



## **BT-552 Membrane Conductivity Test System**

### **BT-550 Gas Delivery System**

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The **BT-552 Membrane Conductivity and Fuel Cell Test System** is designed to do in-plane membrane conductivity testing and basic fuel cell testing. The hardware and software are fully integrated.

The **BT-550 Gas Delivery System** includes the gas flow and humidification components for in-plane membrane conductivity testing and basic fuel cell testing. The customer provides the computer, software, potentiostat, and load box to complete the system.

The differences between these two systems are further discussed below:

- 1) **Computer & Software** – The **BT-552** includes a Dell Computer installed with LabView Basic and Microsoft Office Basic. BekkTech Conductivity Testing Software and BekkTech Fuel Cell Testing Software are also installed.

The **BT-550** does not include a computer or software. You will need to provide a computer with LabView 8.2 or higher and Microsoft Excel. The BekkTech Conductivity Testing Software will be provided on a CD for you to install. The BekkTech Fuel Cell Testing Software is not included with the BT-550.

- 2) **Voltage Measurements** – The **BT-552** includes the Keithley 2400 SourceMeter for applying current and measuring voltage during conductivity testing.

The **BT-550** does not include the Keithley 2400 SourceMeter. You will need to provide a potentiostat for applying current and measuring voltage and will need a method to integrate this data with the humidity and temperature data collected by the Conductivity Testing Software.

- 3) **Load Box** – The **BT-552** includes an Agilent Load Box with ranges of 0-6 Amps or 0-60 Amps.

The **BT-550** does not include a Load Box.

- 4) **Membrane Conductivity Testing Software** –The **BT-552** includes the BekkTech Conductivity Testing Software which automates test procedures to obtain conductivity data at a range of relative humidities and temperatures (to 120C). Data acquisition and data analysis tools are also included and integrated. Scripts can be utilized for automated control of the system. Or the operator can manually input changes to the test parameters, as needed.

The **BT-550** includes the BekkTech Conductivity Testing Software for control and data acquisition of temperatures and gas flow. The voltage-current data is not integrated in the automated process, however, because you provide your own potentiostat with this system. Integration of the voltage-current data with the temperature and relative humidity data will need to be programmed or manually performed by your staff.

- 5) **Fuel Cell Testing Software** – The **BT-552** includes the BekkTech Fuel Cell Testing Software for automated control of Voltage Holds or Current Holds for Polarization Curves. Scripts can be utilized for automated control of the system. Or the operator can manually input changes to the test parameters, as needed.

The **BT-550** does not include any Fuel Cell Testing Software.

- 6) **Automated Data Analysis** – The **BT-552** Testing Software collects all the data needed for Membrane Conductivity Analysis or Fuel Cell Polarization Curves. The BekkTech Data Analysis Tools filter the data collected and generate graphs from the data collected.

All Data Analysis with the **BT-550** will require the operator to manually enter potentiostat and/or load box data in order to have a complete set of data for analysis.

Please see detailed information on each system on the following page to determine which system will better suit your needs.

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**BT-552 Membrane Conductivity Test System**  
**BT-550 Gas Delivery System**

<b>BekkTech Test Systems</b>	<b>BT-550</b>	<b>BT-552</b>
<b>Automated Control and Data Acquisition</b>		
<b><i>BekkTech Conductivity Testing Software in LabView (LabView Software Required)</i></b>		
Automated control of gas flow and temperatures. Automated data acquisition of gas flow and temperatures.	X	X
Automated control of scanning DC Sweeps for obtaining membrane conductivity.		X
Sample scripts are included to demonstrate testing a sample at multiple relative humidities during a given run.	X	X
Graphical view of real-time data: gas flows and temperatures	X	X
Graphical view of real-time data: resistance and relative humidity		X
<b><i>BekkTech Fuel Cell Testing Software in LabView (LabView Software Required)</i></b>		
Script-driven so that user has control over polarization curves		X
Ability to perform either voltage holds or current holds		X
Observe the performance of the sample in real-time graphs of results		X
<b><i>BekkTech Data Analysis Software in MS Office Excel (MS Excel Required)</i></b>		
Excel Spreadsheet for data filtering and analysis	X	X
Generates graphs of temperatures, gas flows and relative humidity over time	X	X
Generates graphs of conductivity as a function of relative humidity and time		X
Generates polarization curves		X
NRE 212 conductivity data is included for comparison to your membrane conductivity data.	X	X
<b>Computer and USB Director</b>		
One Dell computer & monitor with LabView Basic & Microsoft Office Basic installed		X
One USB Director – RS-232 & RS-485 connections for communication to temperature controllers and mass flow controller	X	X
<b>System Hardware</b>		
Wetted gas components are brass and 316 stainless steel upstream of the Mass Flow Controllers and 316 stainless steel and Teflon downstream of the Mass Flow Controllers.	X	X
<b>Gas Delivery</b> – Assembled on a panel for easy access. Place on your desktop or under a ventilation hood.		
Anode gas line with Hydrogen/Nitrogen Mass Flow Controller – 1000 SCCM	X	X
Cathode gas line with Air/Nitrogen Mass Flow Controller – 1000 SCCM	X	X
Hydrogen flashback arrestor	X	X
Back pressure regulators – 0-50 psig (one for anode line, one for cathode line)	X	X
<b>Dew Point / Relative Humidity Control</b>		
Temperature Control System separates electronics from gas delivery and water delivery for safety	X	X
Five 2 Amp Temperature Controllers and five Type T thermocouples for measurement & control of test equipment (120 VAC, 60 Hz)	X	X
Ability to interlock to your external safety system for emergency shutdown	X	X
Two BekkTech Saturators - Appropriate for testing at dew points from 40C to 120C	X	X
Heated Gas Lines (120VAC)	X	X
<b>Low Relative Humidity Add-On (OPTIONAL)</b>		
Enables gas-mixing (wet & dry gas) for membrane conductivity testing at dew points below 40C		X
Includes additional 1000 SCCM Mass Flow Controller, gas line for dry gas, and on / off valve on gas mixing line		X
Includes BekkTech Conductivity Software for Gas Mixing		X
<b>Test Hardware</b>		
One set of Fuel Cell Technologies 5 cm <sup>2</sup> cell hardware for testing to 120C	X	X
One BekkTech Conductivity Cell for testing to 120C	X	X
<b>Voltage and Current Control</b>		
One Keithley 2400 SourceMeter (used for DC Voltage Sweeps for Conductivity Testing) – 120 to 240 VAC, 50 to 60 Hz		X
One Agilent 6060B Electronic Load Box, 0-6 Amp or 0-60 Amp Ranges (used for Voltage & Current Holds for Fuel Cell Testing) – 120 VAC, 60 Hz or 220 - 240 VAC, 50 Hz		X
<b>BekkTech Pressurized Deionized (DI) Water System (Water Supply to Two Saturators)</b>		
Assembled on a stand-alone panel	X	X
Water Reservoir, DI Water Filter, Two Diaphragm Pumps, 120VAC	X	X
<b>Step-Down Isolation Transformer (For International Orders Only)</b>		
Converts power to 120VAC	X	X

