

# National Direct Network



LI-ION  
BATTERY  
R&D  
FABRICATION

ADVANCED  
MATERIAL  
SCIENCE

MODULAR  
SPECTROSCOPY

LABORATORY  
EQUIPMENT

FOOD  
PERSERVATION  
EQUIPMENT

*LABORATORY EQUIPMENT*



# NATIONAL DIRECT NETWORK

## ACKNOWLEDGMENT

### NDN IN BRIEF

National Direct Network Co., Ltd (NDN). was established in 2002 by a group of professionals and experts in the field of science and engineering, such as Chemical science, Chemical engineers, Mechanical engineering. Initially and still continues, the company is engaged in the distribution of importing laboratory equipment for use in the laboratory and field work. All of our lab equipment products are from reputable company and are recognized as the Battery research, Li Ion battery research equipment include cylinder, pouch and button battery, thin film, coating machine, fiber optics spectrophotometer, Raman spectrometer, NIR spectrophotometer, Colorimeter, Plasma cleaner, Spin coater , Contact angle, Dip coater, Autoclave, Glove box, High temperature furnace, Vacuum oven, Oven, syringe pump, Refrigerator and Freezer with explosion proof, and others.

The company also produce Autoclave and retort under the Brand name " Autoclver"  
NDN has found in 2002. We intend to provide best solution for our customer,



NDN has been designing and installing clean room and laboratory furniture and fume hood which including production and installation under the brand name " LabClever".



The Company has continuously improved and enhanced its services to its users. The Turnkey project covers design and installation of laboratories, as well as M & E work and interior work and the supply and installation of scientific instruments. The company has been entrusted with the trust of working in the form of turnkey project from the PTT group such as PTT Asahi, PTT Phenol, PERT (Petroleum and Earth Resources Technology). And also from university such as King Mongkut's University of Technology Thonburi, King Mongkut's University of Technology Ladkrabang, King Mongkut's University of Technology North Bangkok. And private sectors including leading manufacturers and manufacturers such as Coke, SF, Jebsen & Jessen, Idemmitsu. ( Tour our reference work).

Thanks to our customers have put their trust in our quality and services. National Direct Network Co., Ltd. will continue to be developed and presented the high quality as well as providing high quality after-sales performance and fulfilling the promise-completely confidential, reliable, trustworthy expertise to ensure value for money in all of our customer investment .

## NDN NEW HEAD OFFICE WILL AVAILABE VERY SOON

# NATIONAL DIRECT NETWORK



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**PRODUCT BRAND**



Li-ion Coin Cell Fabrication & Equipment

1. Sample Preparation

**Slurry preparation**

**1) Furnace** to sinter raw active material (Cathode & Anode) e.g. -OTF-1200X-80-UL

**2) Milling Machine** to mill material e.g.-MSK-SFM-1

**3) Mixer** to mix active, conductive, and binder material into paste in vacuum e.g. : MSK-SFM-7

**Coating & Drying**

**4) Coater** to coat paste on current collector and attached **Heater** used to dry it. e.g. : MSK-AFA-III

**5) Rolling Press (Calendar)** to roll the electrode to proper thickness. e.g. : MSK-HRP-01

**Calendering**

**6) Vacuum Oven** to bake the electrode to drive away moisture inside. e.g. : EQ-DZF-6050

2. CELL ASSEMBLY

**7) Disc Cutter** to cut single coated anode, cathode, and separator into disc shape e.g.: MSK-T-10

**8) Soak them into electrolyte in Glove Box** with H<sub>2</sub>O and O<sub>2</sub> lower than 1 ppm e.g.: EQ-VGB-6

**9) 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)

**10) Electrode Filler** to fill proper amount of electrolyte into the case .g: BD-10ML-LD

**11) Crimping Machine** to crimp the coin cell so that the battery core is sealed in the case e.g.: MSK-110



3. BATTERY ANALYZE

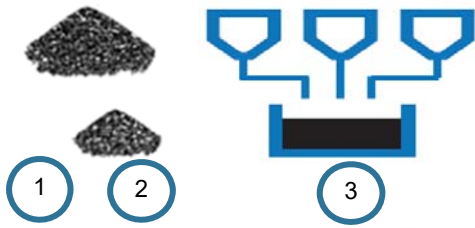
**12) Battery Analyzer** to test the coin cell's performance and **Impedance Tester** to measure battery's internal resistance e.g.: BST8-3



**Li-ion Pouch Cell Fabrication & Equipment**

**1. SAMPLE PREPARATION**

**Slurry preparation**



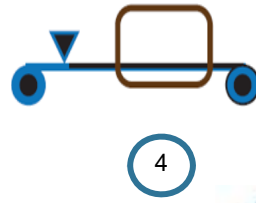
**1) Furnace** to sinter raw active material (Cathode & Anode ) e.g. -OTF-1200X-80-UL



**4) Coater** to coat paste on current collector and attached **Heater** to dry it e.g. -MSK-AFS-EI300-UL



**Coating & Drying**

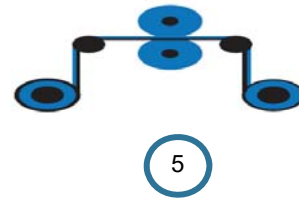


**2) Milling Machine** to mill material e.g.-MSK-SFM-1



**5) Rolling Press (Calendar)** to roll the electrode to proper thickness MSK-E2300B

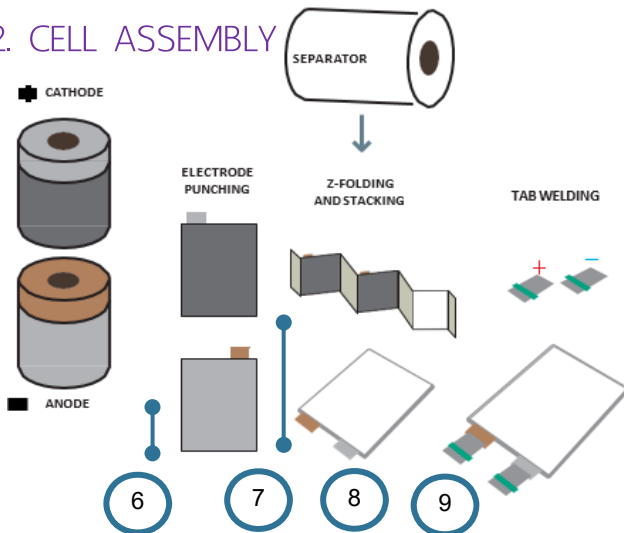
**Calendering**



**3) Mixer** to mixing active, conductive and binder material into paste in vacuum e.g.-MSK-SFM-2L



**2. CELL ASSEMBLY**



**6) Electrode Mould Cutting Machine** to cut out electrode with lead e.g. - MSK-180



**7) Vacuum Oven** to dry the cell if no short-circuit e.g. -DZF-6050-RTL



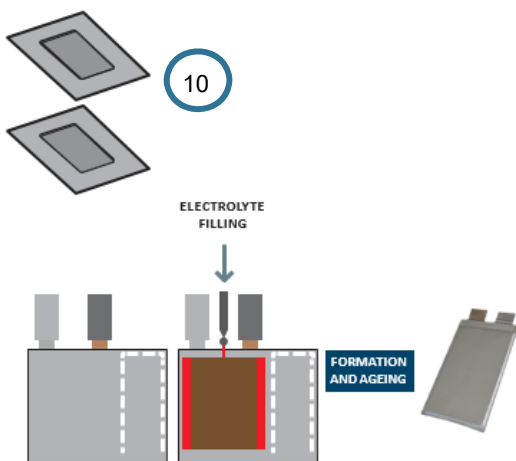
**8) Stacking Machine** to stack layers in form of Anode + Separator+ Cathode + Separator e.g. - MSK-111A-E



**9) Ultrasonic Welding Machine** to first weld current collector and then tab together e.g. - MSK-800W-220



**3 CASE FORMATION AND SEALING**



**10) Cup Forming Machine** to punch cup-shape and gas receiver on Aluminum lamination sheet and then place cell into the cup e.g. - MSK-120



**11) Top & Side Heat Sealing machine** to seal the top and shorter side after double-up -MSK-140-220



**12) Electrolyte Filling System** to fill electrolyte in vacuum/glove box -MSK-150-L



**13) Vacuum Primary-sealing Machine** to seal longer side (the side with gas receiver) under vacuum after electrolyte is filled -MSK-115A-L-220



**4. BATTERY ANALYZE**

**Battery Analyzer** to Charging/Discharge the cell to do battery formation and drive the useless gas caused by electrode chem reaction into gas receiver (A clamp may be applied on battery to drive gas) BST8-5A-CST



Li-ion Cylinder Cell Fabrication & Equipment

1. SAMPLE PREPARATION

**Slurry preparation**

**Coating & Drying**

**Calendering**

**1) Furnace** to sinter raw active material (Cathode & Anode) e.g. -OTF-1200X-80-UL

**2) Milling Machine** to mill material e.g.-MSK-SFM-1

**3) Mixer** to mixing active, conductive and binder material into paste in vacuum e.g.-MSK-SFM-2L

**4) Coater** to coat paste on current collector and attached **Heater** to dry it e.g. -MSK-AFS-EI300-UL

**5) Rolling Press (Calendar)** to roll the electrode to proper thickness MSK-E2300B

2. CELL ASSEMBLY

**6) Sitting Machine** to slit electrode sheet to strip e.g. -MSK-540

**7) Vacuum Oven:** remove any moisture within the cell e.g.-DZF 6050-RTL

**8) Ultrasonic Welding Machine:** joining of multi-layer electrodes, and/or tabs to collectors e.g.-MSK-800W-220

**9) Winding Machine:** form layers of Anode, Separator, and Cathode into a cell core e.g.-MSK-112A-C

3 CASE FORMATION AND SEALING

**10) Spot Welding Machine:** allow contact to be made from cell to bottom of case (grounding) e.g. -MSK-330A

**11) Grooving machine:** create indent on the neck of case to allow for proper seal (after inserting the cell core e.g.-MSK-500

