS and HFR measurements during charge, discharge and at OCV

▶ High-impedance V-sense inputs for whole and half-cell measurements including EIS & HFR

▶ State-of-charge (SOC) voltage inputs for DC SOC measurement when used with SOC cell

▶ All non-metallic electrolyte handling system: pumps, electrolyte reservoirs, drain and purge valves

▶ Cell and electrolyte temperature control up to 50 ℃

▶ Peristaltic pumps with variable flow control including forward and reverse

▶ Electrolyte shielding with inert gas purge blanket

▶ Electrolyte reservoir stirring

▶ Includes ZView(R) & BView software for data analysis in EIS

## OPTIONS

Single Cell RFB Hardware

Four Reservoir Sizes

State-of-Charge Cell

# REDOX FLOW CELL TEST FIXTURE



We offer multiple assembly configurations to allow for various flow configurations, electrode type and thickness.

## FEATURES

▸ Cell fixture specifically designed for use with the Scribner Redox Flow Cell Test System

▸ Cell area from 5 to 25 cm²

▸ All non-metallic flow paths made with noncorrosive, chemically resistant plastics only

▸ 115 V or 230 V cell heaters

▸ Operating temperature up to 120°C

▸ SGL Carbon *SIGRACELL*® graphite felt

▸ PTFE (Teflon®) flow frames

▸ Ultra-high purity, sealed POCO graphite flow fields with precision machined serpentine or interdigitated flow pattern (custom flow patterns available)

▸ Gold-plated copper current collectors

▸ Anodized aluminum end plates with reactant input/output ports, Swagelok fittings, cartridge heaters & thermocouple well

▸ Gaskets, gasket templates and additional hardware such as bolts, washers, fittings and o-rings

## OPTIONS



RFB Cell Kit



RFB Open Cell



RFB w/Flow Frame