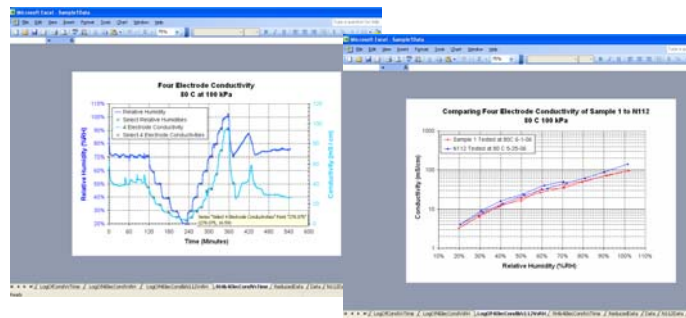
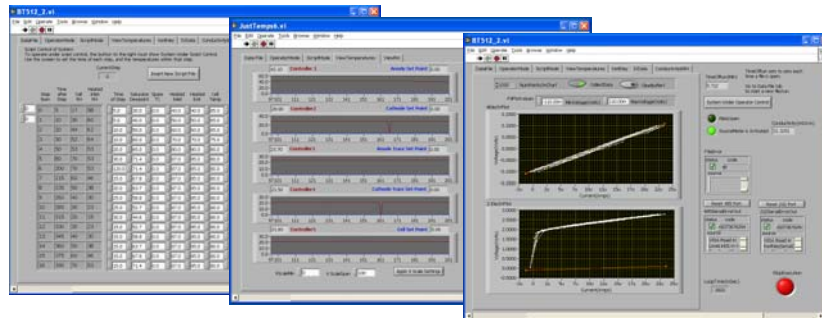
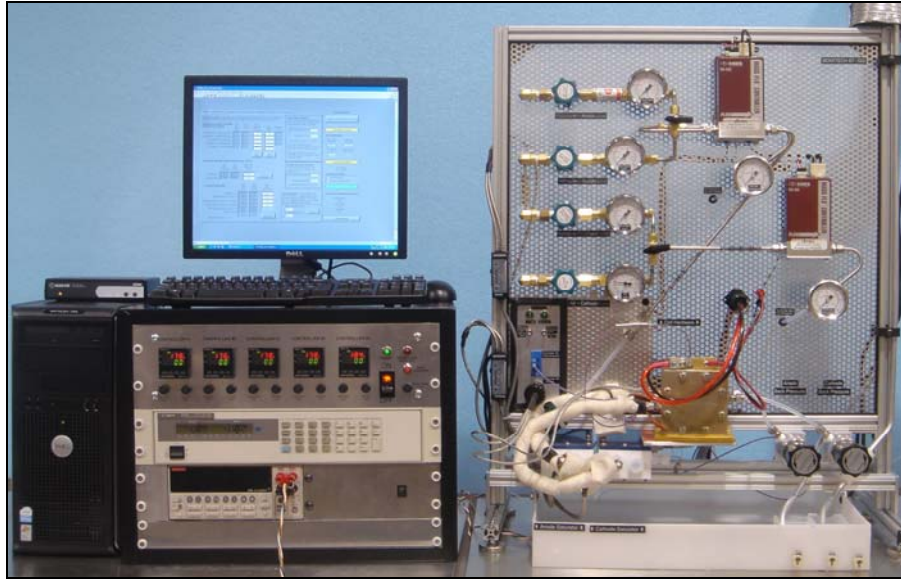
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**System Requirements – Equipment to be provided by the Customer**

Customer Provides (✓)	BT-550	BT-552
Computer with LabView 8.2 or higher and Microsoft Excel	✓	Included
Load Box and Power Supply	✓	Included
Keithley 2400 SourceMeter or Similar Current-Voltage Equipment	✓	Included
Correlation of voltage data with relative humidity and time data	✓	Included

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