**12) Welding Machine:** attach cell to cap (positive) e.g.-MSK-800W-220

**13) Electrolyte Filling:** inject the case with electrolyte within glove box-MSK-150-L

**14) Electrolyte Diffusion & Degassing Chamber** for Professo Li-on Battery Research -MSK-170 -

**15) Sealing Machine (Crimper):** align cap with the open end of case and seal case inside glove box under suitable environment

4. BATTERY ANALYZE

**Battery Analyzer:** charge/discharge the assembled battery for cell activation e.g. BST8-5A-CST & **Battery Analyzer** to test the battery's performance

**COIN CELL PREPARATION**



| Model     | Function                 | Description  |
|-----------|--------------------------|--|
| MSK-110   | Crimping                 | <ul style="list-style-type: none"> <li>One set of crimping die for CR2032, CR2025, and CR2016</li> <li>Optional die available from product option for crimping CR2325, CR2450, AG3, AG5</li> <li>PTFE Anti-Corrosion Core prevents coin cells from being short circuited</li> </ul>      |
| MSK-110D  | Disassembling            | <ul style="list-style-type: none"> <li>One set of disassembling die for CR2032, CR2025, &amp; CR2016</li> <li>PTFE Anti-Corrosion Core prevents coin cells from being short circuited</li> </ul>   |
| MSK-160D2 | Crimping & Disassembling | <ul style="list-style-type: none"> <li>CE Certified electric crimper for the CR20XX series coin cells such as CR2016, CR2025, and CR2032</li> <li>Two sets of dies included in the standard package for enabling this machine's crimping or de-crimping capabilities</li> </ul>          |
| MSK-E110  | Crimping                 | <ul style="list-style-type: none"> <li>CE Certified auto crimper for various types of coin cells, such as CR2016, CR2025 and CR2032</li> <li>Crimping pressure is adjustable according to cell size with digital display on the front panel</li> </ul>                                   |
| MSK-PN110 | Crimping                 | <ul style="list-style-type: none"> <li>Precision electric crimper driven by compressed inert gas or compressed air for various types of coin cells, such as CR2016, CR2025 and CR2032</li> <li>Force Display: digital display force on crimping die: 600 - 1150 Kg adjustable</li> </ul> |

**POUCH CELL PREPARATION**




| MSK-120  | MSK-180   | MSK-140  |
|--|---|--|
|  |   |  |
| Pouch Cell Case Forming Machine  | Semi-Automatic Die Cutter   | Compact Heating Sealer   |
| <ul style="list-style-type: none"> <li>&lt;6.0 mm max pouch depth to punch</li> <li>&lt;8 seconds per trial for stroke frequency</li> <li>Max die size is up to 150Lx120Wx6H mm</li> </ul> | <ul style="list-style-type: none"> <li>300 L x 250 W mm working table area</li> <li>81 L x 49 W mm with current collect die set is included</li> <li>+/- 0.1 mm cutting accuracy</li> </ul> | <ul style="list-style-type: none"> <li>Max sealing is up to 190 mm</li> <li>Sealing width is up to 3.2 mm</li> <li>Sealing thickness is from 0.19 - 0.3 mm</li> <li>50-300°C adjustable sealing temperature</li> </ul> |

| MSK-115A  | MSK-111A   | MSK-112A-POUCH   |
|---|--|--|
|   |  |  |
| Compact Vacuum Sealer   | Semi-Automatic Stacking Machine  | Semi-Automatic Winding Machine   |
| <ul style="list-style-type: none"> <li>Sealing pressure is up to 7 kg/cm<sup>2</sup> adjustable</li> <li>200 L x 150 W mm max sealing dimension</li> <li>50-250°C adjustable sealing temperature</li> </ul> | <ul style="list-style-type: none"> <li>200 mm max stacking layer length</li> <li>400 mm fixed travel distance</li> <li>1-9999 travel cycles</li> </ul> | <ul style="list-style-type: none"> <li>Winding speed up to 250 rpm adjustable</li> <li>Winding blade to wind up pouch cell</li> <li>Switchable between clockwise and counterclockwise</li> </ul> |

**CYLINDER CELL PREPARATION**

| MSK-510M   |  | MSK-510L   |  | MSK-500  |  | MSK-500L  |  |   |  |
|--|--|--|--|--|--|---|--|---|--|
|   |  |  |  |   |  |   |  |   |  |
| <p><b>Hydraulic Crimping Machine</b></p> <ul style="list-style-type: none"> <li>• Six standard die selectable: CR123 /18650 / 26650 / 32650 / AA /AAA</li> <li>• Manual hydraulic pressing up to 5T</li> </ul>                       |  |  |  | <ul style="list-style-type: none"> <li>• Standard Crimping Die for 50100 Cylindrical Battery</li> <li>• Manual hydraulic pressing up to 5T</li> </ul>  |  | <p><b>Semi-Automatic Grooving Machine</b></p> <ul style="list-style-type: none"> <li>• Used for grooving various cylindrical cases including CR123,18650 26650, 32650 and AA</li> <li>• 400 grooving per hour productivity</li> </ul> |  | <ul style="list-style-type: none"> <li>• Used for grooving 50100 cylindrical cases onl</li> <li>• 400 grooving per hour productivity</li> </ul> |  |
| MSK-CSE-300  |  | MSK-112A-CYLINDER  |  | MSK-530  |  |   |  |   |  |
|    |  |   |  |    |  |   |  |   |  |
| <p><b>Semi-Automatic Slitting Machine</b></p> <ul style="list-style-type: none"> <li>• 4 sets of slitting blades (58 mm &amp; 56 mm)</li> <li>• 100-300 microns cutting thickness</li> <li>• 0 - 4 m/min adjustable speed</li> </ul> |  | <p><b>Semi-Automatic Winding Machine</b></p> <ul style="list-style-type: none"> <li>• Winding speed up to 250 rpm adjustable</li> <li>• Winding blade to wind up cylinder cell</li> <li>• Switchable between clockwise and counterclockwise</li> </ul> |  | <p><b>Compact Disassembling Machine</b></p> <ul style="list-style-type: none"> <li>• Slicing motor speed: 1000 rpm</li> <li>• Die rotating speed: 1000 rpm</li> <li>• Micrometer accuracy: 0.05 mm</li> <li>• To disassemble cylinder cases</li> </ul> |  |   |  |   |  |

**OTHERS RELATED TO BATTERY PREPARATION**

| MSK-170   |  | MSK-540  |  | MSK-150  |  |
|---|--|--|--|--|--|
|    |  |    |  |   |  |
| <p><b>Electrolyte Diffusion Chamber</b></p> <ul style="list-style-type: none"> <li>• 326 L x 206 W x 148 H mm inner chamber size</li> <li>• 0-99.99 sec air inflation time</li> <li>• 0-99.99 sec vacuum condition hold time</li> <li>• -20 to 40°C operation temperature</li> <li>• 0 - 1 MPa adjustable air pressure</li> <li>• Easy program setting for specific vacuum condition</li> </ul> |  | <p><b>Roll to Roll Edge Slitting Machine</b></p> <ul style="list-style-type: none"> <li>• Blade engagement: Adjustable 0.2-0.4mm</li> <li>• Max. Reeling/Unreeling Diameter: 250mm</li> <li>• Burr condition: ≤ 25 um</li> <li>• Blade Materials: Ultrafine tungsten alloy</li> <li>• Blade Diameter: 100mm</li> <li>• 30 ~ 300mm adjustable</li> <li>• Stepless adjustable, manual adjustment, digital display</li> </ul> |  | <p><b>Desktop Precision Electrolyte Filler</b></p> <ul style="list-style-type: none"> <li>• Filling volume range: 0 - 2.5 ml</li> <li>• Increment Displayed: 5µl/Thou</li> <li>• Digital Scale Accuracy: 0.01g</li> <li>• Metering Pump and Rack: 220 x 250 x 320mm</li> <li>• Control Box: 140 x 170 x 160mm</li> </ul> |  |



