



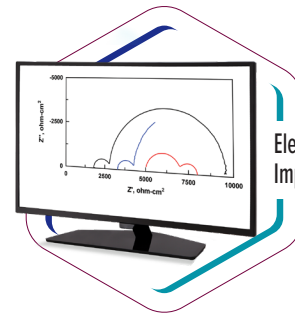
850e Multi-Range Fuel Cell Test System

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

The 850e is designed for single cell testing and diagnostics in a research lab environment.

The 850e features

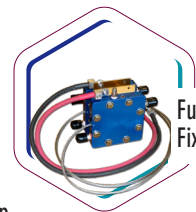
- Multiple current range electronic load choices: 5/25/50 A or 10/50/100 A, 100 W, 20 V
- *FuelCell*[®] software for user-friendly computer controlled cell operation & experimentation
- Temperature controlled high performance 316L stainless steel humidifiers, and heated gas transfer lines
- Computer control of anode and cathode mass flow rates
- Automatic control of N₂ 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
- Automatic Water Fill for humidifiers
- Safety features include detection of alarm conditions and automatic hardware shutdown for safe, reliable operation



Electrochemical Impedance Spectroscopy



Liquid Pump



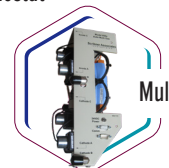
Fuel Cell Fixture



Back Pressure



885 HS Fuel Cell Potentiostat



MultGas Selector

SPECIFICATIONS: 850e Multi-Range Fuel Cell Test System

Electronic Load:

Maximum Load Current	5/25/50 A or 10/50/100 A (configuration dependent)
Maximum Load Power	100 W
Minimum Load Resistance:	< 2 m Ω (100 mV @ 50 A at load terminals)

Current Resolution:	1 mA for 5/25/50 A; 10 mA for 10/50/100 A
Current Accuracy	0.3% of full scale current of selected range

Voltage Measurement and Data Acquisition:

Max . Whole Cell Voltage	20 V
Max . Reference Electrode Voltage:	9.999 V
Voltage Resolution	1 mV

Voltage Accuracy	± 3 mV $\pm 0.3\%$ of reading
Voltage & Current Data Update Rate	100 Hz
Whole Cell Sense Input Resistance	> 35 k Ω
Reference Electrode Input Resistance	> 10 ⁹ Ω

Safety Features:

Impedance Analyzer (Optional 880):

Internal Impedance Analyzer Type	Single sine, one generator and two gain/phase measurement channels
Internal Analyzer Frequency Range	1 mHz to 10 kHz
Measurement Channels	Three: whole cell plus two half cell vs. Reference Electrode

Fuel System:

Reactant Gas Control System	All 316 SS construction of humidifiers, flow path, valves and mass flow controllers, with Swagelok® fittings and heated reactant delivery lines
Mass Flow Control	Anode to 2 SLPM, Cathode to 5 SLPM, Software controlled mass flow controllers, Automatic N ₂ purge valves on Anode and Cathode
Alarms	Gas supply pressures(3), Humidifier water levels(2), External (1), System alarm output (1)
Back Pressure Control	Manual or Automatic, 0 - 2 bar (0 – 30 PSIG), requires optional 850BP or Auto BP accessory
Temperature Controllers	Three: cell, anode humidifier, cathode humidifier
Set & Report Accuracy	$\pm 0.25\%$ of span, ± 1 least significant digit

Temperature:

Sensor Type	Thermocouple, Type T for cell (Type K optional for high temperature)
Humidifiers	Dual sparger-type, passivated 316L, 360 W heaters per bottle
Temperature Range	Ambient to 99 ° C; Optional: 120 ° C

Environment:

Operating Temperature	5 to 35 ° C
Power Source	120 V, 50-60 Hz, 10 A (Export model 220-240 V, 50-60 Hz, 5 A)
Enclosure Type	Single bench top enclosure
Size and Weight	18" H x 11" W x 19" D (+ 11" for heated gas lines); 50 lb .46 cm x 28 cm x 48 cm (+ 28 cm); 23 kg

Automatic shutdown and N₂ purge on under-voltage, over-current, over-temperature, loss of reactant or purge gas pressure, low water, communications failure or external alarm Emergency Stop switch for manual operator shutdown