

User Manual for Cell Test Bed for Li-ion Cells

by

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1. Test Chamber

Cell Test Chamber is made of Acrylic which offers 360° visibilities during testing. It is Front-loading and has Hinged lid, which is ideal for product testing applications



Fig: Acrylic Hinged, Front-Load Cell Test Chamber Drawing

2. HDPE Ports

NPT High Density Poly-Ethylene (HDPE) Ports having 18 threads/inch and 1/4" are used

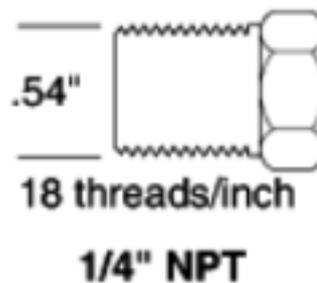


Fig : 1/4" NPT Port Dimensions

3. Battery Cell Holder

18650 Single Battery Cell Spacer/Holder a cylindrical battery spacer, made by flame retardant Polycarbonate/acrylonitrile butadiene styrene (PC-ABS) materials, with high-temperature resistance, excellent low temperature toughness and crack resistance.



Fig : PC-ABS Material Cell Holder

4. PTFE Wires

PolyTetraFluoroEthylene (PTFE) is a fluorocarbon polymer insulation material that allows wiring systems to be used and operated in the most demanding of environments. PTFE is resistant to lubricants and fuels, very flexible, and it has excellent thermal and electrical properties.



Fig : Electrical PTFE Wires

5. SMPS Unit

The 450W SMPS unit of make - Frontech, is used to fulfil power requirements of various components used in the cell test bed experiments



Fig.: Frontech PS-0005 230V/450W SMPS

6. Power Supply Socket

A 250V, 10A power socket from Anchor is used as the main power source for the entire test bed and integrated components. It comes with an inbuilt switch, indicator and a fuse.



Fig : AC Power Socket with Switch, Indicator and Fuse

7. Cooling Fan

A 12V, 1.44W BLDC Motor fan is used to provide Forced Air cooling to the Data Acquisition Unit to prevent its malfunction or damage due to overheating during operation.



Fig : Sunon 8025 12VDC 1.44W Cooling Fan

8. Adhesives

Buna-O-Rings are used to seal off the bolt holes in the acrylic casing so that the chamber remains thermally insulated. Thermal Grease is used to ensure proper heat transfer from sink to environment. Silicon is used as an adhesive paste to join the acrylic sheets together without loss thermal insulation.



Fig.: Thermal Grease



Fig.: Silicone Gel



Fig.: Buna-O-Rings

9. Refrigeration System

A mini refrigeration module is used to achieve sub-zero temperatures inside the cell test chamber. It consists of Evaporator, Condenser, Capillary Tube and Compressor as its main components. The evaporator is fixed in the side walls of the Test Chamber. It is controlled by the microcontroller which gets its temperature feedback through the LM35 sensors used inside the chamber. The condensed water is collected by a grooved ramp on the side and drained out.



Fig.: DC Mini Refrigeration Module

10. Humidifier/Dehumidifier System

A Humidification/Dehumidification Unit regulates the relative humidity inside the cell test chamber. It is controlled by the same microcontroller that controls the Refrigeration Unit and gets its humidity feedback from DHT22 sensor.

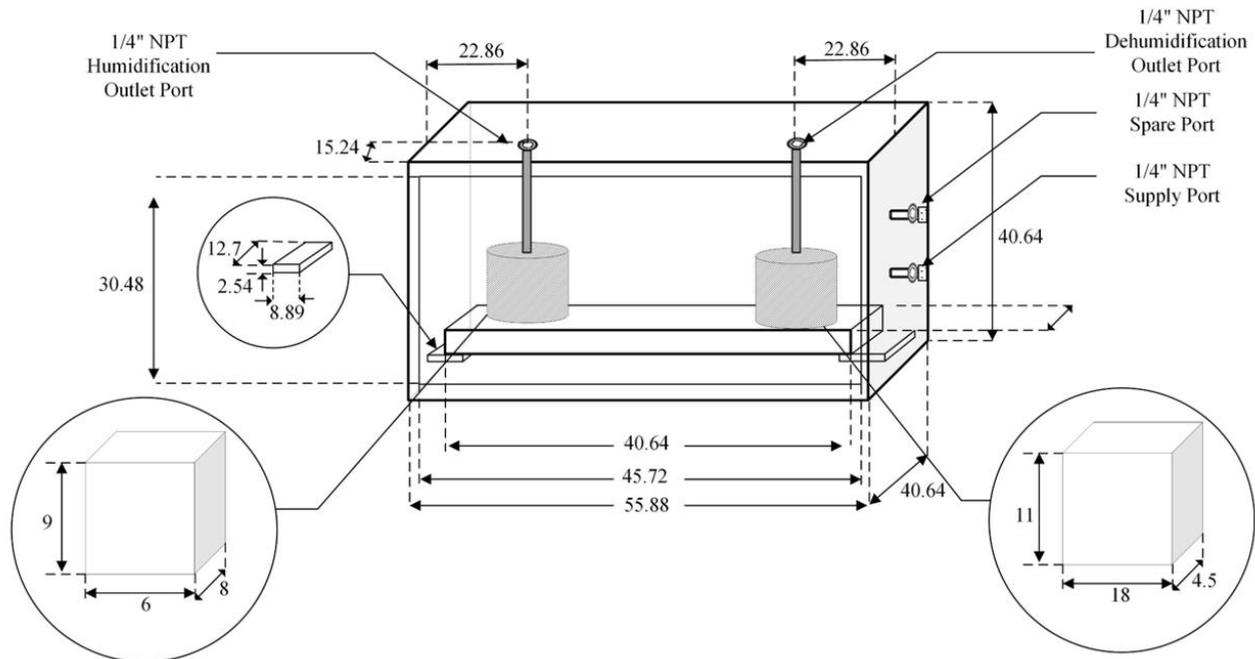


Fig.: Humidification/Dehumidification Unit