**BATTERY SAFETY TESTING**



MSK-TE903



MSK-TE901-UL



EQ-DHG-9070V-TA



EQ-TA-6050



MSK-ISC



MSK-TE905



MSK-TE902

| Model           | Description   | Features  |
|-----------------|---|---|
| MSK-TE903       | Dual Explosion-Proof Box                            | <ul style="list-style-type: none"> <li>Provides a safe enclosure for over-charging &amp; forced discharging of all kinds of battery cells required by the UN38.3 standard (38.3.4.7 &amp; 38.3.4.8)</li> <li>It is two separate compartments with a total of 4 feedthrough ports allow for testing multiple batteries at the same time</li> <li>One safety door is built in the back of each chamber. In the event of a battery explosion, the door will open to reduce pressure inside of the chamber</li> </ul> |
| MSK-TE901-UL    | Short Circuit Test Chamber                          | <ul style="list-style-type: none"> <li>Allows for testing rechargeable batteries &amp; packs under a large current draw up to 1000A</li> <li>This test system consists of two units: 1) a power control unit with high current switch and 2) explosion proof chamber for meeting the UN38.3 standard</li> <li>A remote control is included to allow the user to safely perform the short circuit test up to 7 meters away</li> </ul>  |
| EQ-DHG-9070V-TA | Thermal Abuse Test Chamber                          | <ul style="list-style-type: none"> <li>An explosive-proof air circulating oven with max. working temperature 200°C and 71 Liter capacity</li> <li>The oven is designed for battery thermal abuse test under IEC62133-8.2.2. Digital temperature control will provides +/-1°C accuracy with over-heated alarm and finishing alert</li> </ul>   |
| EQ-TA-6050      | Thermal Abuse Test Chamber                          | <ul style="list-style-type: none"> <li>An explosive-proof oven with 150°C max. working temperature and 53 Liter capacity</li> <li>This oven is designed for battery thermal abuse test under IEC62133-8.3.4. Digital temperature controller provides +/-2°C accuracy with over-heated alarm and completion alert</li> <li>It also can be operated under vacuum or inert gas condition to avoid flame and firing</li> </ul>  |
| MSK-TE902       | Gravity Impact (Free Fall) Tester                   | <ul style="list-style-type: none"> <li>It is a Gravity Impact ( Free Fall ) Tester for impact testing of all kinds of lithium battery according UN38.3 standard ( 38.3.4.6) or IEC-62133-8.3.3 standard</li> <li>A safety door is built in the back of the chamber. In the event of a battery explosion, the door will open to reduce the pressure inside of the chamber</li> </ul>   |
| MSK-ISC         | Battery Forced Internal-Short Circuit (ISC) Tester  | <ul style="list-style-type: none"> <li>A highly integrated 3-in-1 battery ISC testing system which is able to simulate the actual testing and performs cell voltage measurement with various enviromental conditions applied such as temperature &amp; humidity and crushing pressure</li> <li>System is designed based on IEC 62133-2012 8.3.9 testing standards which helps ensure the battery safety and reliability</li> </ul>  |
| MSK-TE905       | Hydraulic Driven Crushing & Nail Penetration Tester | <ul style="list-style-type: none"> <li>Combines crushing test and nail penetration into one machine with explosion-proof box and remote control panel for the IEC 62133.8.3.5 standard</li> <li>An electric hydraulic pump allows the machine to achieve the required force for crushing/ penetrating the battery cells</li> </ul>  |
| MSK-CT6045      | Crushing Tester                                     | <ul style="list-style-type: none"> <li>A crushing test machine with explosion-proof box and remote control pannel for IEC 62133.8.3.5 standard, also meet the requirement of GB8897.4-2002, IEC60086-4:2000, SJ/T11170-1998, UL2054:1997</li> <li>Force 1000N~13KN ( 1.5TN)</li> </ul>  |

BATTERY SAFETY TESTING



| Model      | Description                             | Features  |
|------------|---|---|
| MSK-TE9002 | Nail Penetration Tester                 | <ul style="list-style-type: none"> <li>A professional nail penetration tester for all types of rechargeable battery, which meets international standards, such as UN 38.3, UL2054:1997, GB/T18287-2000, SJ/T11170-1998 etc</li> <li>The nail penetration is carried on a safe and vented stainless steel chamber using 2~8 mm diameter steel nail at variable speed from 10~40mm/s</li> <li>There is a fixture to tighten various type cells, pouches or cylinders in the safety chamber</li> </ul>   |
| MSK-TE906  | Programmable Fast Thermal Test Chamber  | <ul style="list-style-type: none"> <li>A 150 liter Programmable Thermal Test Chamber for thermal test of Rechargeable Battery &amp; Battery Pack according to UN38.3 ( 38.3.4.2 ) and other thermal test from -75°C to + 150°C at faster heating and cooling rate</li> <li>6" touch-screen control panel to set up program, and display temperature profile</li> </ul>  |
| MSK-ES-4   | Computerized Automatic Vibration System | <ul style="list-style-type: none"> <li>A compact computerized Vibration Testing System for Li-Ion battery and battery pack up to 200Hz based on UN38.3 standard (38.3.4.3), which integrates computer and all control units into one box with less stand foot</li> </ul>  |
| MSK-SS-10  | Automated Pneumatic Shock Tester        | <ul style="list-style-type: none"> <li>A computerized automatic shock tester designed for testing Li-Ion battery cells or packs according to the 38.3.4.4; Test T.4: Shock section of the UN38.3 standard</li> <li>This section tests batteries under the simulation of possible impacts during transportation with the pack or cell subjected to an acceleration of 150 gn with a duration of 6 milliseconds ( 50 gn with 11 milliseconds for larger packs or cells)</li> <li>The shock tester is capable of handling battery packs up to 10Kg (22 lbs)</li> </ul> |
| MSK-SS-25  | Automatic Shock Tester                  | <ul style="list-style-type: none"> <li>A computerized automatic shock tester designed for testing Li-Ion battery cells or packs according to the 38.3.4.4; Test T.4: Shock section of the UN38.3 standard</li> <li>This section tests batteries under the simulation of possible impacts during transportation with the pack or cell subjected to an acceleration of 150 gn with a duration of 6 milliseconds (50 gn with 11 milliseconds for larger packs or cells)</li> <li>The shock tester is capable of handling battery packs up to 15Kg</li> </ul>           |
| MSK-TE5068 | Compact Nail Penetration Tester         | <ul style="list-style-type: none"> <li>A professional nail penetration tester for all types of rechargeable battery, which meets international standards, such as UL2054, UL1642, GB/T 18287-2000, GB/T2900.11-1988 idt IEC60086-4: 2000 etc</li> <li>The nail penetration is carried on a safe and vented stainless steel chamber using 2~8 mm diameter steel nail at variable speed from 10~40mm/s</li> <li>There is a manual fixture to tighten various type cells, pouches or cylinders in the safety chamber</li> </ul>  |
| MSK-TE910  | Short Circuit Test System               | <ul style="list-style-type: none"> <li>Allows for testing pouch cell or its battery pack with adjustable temperature and pressure</li> <li>This machine tests insulation resistance precisely to recognize the micro circuit status of the battery in order to test the safety issue of the battery</li> </ul>  |

SPLIT TEST CELL



SC-26650



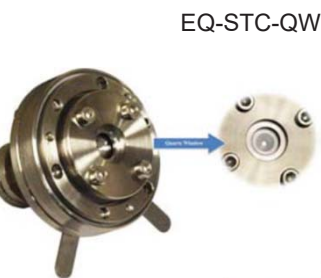
STC-ZINCAIR-W



EQ-STC-LI-AIR



EQ-STC



EQ-STC-QW



EQ-3ESTC15P

| Model         | Features   |
|---------------|--|
| EQ-SC-26650   | <ul style="list-style-type: none"> <li>• Designed for testing 26650 batteries</li> <li>• Full stainless steel end caps</li> <li>• Electrolyte corrosive-proof PTFE body can sustain with temperature up to 250°C</li> <li>• Sealed by electrolyte corrosive-proof PTFE O-rings</li> <li>• ID of PTFE body: 26 mm; Height of PTFE body: 65 mm</li> </ul>  |
| EQ-SC-18650   | <ul style="list-style-type: none"> <li>• Designed for testing 18650 batteries</li> <li>• Full stainless steel end caps</li> <li>• Electrolyte corrosive-proof PTFE body can sustain with temperature up to 250°C</li> <li>• Sealed by electrolyte corrosive-proof PTFE O-rings</li> <li>• ID of PTFE body: 18 mm; Height of PTFE body: 65 mm</li> </ul>  |
| STC-ZINCAIR-W | <ul style="list-style-type: none"> <li>• SS316 structure ensures high electrical conductivity and good corrosion protection</li> <li>• Internal compress spring ensures a good metal contact of the electrodes</li> <li>• Electrolyte corrosive-proof PTFE Guide Sleeve and Sealing O-rings</li> <li>• 10mm Dia. x 1mm Thick Quartz Observation Window allows X-Ray and infrared beam penetration</li> <li>• Bottom Recess Area: 16mm Dia.</li> <li>• Max. Working Temperature: 200°C</li> </ul>   |
| EQ-STC-LI-AIR | <ul style="list-style-type: none"> <li>• Stainless Steel Structure with internal Silver-Clad surface treatment ensures high electrical conductivity and good corrosion protection</li> <li>• Electrolyte corrosive-proof PTFE Guide Sleeve and Sealing O-rings</li> <li>• Cell thickness: 1-3 mm (cathode+separator+anode)</li> <li>• Bottom Recess Area: 20 mm dia.</li> <li>• Max working temperature: 250°C</li> <li>• Dial pressure gauge with display range from -0.1 - 0.15 MPa</li> <li>• Two SS needle valves with 1/4" tube fittings</li> </ul>                   |
| EQ-STC        | <ul style="list-style-type: none"> <li>• A 6 mm height spacer inside the test cell to press down on the electrode and prevent the electrode from curling</li> <li>• Sealed by electrolyte corrosive-proof PTFE O-rings</li> <li>• Electrolyte corrosive-proof PTFE guide sleeve capable of withstanding up to 250 °C</li> <li>• Easy to separate after testing</li> <li>• 10, 12, 15, 19, 20, and 24 mm diameter inserts</li> </ul>  |
| EQ-STC-QW     | <ul style="list-style-type: none"> <li>• A 6 mm height spacer inside the test cell to press down on the electrode and prevent the electrode from curling</li> <li>• 17 mm dia. quartz observation window ensures the X-Ray beam penetration</li> <li>• Sealed by electrolyte corrosive-proof PTFE O-rings</li> <li>• Electrolyte corrosive-proof PTFE guide sleeve capable of withstanding up to 250 °C</li> <li>• Max cell thickness: 6 mm (Cathode+separator+anode)</li> <li>• 19, 20, and 24 mm diameter inserts</li> </ul>   |
| EQ-3ESTC15    | <ul style="list-style-type: none"> <li>• Full SS304 structure</li> <li>• 24 mm diameter insert</li> <li>• Sealed by electrolyte corrosive-proof PTFE O-rings</li> <li>• Electrolyte corrosive-proof PTFE Guide Sleeve capable of withstanding up to 250 °C</li> <li>• Adjustable spring tension on top to accept various electrode thicknesses</li> <li>• Easy to separate after testing</li> <li>• Designed for R&amp;D of rechargeable battery materials by testing three electrodes</li> </ul>  |
| EQ-3ESTC15P   | <ul style="list-style-type: none"> <li>• A three-electrode split cell used for testing anode/cathode with a reference electrode in between</li> <li>• 24 mm diameter insert</li> <li>• The addition of a Digital Pressure Gauge makes it possible to monitor the air pressure inside the chemical reaction chamber</li> <li>• A 1/4" inlet/outlet barb with needle valve allows for easy gas in/out</li> <li>• Electrolyte corrosive-proof PTFE Guide Sleeve capable of withstanding up to 250 °C</li> <li>• Sealed by electrolyte corrosive-proof PTFE O-rings</li> </ul> |

ROLL TO ROLL COATER



MSK-AFA-E300



MSK-AFA-E200

Automatic Roll to Roll Battery Electrode Coating System with Drying Oven    Compact Roll to Roll Tape Casting Machine with Drying Oven

- Can coat electrode sheets up to 250 mm in width and 600 meter in length automatically
- Integrates the functions/features of metallic foil roll unwinding (reeling out), slurry feeder, coating blade, baking oven, and final electrode winding (reeling in) together with touch screen operation
- Can coat electrode sheets up to 160 mm in width and 500 meter in length automatically
- Integrates the functions/features of reeling in & out, slurry feeder, coating blade, baking oven, and final electrode winding (reeling in).

