INDONESIA

Jalan Kamal Raya (Kompleks RUKO CBD) Blok A2-07, Cengkareng Timur Jakarta Barat 11730

> Fax: 021-624- 4502 H/P: 0818513782 / 087883 985 180

Tel: 021-8035 2773 / 021-6667 1224 Email: sales@kgcscientific.com









Step 1: Electrode Sheet Preparation

Furnace to sinter raw active material (Cathode & Anode)



Milling Machine to grind and normalize the sintered material

e.g: MSK-SFM-1



Coater to coat paste on current collector and attached **Heater** used to dry it.

e.g: MSK-AFA-III



Mixer to mix active, conductive, and binder material into paste in vacuum

e.g: MSK-SFM-7

Rolling Press (Calendar) to roll the electrode to desired thickness



e.g: OTF-1200X-S



Vacuum Oven to bake the electrode to drive away moisture inside

e.g: EQ-DZF-6050

Step 2: Cell Assembly

Disc Cutter to cut single coated anode, cathode, and separator into disc shape



Soak them into electrolyte in Glove **Box** with H₂O and O₂ lower than 1 ppm

e.g: EQ-VGB-6





Stack the discs by the order in the coin cell case: Cathode + Separator + Anode+ Spacer + Spring (Current collector from both electrodes contact to the concave side of the each case part)

Electrode Filler to fill proper amount of electrolyte into the case

Crimping Machine to crimp the coin cell so that the battery core is sealed in the case

e.g: BD-10ML

e.g: MSK-T-10

e.g: MSK-110

Step 3: Battery Testing

Battery Analyzer to test the coin cell's performance and Impedance Tester to measure battery's internal resistance

e.g: BST8-3

Li-ion Cylindrical Battery Fabrication & Equipment

Step 1: Electrode Sheet Preparation

Furnace to sinter raw active material (Cathode & Anode)





Milling Machine to grind and normalize the sintered material

e.g: MSK-SFM-1





Coater to coat paste on current collector and attached **Heater** used to dry it.

e.g: MSK-AFA-III



Mixer to mix active, conductive, and binder material into paste in vacuum

e.g: MSK-SFM-7

Rolling Press (Calendar) to roll the electrode to desired thickness

e.g: MSK-HRP-01

e.g: MSK-CSE-300

Step 2: Cell Assembly (Winding Method)

Slitting Machine to cut electrode sheet to strips of desired size



Ultrasonic Welding Machine to join multilayers of electrode and tabs to collectors

e.g: MSK-800



Vacuum Oven to remove any moisture within the cell

e.g: EQ-DZF-6050



Short-Circuit
Detector to test the integrity of the cell



Winding Machine to form layers of Anode, Separator, and Cathode into a cell core

e.g: MSK-112A

Step 3: Case Sealing

Spot Welding Machine to connect cell to the bottom of the case (grounding)





Grooving Machine to create indent on the neck of the case for proper sealing

e.g: MSK-500-18650





Electrolyte Filling to inject the case with electrolyte within **Glove Box**

e.g: BD-10ML



Spot Welding Machine to attach the cell to cap (positive)

e.g: MSK-SFM-7

Crimping Machine to align the cap with open end of the and seal it inside **Glove Box**

e.g: MSK-510-18650



Battery Analyzer to charge/discharge the assembled battery for cell activation

e.g: BST8-3

Step 4: Battery Testing

Battery Analyzer to test the battery's performance and Impedance Tester to measure battery's internal resistance

e.g: BST8-3

INDONESIA

Jalan Kamal Raya (Kompleks RUKO CBD) Blok A2-07, Cengkareng Timur Jakarta Barat 11730

Li-ion Pouch Battery Fabrication & Equipment





Furnace to sinter raw active material (Cathode & Anode)

e.g: OTF-1200X-S



Milling Machine to grind and normalize the sintered material

e.g: MSK-SFM-1



Rolling Press (Calendar) to roll the electrode to desired thickness

e.g: MSK-HRP-01



Coater to coat paste on current collector and attached **Heater** used to dry it.

e.g: MSK-AFA-III



Mixer to mix active. conductive, and binder material into paste in vacuum

e.g: MSK-SFM-7

Step 2: Cell Assembly

Stacking Method

Electrode Mold Cutting Machine

to cut out electrolyte with lead

e.g: MSK-180

e.g: MSK-CSE-300

e.g: MSK-120



Stacking Machine to stack layers in form of Anode + Separator + Cathode + Separator + ...

e.g: MSK-111A

Winding Method

Slitting Machine to cut electrode sheet to strips of desired size



Winding Machine to wind strips of Anode + Separator + Cathode + Separator + ...

