

Supercapacitor Automatic Electrolyte Injection Machine High Precision Vacuum Electrolyte Filling System

Item Number: JZ05



Introduction

Discover high-precision automatic electrolyte filling for supercapacitors. Featuring dual ceramic metering pumps, multi-stage vacuum soaking, 12 independent stations, and $\pm 1\%$ dispensing accuracy, this system ensures reliable, bubble-free electrolyte injection inside dry rooms or glovebox environments for advanced energy storage production.

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Application	Description	Key Benefit
60-Series Cylindrical Supercapacitor Manufacturing	Automated vacuum electrolyte filling for standard 60-series electric double-layer capacitors (EDLCs) and pseudocapacitors.	Consistent $\pm 1\%$ fill precision and rapid cell wetting ensure high cell-to-cell capacitance uniformity and low ESR.
Hybrid Supercapacitor & Lithium-Ion Capacitor Assembly	High-precision electrolyte injection for high-energy density hybrid capacitor systems with thick, dense calendared electrodes.	Alternating multi-stage vacuum and pressure cycles force electrolyte penetration into dense electrode stacks without void formation.
Glovebox & Dry Room Pilot Production	Compact footprint automated filling for battery and supercapacitor pilot lines operated inside controlled nitrogen or argon environments.	Low-vapor exposure design minimizes electrolyte evaporation, protecting glovebox atmosphere purifiers and internal sensors.
Electrochemical R&D & Formulation Testing	Quantitative dispensing of novel organic, ionic liquid, or aqueous electrolyte formulations into experimental cell prototypes.	Broad 0-250 mL volume adjustability and high chemical resistance enable versatile testing of aggressive proprietary chemistries.
Industrial Energy Storage Module Fabrication	Batch processing of heavy-duty ultracapacitor cells designed for grid stabilization, wind turbine pitch control, and rail regenerative braking.	High throughput of approximately 1 cell per minute with automated buffer tank replenishing ensures steady commercial manufacturing.

Specification Parameter	Value / Technical Requirement
Product Item Number	JZ05
Applicable Cell Format	60-Series Supercapacitor Cells (Adjustable Tooling for Variable Heights)
Dispensing Volume Range	0 - 250 mL (Continuously Adjustable)
Injection Accuracy	$\pm 1\%$
Maximum Pump Flow Rate	40 mL/s
Throughput / Capacity	Approx. 1 pc/min (Process and volume dependent)
Station Configuration	12 Stations (Dual-row layout, 6 stations per row, independently operable)
Pumping Mechanism	Dual Valveless Precision Ceramic Pumps (ZrO ₂ / Al ₂ O ₃ Ceramic Cores)
Operating Vacuum Level	Vacuum pressure maintained at ≥ -98 kPa during injection
Required Nitrogen Gas Supply	≥ 0.4 MPa (Compatible with glovebox working atmosphere)
Adjustable Process Parameters	Vacuum evacuation time, high/low vacuum setpoints, liquid soaking time, pressurization level & time, pressure relief time

Specification Parameter	Value / Technical Requirement
Fluid Path Materials	SUS316 / SUS304 Stainless Steel, Industrial Ceramics, PTFE, Chemical-Resistant PE Tubing
Chassis & Structural Materials	6-Series Corrosion-Resistant Anodized Aluminum Alloy
Nozzle Positioning System	Heavy-Duty Mechanical Positioning (Non-electronic, corrosion-immune)
Electrolyte Buffer Tank	Stainless steel intermediate tank with automated high/low level auto-refill control
Weighing & Quality Control System	Integrated precision gravimetric balance with dedicated industrial PC system
Filtration & Protection System	Multi-stage particulate filtration and specialized chemical vapor adsorption traps
Power Supply	AC 220V $\pm 10\%$, 50 Hz, Single Phase
Total Power Consumption	1.5 kW
External Dimensions (Dual Station Unit)	900 mm (L) $\times$ 800 mm (W) $\times$ 880 mm (H)
Environmental Requirements	Dry room or inert glovebox (Dry air / N ₂ atmosphere; ambient plant temperature)
External Vacuum Source Requirement	Dedicated vacuum pump (≥ 20 L/s, ≥ -98 kPa) or central pipeline vacuum (User-supplied)

Component Description	Quantity	Standard Inclusion Details
Dual-Station Electrolyte Injection Base Station	1 Set	Main structural frame and glovebox integration housing
Automated Injection Mechanisms	2 Sets	Precision dual-lead screw drive systems
Precision Ceramic Metering Pumps	2 Units	High-torque, valveless ZrO ₂ /Al ₂ O ₃ ceramic pump heads
Cell Support Brackets & Tooling	2 Units	Height-adjustable fixtures for 60-series supercapacitors
Capacitor Injection Nozzle Positioning Assemblies	2 Sets	Corrosion-resistant mechanical locator mechanisms
Nozzle Clamping & Sealing Mechanisms	2 Sets	High-pressure pneumatic sealing head assemblies
Electrolyte Intermediate Buffer Tank	1 Set	Level-monitored automated refilling reservoir
Automated Master Control System	1 Set	Programmable process controller with intuitive parameter interface
Precision Gravimetric Weighing System	1 Set	Analytical balance integrated with industrial computer
Specialized Vapor Adsorption & Filter Unit	1 Set	Multi-stage vacuum line and exhaust protection assembly
Vacuum Pump Source (≥ 20 L/s, ≥ -98 kPa)	1 Unit	Customer-supplied (Dedicated unit or central facility pipeline)