SPOT & ULTRASONIC WELDER



MSK-310A



MSK-330A



MSK-320B



MSK-360A



MSK-800

| Model    | Description   | Specification   |
|----------|---|---|
| MSK-310A | Compact AC Pulse Spot Welder (Pneumatic Type)   | <ul style="list-style-type: none"> <li>• Input air pressure: 0.1 - 0.8 MPa</li> <li>• Welding current: 0-99% adjustable</li> <li>• Tab thickness applicable: 0.03 - 0.2 mm tab</li> </ul>   |
| MSK-330A | Precise Pneumatic Point Welding Machine   | <ul style="list-style-type: none"> <li>• Input air pressure: 0.1 - 0.8 MPa</li> <li>• Welding current: 0-99% adjustable</li> <li>• Tab thickness applicable: 0.03 - 0.25 mm tab</li> <li>• Controlled by microcontroller, achieve monopulse, dipulse, multiple-pulse welding</li> </ul> |
| MSK-320B | Desk-Top Micro-computer Control Capacitive Discharge Spot Welder (Pedal Type)                 | <ul style="list-style-type: none"> <li>• Built in optoelectronic welding switch</li> <li>• Welding current: 0-99% adjustable</li> <li>• Tab thickness applicable: 0.03 - 0.5 mm tab</li> <li>• Single chip control with LCD control panel</li> </ul>                                    |
| MSK-360A | Heavy Duty Spot Welder (Pneumatic Type) with Welding Head for Thick Tab & Larger Battery Pack | <ul style="list-style-type: none"> <li>• Input air pressure: 0.1 - 0.8 MPa Flat</li> <li>• Welding current: 0-99% adjustable</li> <li>• Tab thickness applicable: 0.03 - 0.5 mm tab</li> <li>• Single chip control with LCD control panel</li> </ul>                                    |
| MSK-800  | Desk-Top Ultrasonic Metal Welder  | <ul style="list-style-type: none"> <li>• Input air pressure: 0.1 - 0.8 MPa</li> <li>• Ultrasonic frequency: 30-40 kHz adjustable</li> <li>• Welding area: 5.2 mm(L) x 5.2 mm(W)</li> <li>• Pneumatic control air pressure at 85 psig</li> </ul>   |
| MSK-800W | Desk-Top 800W Ultrasonic Metal Welder with Touch-Screen Digital Controller                    | <ul style="list-style-type: none"> <li>• Up to four recipes can be stored in the Al or Cu welding programs</li> <li>• Ultrasonic frequency: 30-40 kHz adjustable</li> <li>• Welding area: 4 mm(L) x 4 mm(W)</li> <li>• Pneumatic control air pressure at 85 psig</li> </ul>             |
| MSK-320A | Desk-Top Capacitive Discharge Spot Welder (Pneumatic Type)                                    | <ul style="list-style-type: none"> <li>• Input air pressure: 0.1 - 0.8 MPa</li> <li>• Welding current: 0-99% adjustable</li> <li>• Tab thickness applicable: 0.03 - 0.5 mm tab</li> <li>• Built in optoelectronic welding switch</li> </ul>   |

**BATTERY/CAPACITOR ANALYZER**



BST8-3

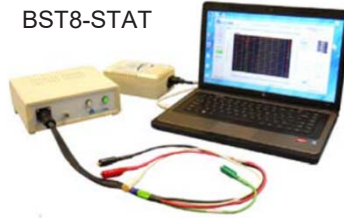


BST8-10A30V

BST8-16-10V2A-IR



BST8-STAT



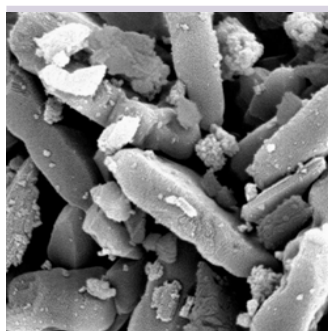
EQ-M9711



| Model            | Description  |
|------------------|--|
| BST8-WA          | <ul style="list-style-type: none"> <li>An eight-channel battery analyzer to analyze small coin cells and cylindrical batteries from 0.002 mA to 1 mA, up to 5V</li> <li>Provides most applications in battery testing fields such as electrode materials research, battery performance test, small-scale battery formation, capability grading, battery pack testing and etc</li> </ul>                              |
| BST8-MA          | <ul style="list-style-type: none"> <li>An eight-channel battery analyzer to analyze small coin cells and cylindrical batteries from 0.1 mA to 10 mA, up to 5V</li> <li>Provides most applications in battery testing fields such as electrode materials research, battery performance test, small-scale battery formation, capability grading, battery pack testing and etc</li> </ul>                               |
| BST8-3           | <ul style="list-style-type: none"> <li>An eight-channel battery analyzer to analyze small coin cells and cylindrical batteries from 6.0 mA to 3000 mA, up to 5V</li> <li>Provides most applications in battery testing fields such as electrode materials research, battery performance test, small-scale battery formation, capability grading, battery pack testing and etc</li> </ul>                             |
| BST8-STAT-LD     | <ul style="list-style-type: none"> <li>Single channel potentiostat/galvanostat with laptop &amp; software for battery/capacitor analysis</li> <li>Suited for electro-chemical -analysis, including cyclic voltammetry, chronoamperometry and chronopotentiometry</li> </ul>  |
| BST8-4C10A50V    | <ul style="list-style-type: none"> <li>4 channel battery analyzing system for Li-ion, LiFePO3, Ni-MH, Ni-Cd, and Lead acid battery packs with up to 50V and 10A per channel</li> <li>Intelligent power failure protection</li> </ul>   |
| BST8-5V40A-RT    | <ul style="list-style-type: none"> <li>8 channel battery analyzing system for Li-ion, LiFePO3, Ni-MH, Ni-Cd, and Lead acid battery packs with up to 5V and 40A per channel</li> <li>Based on network communication design and software combines a DC Internal Resistance Analysis function when doing cycle charging/discharging, which ensures a stable connection and high integration testing platform</li> </ul> |
| BST8-16-10V2A-IR | <ul style="list-style-type: none"> <li>16-channel battery analyzer used for testing all kinds of battery including Li-ion battery, NiMH, NiCd, battery pack, and etc</li> <li>Each channel is an independent constant-current (0.1 - 2A) and constant-voltage (0 - 10V) source which can be programmed and controlled by testing software</li> </ul>   |
| BST8-10A30V      | <ul style="list-style-type: none"> <li>8 channel battery analyzing system for Li-ion, LiFePO3, Ni-MH, Ni-Cd, and Lead acid battery packs with up to 30V and 10A per channel</li> <li>Intelligent power failure protection</li> </ul>   |
| EQ-M9711         | <ul style="list-style-type: none"> <li>DC programmable electronic load with PC control software for Battery and Capacitor Discharging Test : 0-30A, 0-150V, 150W</li> <li>Over current, over voltage, over power, over heat, polarity reversed protection</li> </ul>   |
| EQ-BVIR          | <ul style="list-style-type: none"> <li>Battery internal resistance tester can be used for measuring the Internal Resistance and Open Circuit Voltage of almost all of the commercial batteries such as Secondary battery, Lead acid battery, Nickle cadmium, Nickle-metal Hydride and Li-ion battery</li> </ul>  |
| EQ-MSK-BK300     | <ul style="list-style-type: none"> <li>Precision internal resistance meter for R&amp;D or quality control of all rechargeable battery, which has accuracy up to 1 milli-ohm and can measure any battery from 0-19.99V</li> <li>Adopts sine wave AC power with frequency of 1000Hz to carry out test on the battery internal resistance</li> </ul>  |
| EQ-IT9712        | <ul style="list-style-type: none"> <li>300W DC programmable electronic load for Battery Test: 120V / 30A</li> <li>Over current, over voltage, over power, over heat, polarity reversed protection</li> </ul>   |

