850 Multi-Range Fuel Cell Test System

Fully Automated, Turnkey, Test System For The Operation And Measurement Of Single Cell PEM, AEM & DM Fuel Cells

New 125 Amp Electronic Load!

FEATURES

Advanced Diagnostics:

Three Current Range Electronic Load Choices 50, 100, & 125 Amps

Modular Benchtop Design for Complete Diagnostics of Single Cell Testing

- Integrated Frequency Response Analyzer with EIS and HFR
- Integrated Potentiostat for In Situ CV and LSV Experiments
- Auto Multigas Selection for Poisoning and Hydrogen Crossover Experiments
- Auto Back Pressure for Independent Control of Anode / Cathode Pressures

Unattended Operation:

Smart Fuel Management with Automatic Filling / Draining Humidifiers, Automated Shutdown with Embedded Firmware Level Safety Management & Electronically Controlled Purge Gas

Intuitive Controls:

FuelCell® Software for User-Friendly Computer-Controlled Cell Operation & Experimentation

ZView® World's Leading Impedance Analysis & Equivalent Circuit Modeling Software

Fuel Cell Test System

scribner

SPECIFICATIONS

Electrical

Load Current Range Configurations:
5/25/50A, 10/50/100A, 12/62/125A

Maximum Load Power:
100W

Minimum Load Resistance:
<2 mΩ (100mV @ 50A at load terminals)

Current Resolution:
1 mA or 10 mA per software current range selection

Current Accuracy:
0.3% of full-scale current of selected range

Max . Whole Cell Voltage:
20V

Max . Reference Electrode Voltage:
9.999V

Voltage Accuracy:
±3 mV ±0.3% of reading

Voltage & Current Data Update Rate:
100 Hz

Whole Cell Sense Input Resistance:
> 35kΩ

Reference Electrode Input Resistance:
> 10^9 Ω

Process Control

Wetted Materials:
All 316SS

Fittings:
Swagelok® fittings and heated lines

Mass Flow Control:
Software controlled Anode & Cathode

Purge Control:
Automatic N_2 for Anode & Cathode

Humidifiers:
Dual sparger-type, passivated 316SS, 360 W heaters per bottle

Temperature Control:
(3) Cell, Anode humidifier, Cathode humidifier

Cell Thermocouple:
Type T or Type K

Temperature Range:
Ambient to 99.0°C; Optional: 120°C

Temp Measurement Accuracy:
±0.25% of span, ±1 least significant digit

Operating Environment

Operating Temperature:
5 – 35 °C

Power Source:
120(10A) or 220–240(5A) VAC 50/60 Hz

Enclosure Type:
Single bench top unit

Size & Weight:
46 x 28 x 48 cm (18 x 11 x 19 in) & 23 kg (50 lbs)

Options

Back Pressure Control:
Manual or Automatic, 0 – 2 bar (0 — 30 psi), requires external accessory

Internal Impedance:
Single sine, (1) Generator and (2) Gain/Phase

Internal Analyzer Freq. Range:
1 mHz to 10 kHz

Impedance Measurement Channels:
(1) Whole cell, plus (2) Half Cell vs. Reference Electrode

Safety

Alarms:
Gas supply pressures(3), Humidifier Water Levels(2), External (1), System Alarm Output (1)

Fail Safe Continuous Monitoring:
Embedded Firmware Level Decisions, N_2 Purge On Alarm Condition, E-Stop, Voltage, Current, Temperate

INTERNAL OPTIONS

Frequency Response Analyzer (FRA)

Adds **Electrochemical Impedance Spectroscopy (EIS)** and **High-Frequency Resistance (HFR)** measurements for cell diagnostics, monitoring membrane performance over time and under varying operating conditions.

Humidifier By-Pass

Automated delivery between dry and humidified gas to the Fuel Cell to enable **Accelerated Lifetime Durability Testing** and **Predictive Failure Analysis** of the membrane.

Software controlled Humidifier By-Pass for flowing **Reformate / Contaminate Gases**, while avoiding humidifier contamination, and operating a stack or cell that doesn't require humidified gas.

Humidifier Auto Drain/Fill

Rapid Due Point Reduction to reduce total testing time and automating humidifier water maintenance by draining the system prior to offline operation.

ACCESSORIES

Turnkey Solutions
Consumables & Service

Consumables & Integrations
Allow Scribner to source consumables or other equipment as a turnkey service. From membranes to mass spectroscopy, we have a partner to support your research.

Installation Service
Have Scribner install, commission, and train users on the test system. Build confidence learning from our Electrochemists.

Repair and Maintenance Service
Scribner stocks replacement parts and provides fast friendly technical support both in person and virtually. Our factory service center is ready to help.

Extended Warranty
Protect your test system with additional warranties above our complementary one-year service.

In-Field Support
Scribner continuously releases Application Notes and Software Updates to keep you ahead of the curve.

On-site Calibration
Can't take your test system out of service? Allow Scribner to service on-site.

Expanded Cell Control
Automatic Back Pressure

Automated cell pressure control to support advanced test protocols.

Provides water trap functions to limit the amount of water in the exhaust stream, including self-draining condensate tanks, to improve user and facility safety.

Expanded Gas Control
Gas Mixing Interface

Automated Gas Mixing capability is available as an **Internal Option** (See Part Configurator Page for additional details) and an External Option for expanded customization, with up to (3) number of Mass flow Controllers.

Additional Inputs
Data Expansion Unit

16 Channels of additional inputs to capture temperature or analog measurements, to enable the study of physical or mechanical element affecting cell performance like Heat Distribution, Flow Restrictions, Water Management, etc…

Advanced Cell Diagnostics
Potentiostat

Electrochemical Impedance Spectroscopy (EIS) measurements are used for cell diagnostics to identify performance limitations across multiple frequency regimes.

