

Semi Automatic Cylindrical Lithium Ion Battery Winding Machine

Item Number: JR01



Introduction

Engineered for precision cylindrical lithium-ion cell assembly, this semi-automatic winding machine delivers active tension control, integrated dust removal, automated tape termination, and high-yield electrode alignment for advanced pilot line and laboratory battery manufacturing workflows.

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Application	Description	Key Benefit
Lithium-Ion Battery Pilot Lines	Mid-volume prototype fabrication and validation of commercial cylindrical formats including 14500, 18650, and 21700 cells.	Delivers mass-production quality alignment and tension control without the tooling cost of fully automated lines.
Advanced Battery Materials R&D	Evaluation of novel cathode/anode active materials, ultra-thin foil current collectors, and ceramic-coated separators.	Gentle web handling and adjustable speed curves accommodate delicate or brittle experimental electrodes.
Next-Generation Sodium-Ion Prototyping	Precision cylindrical jelly roll fabrication using thicker or stiffer sodium-ion electrode materials and specialized separators.	High mechanical rigidity and custom winding pin diameters prevent electrode cracking and delamination during tight-radius turns.
Solid-State & Hybrid Electrolyte Assembly	Winding flexible composite solid-state electrolyte membranes with matched electrode pairings under controlled dry-room conditions.	Closed-loop active tensioning prevents localized stress concentrations, wrinkling, or micro-fracturing of brittle solid electrolyte layers.
University & Institutional Research	Academic cell prototyping, energy storage device research, and electrochemistry failure analysis studies.	Fast specification changeover and quick-change winding pin sets allow diverse experimental matrices on a single machine.
Custom Industrial & Medical Battery Cells	Low-to-medium batch manufacturing of specialized high-reliability cylindrical cells with non-standard dimensions or thick multi-tab designs.	Highly configurable winding speeds, tape lengths, and needle diameters ensure tailored production to exact customer standards.

Parameter Category	Specification Item	Value / Standard (JR01)
Model Identifier	Item Number	JR01
Cell Dimensions	Applicable Finished Cell Outer Diameter	Ø10 mm - Ø25 mm (e.g., 14500, 18650, 21700, 26650)
Winding Needle	Winding Pin Diameter Range	Ø2.5 mm - Ø8.0 mm (one standard set included, custom sized to order)
Winding Needle	Mechanism Type	Single-needle counter-penetration structure
Production Capacity	Throughput Speed	7 - 11 pcs/min (standard rated at 8 pcs/min depending on electrode length/width)
Product Yield	Qualified Finishing Rate	≥ 98% (excluding non-equipment or incoming material defects)
Positive Electrode (Cathode)	Material Length	200 mm - 3000 mm
Positive Electrode (Cathode)	Material Width	25 mm - 68 mm (strip width: 24 mm - 69 mm)
Positive Electrode (Cathode)	Material Thickness	0.1 mm - 0.2 mm
Negative Electrode (Anode)	Material Length	200 mm - 3000 mm
Negative Electrode (Anode)	Material Width	25 mm - 68 mm (strip width: 24 mm - 69 mm)
Negative Electrode (Anode)	Material Thickness	0.1 mm - 0.2 mm

Parameter Category	Specification Item	Value / Standard (JR01)
Separator Material	Roll Width	24 mm – 69 mm (overall range: 25 mm – 70 mm)
Separator Material	Thickness Range	0.016 mm – 0.045 mm
Separator Material	Roll Dimensions	Inner Diameter: 76.2 mm (3.0 in) / Max Outer Diameter: 250 mm
Termination Tape	Roll Width	8 mm – 40 mm
Termination Tape	Thickness Range	0.010 mm – 0.035 mm
Termination Tape	Roll Dimensions	Inner Diameter: 76.2 mm (3.0 in) / Max Outer Diameter: 150 mm
Process Geometry	Winding Layer Order	Separator fully encases Negative Electrode; Negative Electrode encases Positive Electrode
Alignment Accuracies	Separator Alignment Error	< ± 0.5 mm (under standard incoming material tolerances)
Alignment Accuracies	Electrode Alignment Error	< ± 0.5 mm (under standard incoming material tolerances)
Alignment Accuracies	Finished Cut-Face Alignment	± 0.5 mm
Incoming Material Tolerances	Electrode Width Deviation Requirement	< ± 0.2 mm
Incoming Material Tolerances	Electrode 'S' Camber / Bending Error	< ± 1.0 mm per 500 mm length
Incoming Material Tolerances	Separator Roll Stepped-Tower Error	< ± 0.2 mm
Automation Features	Process Sequence	Manual electrode feed → Auto winding → Auto pin index → Auto tape termination → Auto core discharge
Tape Application	Taping Method	Horizontal application (perpendicular to tabs), non-tensioning flat bonding
Dust Removal	Particulate Elimination	Dual-side electrode dust clearing apparatus included
Separator Decoiler	Feed Mechanism	Dual-roll active unwinding with proximity sensor tension modulation
Control & Automation	Programmable Logic Controller (PLC)	Panasonic AFRX-HC60T
Control & Automation	Human-Machine Interface (HMI)	7-inch True Color Touchscreen (MCGS / Igerlon)
Drive Motors	Winding Drive Motor	Panasonic High-Precision Servo Motor System
Drive Motors	Tension Control Motors	High-Precision Stepper Motors (Yankong / Shenzhen Li-San)
Sensing System	Optical & Proximity Sensors	Panasonic / JYC / DFC Sensor Array
Pneumatic System	Pneumatic Components & Valves	AirTAC / Xingzhen Precision Pneumatics
Safety & Diagnostics	Alarm System	Built-in fault alarm, automatic fault shutdown, real-time diagnostic messaging, one-key reset
Utility Requirements	Input Power Supply	AC 220V $\pm 10\%$, 50 Hz, 1.5 kVA single phase
Utility Requirements	Compressed Air Supply	0.4 MPa – 0.6 MPa (dry, filtered, non-lubricated)
Physical Dimensions	Overall Equipment Size (L x W x H)	1660 mm x 1300 mm x 1570 mm (excluding electrode feeder overhang)
Physical Dimensions	Equipment Weight	Approximately 800 kg
Documentation & Spares	Included Accessories	1 Full Operating Manual, 1 Standard Spare Parts Kit (per packing list), 1 Winding Needle Set