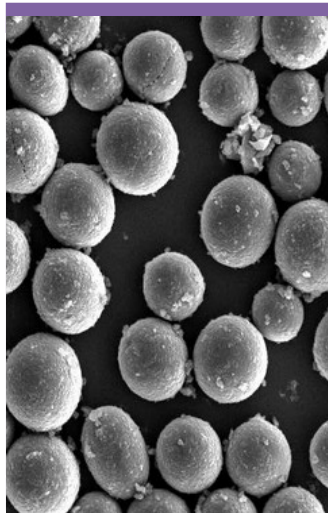
## CONSUMABLES FOR BATTERY R&amp;D

## LI-ION BATTERY CATHODE POWDER



|                 |  |
|-----------------|--|
| NP-SI-P100      | 100 g Si (99.%, 100 nm) Nanopowder   |
| EQ-LIB-LFPO-KJ2 | High-Rate (Upto 15C) LiFePO4 Powder for Li-ion battery Cathode, 150g/bag     |
| EQ-LIB-LCN      | Li2CO3 (Carbonate) Powder for Li-ion Battery Cathode, 200g/bottle            |
| EQ-LIB-LCO      | LiCoO2 (Cobalt) Powder for Li-ion Battery Cathode, 200g/bag                  |
| EQ-LIB-LMO      | LiMn2O4 (Manganese) Powder for Li-ion Battery Cathode, 200g/bag              |
| EQ-LIB-LFPO     | LiFePO4 (Phosphate) Powder for Li-ion battery Cathode, 150g/bag              |
| EQ-LIB-LNCM523  | LiNiCoMnO2 ( NCM ) Powder for Li-ion Battery Cathode 200g/bottle             |
| EQ-LIB-LNCM111  | LiNiCoMnO2 ( NCM ) Powder for High Capacity Li-ion Battery Cathode, 200g/bag |

## LI-ION BATTERY ANODE POWDER



|                 |   |
|-----------------|---|
| EQ-LIB-LTO      | Li4Ti5O12 (Titanate) Powder for Li-ion Battery Anode, 200g/bag                                    |
| EQ-LIB-AB       | Conductive Acetylene Black for Li-ion battery Anode/Cathode, 25g/bag                              |
| EQ-LIB-CGP      | Conductive Graphite Powder for Li-ion battery Anode/Cathode, 80g/bag                              |
| EQ-LIB-SUPERC45 | TIMCAL SUPER C45 Conductive Carbon Black as Conductive Additive for Lithium-Ion Batteries 80g/bag |
| EQ-LIB-SUPERP   | TIMCAL Graphite & Carbon Super P® Conductive Carbon Black, 100g/bag                               |
| EQ-LIB-SUPERC65 | TIMCAL SUPER C65 Conductive Carbon Black as Conductive Additive for Lithium-Ion Batteries 80g/bag |
| EQ-LIB-CMSG     | Artificial Graphite Powder for Li-ion battery Anode, 200g/bag                                     |
| EQ-LIB-MCMB     | MCMB (MesoCarbon MicroBeads) Graphite Powder for Li-ion Battery Anode, 250g/bag                   |
| EQ-LIB-CMC      | Carboxymethyl Cellulose (CMC) for Li-ion Battery Anode 100g/bottle                                |
| EQ-AB-520       | High Surface Active Carbon For Super-Capacitor Electrode (70g / Bag )                             |



## BATTERY ELECTRODE/LI CHIPS

|                  |  |
|------------------|--|
| EQ-CC-CU-20      | Conductive Carbon Coated Copper Foil for Battery Anode Substrate (280mm width x 11um thick, 1.3 kg/roll)                   |
| BC-AF-241LPF-DS  | Li-Ion Battery Cathode - Aluminum foil double side coated by LiFePO4 (241mm L x 200mm W x 0.2mm T) 5 sheets/bag            |
| BC-CF-241LPF-SS  | Li-Ion Battery Cathode - Aluminum foil single side coated by LiFePO4 (241mm L x 200mm W x 0.1mm T) 5 sheets/bag            |
| BC-AF-267MN-DS   | Li-Ion Battery Cathode - Aluminum foil double side coated by LiMn2O4 (267mm L x 214mm W x 0.2mm T) 5 sheets/bag            |
| BC-AF-267CO-DS   | Li-Ion Battery Cathode - Aluminum foil double side coated by LiCoO2 (241mm L x 200mm W x 94um T) 5 sheets/bag              |
| BC-AF-241CO-SS   | Li-Ion Battery Cathode - Aluminum foil single side coated by LiCoO2 (241mm L x 200mm W x 0.1mm T) 5 sheets/bag             |
| BC-CF-241-DS     | Li-Ion Battery Anode -Copper foil double side coated by CMS Graphite (241mm L x 200mm W x 0.2mm T) 5 sheets/bag            |
| BC-CF-241-SS     | Li-Ion Battery Anode - Copper foil single side coated by CMS Graphite (241mm L x 200mm W x 0.1mm T) 5 sheets/bag           |
| BC-CF-241-SS-005 | Li-Ion Battery Anode -Copper foil single side coated by CMS Graphite (241mm L x 200mm W x 0.05mm T) 5 sheets/bag           |
| BC-CF-750-DS     | 18650 Li-Ion Battery Anode Strip -Copper foil double side coated by CMS Graphite(750mm L x 58mm W x 0.11mm T) 50 pcs/roll  |
| BC-AF-670MN-DS   | 18650 Li-Ion Battery Cathode Strips - Aluminum foil double side coated by LiMn2O4 (670mm L x 56mm W x 0.15mm T) 50pcs/roll |
| EQ-LIB-LIC45     | Lithium Chip 15.6 Dia x 0.45 t mm for Li-ion Battery R&D 130g/bottle   |
| EQ-LIB-LIC25     | Lithium Chip 15.6 Dia x 0.25t mm for Li-ion Battery R&D 100g/bottle (4000 pcs)   |
| LIB-LIF-30M      | Lithium ( Li ) Foil: 30 Meter Length x 35 mm Width x 0.17mm Thick  |
| LIB-LIF-35M      | Lithium ( Li ) Foil: 35 Meter Length x 76.5 mm Width x 0.06mm Thick  |

## CONSUMABLES FOR BATTERY R&D

### LI-ION BATTERY BINDERS

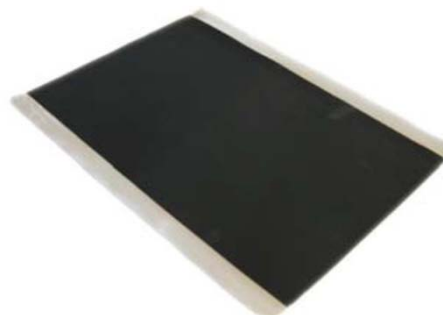
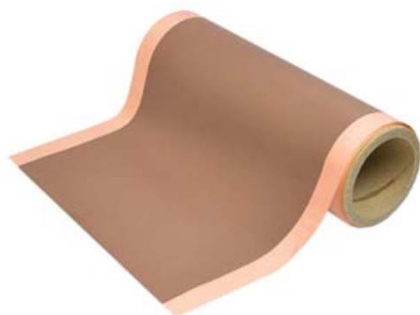


|             |   |
|-------------|---|
| EQ-LIB-PVDF | PVDF binder for Li-ion battery electrodes 80g/bag                                     |
| EQ-LIB-NMP  | N-Methyl-2-pyrrolidone (NMP) solvent for PVDF 250g/bottle                             |
| EQ-LIB-CMC  | Carboxymethyl Cellulose (CMC) for Li-ion Battery Anode 100g/bottle                    |
| EQ-LIB-SBR  | Styrene-Butadiene Rubber (SBR) binder for Li-ion Battery Anode 260g/bottle            |
| EQ-LIB-PTFE | Polytetrafluoroethylene (PTFE) Condensed Liquid Binder for Li-ion Battery 360g/bottle |
| EQ-LIB-520L | Water-based (Aqueous) Binder Powder for Li-ion Battery Cathode 120g/bottle            |

### LI-ION BATTERY SEPARATOR



|                  |  |
|------------------|--|
| EQ-BSF-0016-500A | Ceramic Coated Membrane (16um thick x 60mm W x 500m L ) as Separator of Li-ion Battery |
| EQ-BSF-0025-400C | Li-ion Battery Separator Film (25um thick x 60mm W x 400m L, Celgard)                  |
| EQ-BSF-0025-60C  | Li-ion Battery Separator Film (25um thick x 85mm W x 60m L, Celgard)                   |
| EQ-PTFE-02-47    | PTFE Membrane as Separator for Lithium Air Battery 100/pk                              |



### ELECTRODE SUBSTRATE (CURRENT COLLECTOR)

|                          |  |
|--------------------------|--|
| EQ-BCAF-15U-280          | Aluminum Foil for Battery Cathode Substrate (350m Length x 280mm width x 15um thickness)                   |
| EQ-BCANF-45U             | Aluminum Mesh Foil for Battery Cathode Substrate (240mm width x 45um thick x 50 Meter Length )             |
| EQ-BCANF-20U             | Aluminum Mesh Foil for Battery Cathode Substrate (265mm width x 20um thick)                                |
| EQ-CC-AL-20U-260         | Conductive Carbon Coated Aluminum Foil for Battery Cathode Substrate (260mm W x 16um Thick, 80m / Roll )   |
| EQ-CC-CU-20              | Conductive Carbon Coated Copper Foil for Battery Anode Substrate (280mm width x 11um thick, 1.3 kg/roll)   |
| EQ-BCCF-9U               | Copper Foil for Battery Anode Substrate (190 m L x 280mm W x 9um thick)                                    |
| EQ-BCCF-25U              | Copper Foil for Graphene Growth (90m length x 150mm width x 25um thickness)                                |
| EQ-BCCNF-45U             | Copper Mesh Foil for Battery Anode Substrate (240mm width x 45um thickness x 20 Meter L)                   |
| EQ-BCCNF-55U             | Copper Mesh Foil for Battery Anode Substrate (240mm width x 55um thickness x 20 Meter L)                   |
| EQ-BCCF-2MM              | Copper Foam for Battery Cathode Substrate (500mm length x 300mm width x 1.6mm thickness)                   |
| EQ-BCGDL-1400S           | Carbon Foam as Gas Diffusion Layer (225 W x 270L x 0.454 mm thick) for Metal Air Battery                   |
| MF-TA-FOIL-400L200W005TH | Tantalum Polycrystalline Metallic Foil: 0.05mm thick x 200mm Width x 400 mm Length                         |
| MF-TA-FOIL-252505SN      | Tantalum Polycrystalline Metallic Foil: 25x25x0.5mm, un-polished   |
| MF-TI-FOIL-700L-105      | Titanium (Ti) Foil: 110mm Width x 0.1mm thick x 700 mm Length  |
| MF-W-FOIL-200L           | Copper Foam for Battery Cathode Substrate (500mm length x 300mm width x 1.6mm thickness)                   |
| EQ-BCNF-16M              | Nickel Foam for Battery Cathode Substrate (1000mm length x 300mm width x 1.6mm thickness)                  |
| EQ-BCNF-80UM             | Nickel Foam for Battery or Supercapacitor Cathode Substrate (300mm length x 80mm width x 0.08mm thickness) |
| NFOIL-25U                | Nickel Foil: (0.03mm thick x 150mm width x 5000 mm length)   |
| SSF-316-300-01           | Stainless Steel Foil: SS316 0.1mm Thick x 300mm W x 4000 mm L  |
| SF-316-100-1.6           | Stainless Steel Foam: SS316 1.6mm Thick x 100mm W x 1000 mm L  |
| EQ-SSMD-304              | 304 Stainless Steel Meshed Disc as Electrode Substrate for CR20XX Coin Cell                                |
| MCMG-FOIL-18L-1000       | Magnesium ( Mg ) Foil: 100mm Width x 0.1 tmm thick x 1000 mm Length  |
| MF-V-FOIL-100L-0.25T     | Vanadium Foil (V) Foil: 0.25mm t x50 mm W x 100 mm L   |