High-Frequency Resistance (HFR) allows single-frequency measurement to monitor membrane performance over time and under varying operating conditions.

Characterization
Auto-Multi Gas

Electrochemical Surface Area (ECSA) Measurement enabled by computer controlled **Automatic Multi Gas** selector.

Measurement of **Hydrogen Cross Over** and enhanced diagnostics.

Additional Accessories

- Cell Fixtures **Heated Cuffs** to eliminate heat loss
- **DI Water Tank** to provide stable pressurized delivery of existing DI water source
- **Stand-Alone Humidifier** for 3rd channel
- **MEOH Pump** for DMFC Operations

CELL FIXTURES

Proton Exchange Membrane

Flow-Fields are manufactured with ultra-high purity and sealed POCO graphite with precision machined flow patterns, including gold-plated copper current collector plates.

Anion Exchange Membrane

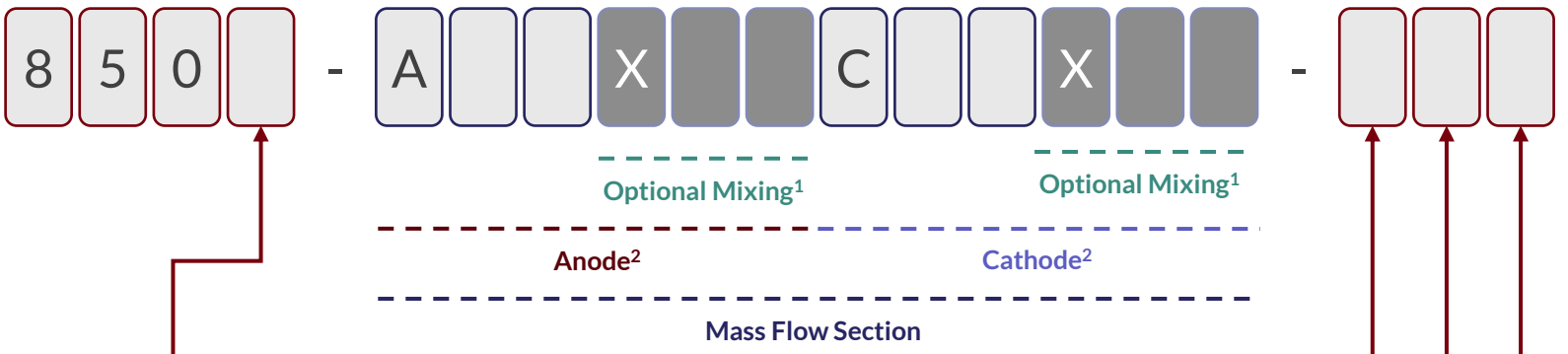
Non-corrosive, chemically resistant plastics and multiple assembly configurations, ensuring compatibility with various electrode types and thicknesses.

High-Pressure Electrolysis[1]

Available in Aluminum, Stainless Steel, and Nickel 200 End-Plates, as well as a wide range of Flow-Field materials and patterns.

[1]Parts derived from National Laboratory Renewable Energy under DOI: J. Wrubel, S. Ware, C. Schaffer, M. Allen, E. Klein, R. Rice, C. Engtrakul, and G. Bender. "NREL 25-cm2 High-Pressure Low-Temperature Electrolysis Cell Hardware (Open Source)." National Renewable Energy Laboratory Data Catalog. DOI: 10.7799/2205626. 2023.

PRODUCT CONFIGURATION



Load Definition	
Code	Description
B	100W 5/25/50A
C	100W 10/50/100A
D	100W 12/62/125A

Hydrogen	
Code	Description
H1	0.1 SLPM H2
H2	0.2 SLPM H2
H3	0.5 SLPM H2
H4	1.0 SLPM H2
H5	2.0 SLPM H2
H6	5.0 SLPM H2

Nitrogen	
Code	Description
N1	0.1 SLPM N2
N2	0.2 SLPM N2
N3	0.5 SLPM N2
N4	1.0 SLPM N2
N5	2.0 SLPM N2
N6	5.0 SLPM N2

Air	
Code	Description
A1	0.1 SLPM Air
A2	0.2 SLPM Air
A3	0.5 SLPM Air
A4	1.0 SLPM Air
A5	2.0 SLPM Air
A6	5.0 SLPM Air

[1] Mixing Mass Flow Controllers are NOT required. Only (1) Internally mounted Mixing Mass Flow Controller per Test-Station for additional mixing capabilities. Externally mounted options are available (850 Reformate Box). Mixing option after the A (Anode) and before the C (Cathode) denotes mixing capabilities on the Anode side. The mixing option after the C (Cathode) denotes mixing capabilities on the Cathode side.

[2] Custom Anode and Cathode Mass Flow controllers may be available. Contact ***info@scribner.com*** *for additional details.*

Internal Option Code			
Code	881 FRA	Humidifier By-Pass	Humidifier Auto Drain/Fill
0	N	N	N
1	N	Y	N
2	N	Y	Y
3	N	N	Y
4	Y	N	Y
5	Y	N	N
6	Y	Y	N
Z	Y	Y	Y

Thermocouple Code	
Code	Cell Thermocouple Type
0	No
J	Type J
K	Type K
R	Type R
S	Type S
T	Type T

Plug (Voltage) Code	
Code	Plug Type
C	Chinese Plug (230V)
E	European Plug (230V)
N	North American Plug (120V)
U	UK Plug (230V)