e.g: MSK-112A



Vacuum Oven to remove any moisture within the cell

e.g: EQ-DZF-6050



Short-Circuit Detector to test the integrity of the cell



Ultrasonic Welding Machine to weld current collector and tab together

e.g: MSK-800

Step 3: Case Formation & Sealing

Cup Forming Machine to punch pouch shape to place the cell



Top & Side Heat Sealing Machine to seal top and shorter side after double-up

e.g: MSK-140





Vacuum Primary-Sealing Machine to

seal longer side under vacuum

e.g: MSK-115A



Electrolyte Filling to inject the case with electrolyte within **Glove Box**

e.g: BD-10ML

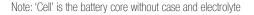
Battery Analyzer to charge/discharge the assembled battery for cell activation

e.g: BST8-3

Step 4: Battery Testing

Battery Analyzer to test the battery's performance and Impedance Tester to measure battery's internal resistance

e.g: BST8-3



SCHEDULE 1

MSK-AFA-III



Compact Tape Casting Film Coater with Dryer, Vacuum Chuck & Film Applicator

- 10 550 m stroke length adjustable by using adjustable position switch
- 100 mm adjustable doctor blade included
- 120 l/m oilless vacuum pump included for immediate usage
- 0 100 mm/sec variable traverse speed
- Max heating temperature is up to 200°C

MSK-140



Compact Heating Sealer for Sealing Laminated Aluminum Case of Pouch Cells

- Max sealing length up to 190 mm
- Sealing width up to 3.2 mm
- Sealing thickness up to 0.19 0.3 mm
- 25 mm die opening
- 0 0.7 MPa adjustable sealing pressure
- 50 300°C adjustable sealing temperature
- 0 99 Seconds adjustable heating timer
- Soft sealing blade (with tab in between)

MSK-T-10



Compact Precision Disc Cutter with Standard 16, 19, 20 Dia. mm Cutting Die

- Cr plated steel as major structural material
- 16, 19, and 29 mm precision dies are included
- Compact size which can be put into glove box through air lock chamber
- Can be customized up to 2mm diameter dies

MSK-120



Pouch Cell Case Forming Machine for Aluminum Laminated Films

- < 6.0 mm max pouch depth to punch
- 5 metric tons max punching pressure
- < 8 seconds per trial for stroke frequency
- 0.11 0.20 mm Aluminum laminated film thickness
- Max die size is up to 150 mm L x 120 mm W x 6 mm H

MSK-180



Semi-Automatic Die Cutter for Pouch Cell Electrode Sheet

- 300 mm L x 250 mm W working table area
- 81 mm L x 49 mm W with current collect die set is included
- Built in IR sensor (safety curtain)
- +/- 0.1 mm cutting accuracy
- 800 2000 pieces of electrodes per hour production yield

MSK-111A



Semi-Automatic Stacking Machine for Pouch Cell

- 200 mm max stacking layer length
- 400 mm fixed travel distance
- 1 9999 travel cycles
- 40 80 psi suggested air pressure
- Stacking platform consists of 550 mm L x 390 mm W x 660 mm H

EQ-VGB-6



Large Glove Box with Gas Purification System & Digital Control

- Automatic pressure control by PLC system (+/- 12 mbar)
- 1220 mm L x 760 mm W x 900 mm H chamber dimension
- < 1 ppm water concentration
- < 1 ppm oxygen concentration
- < 0.05 Vol%/hour leak rate</p>
- > 0.3 µm inlet & outlet filter

BD-10ML



Bottletop Electrolyte Digital Dispenser with 1 L SS Bottle

- Uses a floating piston design with no seals to wear or replace, minimizing service downtime
- 4 PP bottle adapters, 45/40mm, 45/33mm, 33mm/28, 33mm/24 and filling tube
- One 1000 mL stainless steel bottle

Tel: 021-8035 2773 / 021- 6667 1224 Fax: 021-624- 4502 H/P: 0818513782 / 087883 985 180

Email: sales@kgcscientific.com



MSK-115A



Compact Vacuum Sealer for Preparing Pouch Cell

- Sealing pressure up to 7 kg/cm² adjustable
- 200 mm L x 150 mm W max sealing dimensions
- 5 mm edge sealing width
- 50 250°C adjustable sealing temperature
- 50 250°C adjustable sealing temperature
- 0 99 Seconds adjustable heating timer
- Hard sealing blade (no tab in between)

MSK-170



Electrolyte Diffusion Chamber for Professional Li-ion Battery Research

- 0 1 MPa adjustable air pressure
- 326 mm L x 206 mm W x 148 mm H inner chamber size
- 0 99.99 sec air inflation time
- 0 99.99 sec vacuum condition hold time
- -20 to 40°C operation temperature
- Easy program setting for specific vacuum condition