CONSUMABLES FOR BATTERY R&D



| COIN CELL CASES      |  |
|----------------------|--|
| EQ-CR2032-CASE       | CR2032 coin cell cases (20d x 3.2t mm) with O-rings for Battery Research - 100 pcs/pck                         |
| EQ-CR2032-CASE-316A  | Al-Clad CR2032 Coin Cell Can (20d x 3.2mm) for Li-ion Battery up to 5.5V- 20 Pcs/pck                           |
| EQ-CR2016-CASE-304   | CR2016 coin cell cases (20d x 1.6 mm) with seal O-rings for Battery Research - 100 pcs/pck                     |
| EQ-CR20-WS           | Wave Spring and Spacer for CR2032 (100 pairs/pck)  |
| CR2016-KAPTON        | CR2016 Case with one side Kapton Window (10mm) for in-situ X- Ray Analysis - 5 set/pck                         |
| EQ-CR2016-KAPTON-2S  | CR2016 Case with two sides Kapton Windows for in-situ Neutron Diffraction Analysis - 5 pairs/pkg               |
| CR2032-CASE-304-MESH | Meshed CR2032 Coin Cells Cases (20d x 3.2mm) with seal O-rings for Lithium Air Battery Research - 10pcs/pck    |
| EQ-CR2325-CASE-316   | Stainless Steel-CR2325 button cells cases (23d x 2.5t mm) with seal O-rings for Battery Research - 100 pcs/pck |
| EQ-CR1220-CASE-304   | CR1220 Stainless Steel Coin Cell cases (12.5 d x 2 mm) with seal O-rings for Battery Research - 100 pcs/pck    |
| EQ-CR2025-CASE-304   | CR2025 Button Cell Case (20d x 2.5mm, 304SS ) with Seal O-rings for Battery Research - 100pcs/pck              |
| EQ-CR20WS-SPRING316  | Stainless Steel Wave Spring for CR2032 Case - 100 pcs/pck  |
| EQ-CR2450-CASE-304   | CR2450 Stainless Steel button cell cases (24d x 5.0mm) with seal O-rings for Battery Research - 100 pcs/pck    |
| CR2032-CASE-304G     | Gold-Coated SS304 CR2032 Button Cell Cases (20d x 3.2mm) with (1 pair with O-ring)                             |
| CR2032-CASE-304PT    | Platinum-Coated SS304 CR2032 Button Cell Cases (20d x 3.2mm) with O-ring, 1 pair                               |
| EQ-CR20BW-SPRING304  | Stainless Steel Spring (Belleville Washers) for CR2032 Cases - 100 pcs/pck                                     |
| EQ-CR20-SPACER304-02 | Stainless Steel Spacer for CR20XX Cell (15.4 mm Dia x 0.2 mm) - 100 pcs/pck                                    |
| EQ-CR20-SPACER304-05 | Stainless Steel Spacer for CR20XX Cell (15.8mm Diam x 0.5 mm) - 100 pcs/pck                                    |
| EQ-CR2450-SPACER316  | Stainless Steel Spacer for CR2450 Cell (20mm Dia x 1mm) - 100 pcs/pck  |
| EQ-AG3-CASE          | Stainless Steel-AG3 / 312 button cell cases (7.9d x 3.6t mm) with O-rings for Battery Research - 100 pcs/pck   |



| CYLINDER CELL CASE |   |
|--------------------|---|
| EQ-LIB-18650       | 18650 Cylinder Cell Case with Anti-Explosive Cap and Insulation O-ring - 100 Pcs/package                        |
| EQ-LIB-26650       | 26650 Cylinder Cell Case and Anti-Explosive Cap with Insulation O-ring - 100 Pcs/package                        |
| EQ-LIB-32650       | 32650 Cylinder Cell Case and Anti-Explosive Cap with Insulation O-ring - 60 Pcs/package                         |
| EQ-LIB-AA          | AA Size (14500) Cylinder Cell Case with Anti-Explosive Cap (Built-in PTC) & Insulation O-ring - 100 Pcs/package |
| EQ-LIB-50100       | Cylindrical Aluminum Case with Cap and Terminals for Supper Capacitor and Battery R&D 5pcs/pack                 |
| EQ-LIB-AAA         | AAA Size (10440) Cylinder Cell Case with Anti-Explosive Cap & Insulation O-ring - 100 Pcs/package               |



CONSUMABLES FOR BATTERY R&D



POUCH CELL CASES

|                 |  |
|-----------------|--|
| EQ-ALF-100-210  | Aluminum Laminated Film for Pouch Cell Case, 100mm W x 210mm L 50pcs/Bag |
| EQ-ALF-400-7.5M | Aluminum Laminated Film for Pouch Cell Case, 400mm W x 7.5 m L           |
| EQ-PLIB-604694  | Formed Pouch Cell Case - 94x46x6.0t mm, 50pcs/Bag                        |
| EQ-PLIB-302025  | Formed Pouch Cell Case with Air Receiver - 20x25x3.0t mm L 50pcs/Bag     |
| EQ-PLIB-475075  | Formed Pouch Cell Case, 75x50x4.7t mm, 50pcs/Bag                         |

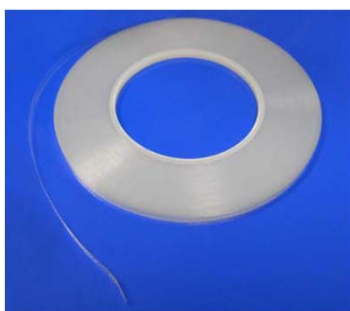
NICKEL TAB

|              |   |
|--------------|---|
| EQ-PLIB-NTA3 | 3mm Width Nickel Tab as Negative Terminal for Polymer Li-ion Battery 40pcs/Box  |
| EQ-PLIB-NTA4 | 4mm Width Nickel Tab as Negative Terminal for Pouch Cell, 50pcs/Box             |
| EQ-PLIB-NTA8 | 8mm Width Nickel Tab as Negative Terminal for Pouch Cell, 50pcs/Box             |
| EQ-PLIB-ATC3 | 3mm Width Aluminum Tab as Positive Terminal for Pouch Li-ion Cell 40pcs/Box     |
| EQ-PLIB-ATC4 | 4mm width Aluminum Tab as Positive Terminal for Pouch Cell, 50pcs/Box           |
| EQ-PLIB-ATC8 | 8mm Width Aluminum Tab as Positive Terminal for Pouch Cell, 50pcs/Box           |
| LIB-SSWT     | Stainless Steel Battery Weldering Lead/Tab/Terminal (27 x 6 x 0.2mm) 10 pcs/pck |



ELECTROLYTE

|             |  |
|-------------|--|
| EQ-Be-LiPF6 | Electrolyte LiPF6 for Lithium-ion battery R&D (LiPF6 in Organic Solvent for Immediate Use) 500g (10 x 50g) |
| EQ-LBC3015B | Electrolyte LiPF6 for LiMn2O4/LiFePO4 Lithium-ion battery R&D, 1Kg in Stainless Steel Container            |
| EQ-LBC3051C | Electrolyte LiPF6 for LiCoO2 Lithium-ion battery R&D, 1Kg in Stainless Steel Container                     |



STRAPPING TAPE

|              |  |
|--------------|--|
| EQ-PLIB-HMA8 | Hot Melt Adhesive (Polymer Tape) for Heat Sealing Pouch Cell Tabs (100m L x 8mm W x 0.1mm Thickness) |
| EQ-PLIB-HMA4 | Hot Melt Adhesive (Polymer Tape) for Heat Sealing Pouch Cell Tabs (100m L x 4mm W x 0.1mm Thickness) |
| EQ-LIB-ST    | Strapping Tape (200m L x 10mm W x 0.03mm Thickness) for Pouch/Cylinder Cell                          |

TUBE FURNACE



| Model             | Quartz Tube Option | Heating Rate   | Working Temperature                    | Features  | Advantages   |
|-------------------|--------------------|----------------|--|---|--|
| GSL-1100X         | 1" O.D. or 2" O.D. | Max: 20°C /min | Max: 1100°C (< 1 hour)<br>Cont: 1000°C | Dial Vacuum Gauge   | The chamber can be set up in vertical, horizontal, or at an angle            |
| GSL-1100X-50-LVT  | 1" O.D.            | Max: 20°C /min | Max: 1100°C (< 1 hour)<br>Cont: 1000°C | Digital Vacuum Gauge, Temperature Calibrator, Vacuum Pump and Filter    | Stainless steel shell with adjustable height                                 |
| OTF-1200X-S50-LVT | 1" O.D. or 2" O.D. | Max: 10°C /min | Max: 1200°C (< 1 hour)<br>Cont: 1100°C | Digital Vacuum Gauge, Temperature Calibrator, and Vacuum System         | Can heat sample in vacuum up to 1E-2 Torr or flowing gas.                    |
| OTF-1200X-S50-2F  | 2" O.D.            | Max: 10°C /min | Max: 1200°C (< 1 hour)<br>Cont: 1100°C | Digital Vacuum Gauge, Two Channel Gas Mixing Station, and Vacuum System | Anti corrosive gauge to be used with aggressive gases                        |
| OTF-1200X-S       | 1" O.D. or 2" O.D. | Max: 20°C /min | Max: 1200°C (< 1 hour)<br>Cont: 1100°C | Dial Vacuum Gauge   | Split-able horizontal tube furnace   |
| OTF-1200X-4-RTP   | 4" O.D.            | Max: 50°C /sec | Max: 1100°C (< 10 min)<br>Cont: 600°C  | Digital Vacuum Gauge  | Rapid thermal processing system for fast heating and double layer steel case |
| OTF-1200X-S-VT    | 1" O.D. or 2" O.D. | Max: 20°C /min | Max: 1200°C (< 1 hour)<br>Cont: 1100°C | Dial Vacuum Gauge   | Split-able vertical tube furnace   |

VACUUM CHAMBER FURNACE



|                     |  |
|---------------------|--|
| Model               | VBF-1200X-H8-UL  |
| Quartz Tube Size    | 8" O.D x 7.5" I.D.x 13.4" L  |
| Volume              | 7.6 L  |
| Working Temperature | Maximum 1100°C for 30 minutes and 1000°C continuously  |
| Features            | <ul style="list-style-type: none"> <li>• PID automatic control and auto-tune function</li> <li>• Stainless steel vacuum flange with one needle valve as gas inlet</li> <li>• One port for vacuum pump connection</li> <li>• Digital vacuum gauge provided</li> </ul> |
| UL Recognition      | All electric components are UL recognized  |
| Price               |  |

## MUFFLE FURNACE

Muffle furnace (400°C-1800°C) steps in as the necessary part of laboratory that requires extreme heat environment. MTI is providing the muffle furnace at an affordable cost. The sizes of the muffle furnace are various from the smaller furnaces which are conveniently placed on a workbench, to the larger units that has a coveted capacity and competent for all duty.

General Features:

- PID automatic control
- and auto tune function temperature controller
- High purity alumina fiber insulation
- Double shell steel case



KSL-1100X-S



KSL-1500X-S



KSL-1200X-M

| Model        | Chamber Dimension L x W x H | Volume | Heating Rate                 | Working Temperature                  | Heating Element       | Power  |
|--------------|-----------------------------|--------|------------------------------|--------------------------------------|-----------------------|--------|
| KSL-1100X-S  | 4" x 4" x 4"                | 1 L    | Max: 30°C/min                | Max: 1200°C (< 1 hour) Cont: 1100°C  | Resistance Wire       | 700 W  |
| KSL-1200X-L  | 16" x 16" x 16"             | 64 L   | Max: 20°C/min                | Max: 1100°C (< 1 hour) Cont: 1000 °C | Resistance Wire       | 5000 W |
| KSL-1200X-J  | 6" x 6" x 7"                | 4.2 L  | Max: 30°C/min                | Max: 1200°C (< 4 hour) Cont: 1100 °C | Resistance Wire       | 3000 W |
| KSL-1200X    | 12" x 8" x 5"               | 7.2 L  | Max: 50°C/min                | Max: 1200°C (< 1 hour) Cont: 1100°C  | Resistance Wire       | 3500 W |
| KSL-1200-X-M | 12" x 12" x 12"             | 27 L   | Max: 10°C/min                | Max: 1200°C (< 1 hour) Cont: 1100 °C | Resistance Wire       | 7000 W |
| KSL-1500X-S  | 4.7" x 4.7" x 4.7"          | 1.7 L  | Max: 20°C/min Cont: 10°C/min | Max: 1500°C (< 1 hour) Cont: 1400°C  | Silicon Carbide       | 2000 W |
| KSL-1700X-S  | 4.7" x 4.7" x 4.7"          | 1.7 L  | Max: 20°C/min Cont: 10°C/min | Max: 1700°C (< 3 hour) Cont: 1600°C  | Molybdenum Disilicide | 3000 W |

## SPIN COATER

VTC-50



Desktop Spin Coater with Complete Accessories

- 4" stainless steel spin plates are included, which can hold one or multiple samples by wax or double-sided tape
- The spinning speed is variable from 0-5100 rpm
- 20 ml syringe is included for liquid injection with adjustable syringe holder that can rotate freely along the support rod

VTC-100A



Programmable Spin Coater with Vacuum Chucks, Oilless Vacuum Pump & Accessories

- Liquid disk made of polypropylene to resist most of corrosive solutions (1", 2", & 4")
- The spinning speed is variable from 500-8000 rpm with two programmable segments
- One oilless vacuum pump and one filter are included
- 20ml syringe is used to contain the coating material

VTC-200



Programmable Vacuum Chuck Spin Coater with Complete Accessories

- One 6" vacuum chuck is included for holding 6" and 8" wafers
- 500 - 5000 rpm adjustable spinning speed
- Digital control panel with two programmable segments of different spin times and speeds
- 20ml syringe is used to contain the coating material

**DIP COATER**

PTL-MM01



**Desktop Dip Coater with Variable Speed**

- Dipping speed is within 1-200 mm/mm adjustable
- Dipping traveling within 0-200 mm adjustable
- 150 ml solution container is included
- Sample weight less than 250g

PTL-MM02



**Programmable Dip Coater with Digital Controller**

- Dipping speed is within 1-200 mm/min adjustable
- Dipping traveling within 0-75 mm adjustable
- 150 ml solution container is included
- Sample weight less than 250g

PTL-200



**PLC Controlled Dip Coater for Large Substrate**

- Coating samples with size up to 10" x 12"
- Pulling rate, immersion rate, dwell time and cycling time are fully programmable
- 4 liter polypropylene tank is provided
- Max stroke length is up to 300 mm
- Max sample load is 7 kg

**HOT ROLLING**

MSK-HRP-MR100A



**4" Rolling Press with Dual Micrometer**

- 100 mm Dia. x 100mm width Rollers made from hardened tool steel HRC60-62
- Dual micrometer for accurate thickness adjustment in the range 0 - 1.8 mm
- Constant Rolling Speed: 65 mm / second

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

**CUTTING AND DICING**

SYJ-30



**Heavy Duty High Speed Abrasive Cut-off Saw with 10" SiC Cutting Blades**

- 10" SiC cutting blades are included
- Max cutting section is up to 30 mm x 30 mm
- Manually push up with T clamp vise is included for quick tightening or release
- Motor speed is 2800 rpm
- A cooling system is built in with inlet and outlet provided

SYJ-40



**High Speed Diamond Cut-off Saw with Vise and 4" Diamond Blades**

- 4" impregnated diamond blades are included
- Speed varies from 400 to 3250 rpm
- Flat saw table for easy trimming oversized slabs
- Max cutting depth is 25.4 mm
- Vise provided to handle the sample smoothly

SYJ-150



**Digital Low Speed Diamond Saw with 4" Precision Blades & Complete Accessories**

- Variable 0 - 600 rpm with LED digital display
- Cutting width range is from 1mm - 24mm by adjusting the LCD digital micrometer
- Max cutting depth is 55 mm when using 25 mm O.D blade flange
- Two angle adjustable sample holder is included

**ELECTRO SPINNING STATION**



| MSK-NFES-3LD   |
|--|
| <ul style="list-style-type: none"> <li>• Digital control for various features like rotating mandrel speed, spin duration, syringe pump flow rate etc</li> <li>• Rotating mandrel targets of varying diameters, stationary target provided with the system</li> <li>• System hood has features like exhaust fan, halogen lighting and transparent door for monitoring electrospinning process</li> <li>• Built-in ark protection circuit</li> <li>• Four syringe dispensing system</li> <li>• SS Plate with grounding facility</li> <li>• Stationary target dimension: 320 mm x 100 mm x 2 mm</li> <li>• Drum collector rotational speed: 300 - 4000 rpm</li> <li>• Microprocessor controlled BLDC motor with hall sensor feedback</li> <li>• Drum collector speed stability: +/-1%</li> <li>• Transparent glass windows on four sides for easily monitoring the electrospinning process</li> </ul> |

| MSK-NFES-4LD   |
|--|
| <ul style="list-style-type: none"> <li>• PC control for various features like rotating mandrel speed, spin duration, syringe pump flow rate etc</li> <li>• Rotating mandrel targets of varying diameters, stationary target provided with the system</li> <li>• System hood has features like exhaust fan, halogen lighting and transparent door for monitoring electrospinning process</li> <li>• Built-in ark protection circuit</li> <li>• Four syringe dispensing system</li> <li>• SS Plate with grounding facility</li> <li>• Stationary target dimension: 320 mm x 100 mm x 2 mm</li> <li>• Drum collector rotational speed: 300 - 4000 rpm</li> <li>• Microprocessor controlled BLDC motor with hall sensor feedback</li> <li>• Drum collector speed stability: +/-1%</li> <li>• Transparent glass windows on four sides for easily monitoring the electrospinning process</li> <li>• Centralized software control of almost all of the electrospinning parameters (laptop is included for immediate usage)</li> </ul> |