MSK-112A



Semi-Automatic Winding Machine for Electrodes

- Winding speed up to 250 rpm adjustable
- Winding blade available for pouch cell and cylindrical cell
- Switchable between clockwise and counterclockwise

MSK-800



Desktop Ultrasonic Metal Welder

- 300 W max power consumption
- 4 mm L x 4 mm W welding area
- Two welding heads and three welding bases are included for welding both Al & Cu current collectors up to 25 layers
- Two types of patterns for various usage
- 30 40 kHz adjustable frequency
- 85 psi pneumatic control

MSK-500-18650



Desktop Semi-Auto Grooving Machine for Various Cylinder Cell

- 400 grooving per hour productivity
- > 0.5 MPa air pressure is required
- CR123 / 18650 / 26650 / 32650 / AA selectable
- 1.2 2.0 mm depth grooving dimensions
- 1.1 1.5 mm width grooving dimensions
- +/- 0.1 mm grooving accuracy
- > 1 million times grooving blade durability

MSK-510-18650



Desktop Hydraulic Sealing Machine for 26650, 18650, 32650, CR123, AA, AAA

- Driving force using manual hydraulic pressing up to 5T
- Six standard die selectable
- It is necessary to groove the opening end of the cylindrical case by using the MSK-500 grooving machine before sealing the cap
- Free 100 pcs sample of selected die

MSK-330A



Precise Pneumatic Point Welding Machine

- 10 kW max power
- 0.1 0.8 MPa air pressure range
- 0 99 A welding current
- 0.03 0.25 mm welding thickness
- Controlled by microcontroller to achieve monopulse, dipulse, & multiple-pulse welding

MSK-CSE-300



Semi-Automatic Slitting Machine for Electrodes of Cylinder and Pouch Cell

- 4 sets pf slitting blades (two blades with slitting width of 58mm, and another two with slitting width of 56 mm)
- 100 300 microns cutting thickness
- 0 4 m/min adjustable speed
- Tungsten alloys blade material

SCHEDULE 1

OTF-1200X-S



Compact Split Tube Furnace with Vacuum Flanges & Optional 1"-2" O.D Quartz Tube

- Power: 1.2 kW
- Max temperature: 1200°C (<1 hour)
 Max Heating Rate: < 20°C/min
 Temperature Accuracy: +/- 1°C
- Heating element: Fe-Cr-Al Alloy doped by Mo
- Heating Zone Length: 8" (200 mm) single zone
- Vacuum flanges, thermal blocks, and quartz tube included for quick usage

BST8-3



8 Channel Battery Analyzer for All Rechargeable Cells

- To analyze small coin cells and cylindrical batteries from 6.0 mA to 3000 mA, up to 5V
- Eight independent programmable channels
- The software (TC5.3) with calibration function is included to set various working modes for measuring capacity and life cycle for all types of rechargeable batteries
- Accuracy: ±(0.05% of reading + 0.1% of range)
- Time interval: 1 900s
- Max measurement cycles: 9999 cycles

MSK-HRP-01



4" Hot Rolling Press

- Max heating temperature: 125°C
- 100 mm Dia. x 100mm width Rollers made from hardened tool steel HRC60-62
- Calendering thickness in the range 0 -1.2 mm adjustable
- Rolling speed 0 40mm /sec adjustable

EQ-DZF-6050



53L 250°C Vacuum Oven (16x13x14")

- Observation window consists of inner termpered glass and outer transparent polycarbonate shield
- Inner Chamber size: 415 L mm x 345 H mm x 370 W mm
- Capacity: 53 liter
- A good vacuum seal is achieved by silicone door gasket and positive latch door
- 1500 W power consumption

MSK-SFM-1



Bench-Top Planetary Automatic Ball Mill with 4 Alumina Jars (4 x 500mL)

- Max power consumption: 500 W
- Main plate rotation: 30 350 rpm
- Mixing tank self rotation: 60 700 rpm
- Timer controls major platen's running time from 1 to 999 minutes
- Timer control tank rotation time from clockwise to anticlockwise direction: 1-99 minutes
- Four 500 ml Alumina Jars are included

MSK-110



Compact Hydraulic Crimping Machine: One for All Button Cells

- One set of crimping die for CR2032, CR2025, and CR2016 included
- PTFE core to prevent coin cells from being short circuited
- Heavy Duty Steel Platform
- Max. 8 metric Tons hydraulic pump with automatic pressure relief

MSK-SFM-7



Desk-Top Bubble Remover (150/500ml) with Vibration Plate & Two Containers

- Rotary speed: 320 rpm
- One 150 ml stainless steel and one 500 ml container are included
- Built in vacuum pump with vacuum level -0.08~0.09 MPa
- Vibrating at 1000 Hz
- Power up to 150 W