**SPRAY PYROLYSIS COATING**



| MSK-USP-02-LD  |
|--|
| <ul style="list-style-type: none"> <li>• Three Spray heads are included</li> <li>-Ultrasonic sprayhead: for thinner film coating</li> <li>-Compressive air spray : for thick film</li> <li>-20ml Syringe pump with compressive air</li> <li>• Dispensing unit capacity: 50ml &amp; 250ml ( two containers included )</li> <li>• Dispensing rate: 1-20ml / sec. adjustable via software.</li> <li>• One brand new laptop computer with pre-installed software is included for immediate use</li> <li>• Ultrasonic atomizer nozzle: 40 KHz, 130W</li> <li>• Producing a fine spray of droplets of 50 micron average size.</li> <li>• Sprayer traverse: X - Y 200 mm max.</li> <li>• Drive speed X axis (min-max): 10-800 mm / sec</li> <li>• Drive speed Y axis (min-max): 1-12 mm / sec</li> <li>• Substrate plate dimension: 150 X 150 mm</li> <li>• Max temperature: 500°C</li> <li>• PC connectivity: RS232 Port</li> <li>• One Compact air ompressor is included for immediate use</li> </ul> |

| MSK-USP-04-LD  |
|--|
| <ul style="list-style-type: none"> <li>• Three Spray heads are included</li> <li>-Ultrasonic spayhead: for thinner film coating</li> <li>-Compressive air spary : for thick film</li> <li>-20ml Syringe pump with compressive air</li> <li>• Dispensing unit capacity: 50ml &amp; 250ml ( two containers included )</li> <li>• Dispensing rate: 1-20ml / sec. adjustable via software.</li> <li>• One brand new laptop computer with pre-installed software is included for immediate use</li> <li>• Ultrasonic atomizer nozzle: 40 KHz, 130W</li> <li>• Producing a fine spray of droplets of 50 micron average size.</li> <li>• Sprayer traverse: X - Y 200 mm max.</li> <li>• Drive speed X axis (min-max): 10-800 mm / sec</li> <li>• Drive speed Y axis (min-max): 1-12 mm / sec</li> <li>• Substrate plate dimension: 150 X 150 mm</li> <li>• Max temperature: 500°C</li> <li>• PC connectivity: RS232 Port</li> <li>• One Compact air compressor is included for immediate use</li> <li>• Digital temperature controller with 7 segment programmable</li> </ul> |

**POLISHING MACHINE**

MTI's polishing machine can be used as a high precision lapping machine for polishing crystal components, semiconductor wafers and ceramic substrates. They also can be adopted as a standard grinding and polishing machine for preparing metallographic samples.



| Model            | Speed          | Description  |
|------------------|----------------|--|
| EQ-UNIPOL-300    | 0 - 160 rpm    | <ul style="list-style-type: none"> <li>One rubber polishing bowl with one 3" glass lapping plates, two 1" dia. sample holders are included</li> <li>Adjustable speed and time with analog control</li> </ul>   |
| EQ-UNIPOL-800-LD | 500 - 3000 rpm | <ul style="list-style-type: none"> <li>Coolant reservoir (top black) with valve and drain container (bottom black) are included for operating the machine anywhere</li> <li>Adjustable speed and time with analog control</li> </ul>   |
| EQ-UNIPOL-1210   | 50 - 600 rpm   | <ul style="list-style-type: none"> <li>12" Aluminum mater plate with magnetic pad and steel buffer sheet to make replace diamond plate and sand paper at easy</li> <li>Digital control panel with touch button operation and water resistance</li> </ul>   |
| EQ-UNIPOL-820    | 0 -600 rpm     | <ul style="list-style-type: none"> <li>Heavy duty grinding / polishing machine with two 8" lapping plates and independent speed control</li> <li>Upgraded magnetic plates were installed in the machine, which makes installing sand paper/ polishing pad quickly and easily</li> </ul>  |
| EQ-UNIPOL-810    | 80 - 600 rpm   | <ul style="list-style-type: none"> <li>Automatic slurry feeder can realize automatic dropping grinding lubricant</li> <li>Desk top installation, stepless speed adjustable, digital display rotary speed, convenient to operate</li> </ul>   |
| EQ-UNIPOL-802    | 0 - 125 rpm    | <ul style="list-style-type: none"> <li>Equipped with 8" super flat lapping plate and can be used as a high precision lapping machine for polishing crystal components, semiconductor wafers, and ceramic substrates up to 3" in diameter</li> </ul>  |
| EQ-UNIPOL-1000S  | 20-350 rpm     | <ul style="list-style-type: none"> <li>Adjustable pressing force for different polishing conditions and materials</li> <li>Multiple sample polishing if sample size less than 50mm in diameter with adjustable speed</li> </ul>  |
| EQ-UNIPOL-1202   | 0 - 125 rpm    | <ul style="list-style-type: none"> <li>Two super flat lapping plate with flatness &lt; 0.25 micron/inch<sup>2</sup>. One cast iron plate for lapping and one cast aluminum plate for polishing</li> <li>Two rocking work stations with wafer holders and condition rings, which can be controlled independently for polishing 2 pcs of 4" wafers in same time</li> </ul> |
| EQ-UNIPOL-160D   | 0 - 1500 rpm   | <ul style="list-style-type: none"> <li>Can lap and polish 4 pieces of maximum 2" wafers in double sides at same time, and achieves TTV less of one micron in 2" diameter area</li> <li>Adjustable speed analog control</li> </ul>  |
| EQ-UNIPOL-1502   | 0 - 80 rpm     | <ul style="list-style-type: none"> <li>Three rocking work stations with wafer holders and condition rings</li> <li>Can be controlled independently for polishing 3 pcs of 4" wafers or 9 pieces of 2" wafers in one running</li> </ul>   |

EQ-PF-2-1



Assembly

2" Polishing Fixture for Precision/ Automatic Thinning and Polishing

- 2" sample holder to take wafer or substrate up to 2"
- Thickness control screw fixture with resolution of 0.005 mm
- Two micrometers are included with resolution of +/- 1 micron
- Can fit with Unipol 801, Unipol 802 and any precision 8" polishing machine with York support

EQ-PF-4-1V



Assembly

4" Polishing Fixture with Vacuum Chuck for Faster Thinning and Polishing

- 4" sample holder vacuum chuck to take wafer or substrate up to 4"
- Vacuum chuck can suck wafer through vacuum pump without wax
- One digital micrometer is included with resolution of +/- 1 micron
- Can fit with Unipol 1202 and Unipol 1502 and any precision 12" or larger polishing machine with York support

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

VACUUM DESSICATOR

EQ-SP-VC-3



Vacuum-able Dessicator with Internal Pump

- 11 liter capacity with inside dimension of 320 W x 240 D x 260 H mm
- Delicate appearance with solid and rigid structure made of high intensity polycarbonate materials
- Dust, mildew, and moisture proof
- Can be operated without a power supply and design is free of fragile moisture absorption reading electronics

SCREEN PRINTING COATER

EQ-SPC-2



Desk-top Screen Printing Film Coater

- Dia. 150 mm sample stage
- One Vacuum Chuck & One 120 l/m Oilless Vacuum Pump are included for quick usage
- Screen frame adjusting: 20° adjustable
- Vacuumed area: 10 x 10 mm
- Max. 155 x 255 mm printing area

VACUUM GLOVE BOX

EQ-VGB-2Y



Bench top Transparent Glove Box with Pressure Control System

- Transparent polycarbonate main chamber casing with dimensions: 875(L)x480(W)x500(H) mm up to 675 Torr vacuum level
- Air-lock chamber with dimensions: 230(L)x220(W)x230(H) mm up to 100 Torr vacuum level
- One mechanical vacuum gauge and two solenoid valves are installed for pressure control
- Two needle valves for main chamber and air-lock chamber are installed for immediate use

FURNACE & GLOVE BOX ACCESSORIES

ADVANCED MATERIAL SCIENCE

EQ-TW-3A



Single Step Rotary Vane Vacuum Pump

- 187 liter/min
- Vacuum up to 0.075 Torr
- 1/2 HP 360 W
- 20 ml volume of oil
- Oil Mist Reduction Unit with KF-25 Adapter and Quick Clamp are included

EQ-2XZ



Double Stage Rotary Vane Vacuum Pump

- 120 liter/min
- Vacuum up to 0.004 Torr
- Traps particles up to 0.3 microns
- With Oil Trap, Exhaust Filter, Bellow & KF-D25 Inlet

EQ-YTP-550-LD



Heavy Duty Double Stage Rotary Vane Vacuum Pump

- 220 liter/min
- Vacuum up to 0.003 Torr
- 550 W (atm)
- With Exhaust Filter, KF25D Adaptor and Clamp

EQ-VPC-30D



Dual Valve Digital Vacuum & Pressure Gauge

- Range up to 800 Torr
- +/- 0.25% full-scale
- Measurement in: psia, psig, mm Hg, " Hg, " H20, mBar, Atm, Torr, kPa
- For clean, dry, noncorrosive and inert gas
- 1/8" NPT female connection

EQ-VPC-30



In-Line Digital Vacuum Pressure Controller

- Range up to 800 Torr
- +/- 0.25% full-scale
- Measurement in Torr
- For clean, dry, noncorrosive and inert gas
- 1/8" NPT female connection

EQ-OM-OS524E



Handheld Infrared Thermometer with Laser Pointer

- Measurement range from 538°C - 2482°C
- Built-in Laser sighting in Circle & Dot configurations
- 100 ms response time
- Spectral response within 2 to 2.5 microns

EQ-MTM-3



Three Channels Temperature Monitoring System

- Computerized via an RS232 comm port (cable included)
- Three buzzing alarms
- Accept K, S and B type of thermocouple
- Cut off power function when temperature exceeds the set point

EQ-MTS02













Temperature Control System for MTI Furnace via Computer

- Can be used for MTI furnaces with 518P controller except GSL-1100X-S, KSL-1200-S and OTF-1200X-S.
- One control module, serial port controller cable and one disc of software package are included



FURNACE & GLOVE BOX ACCESSORIES

|  |   |   |   |
|--|---|---|---|
| <p>GPH-DHDO</p>    | <p>EQ-MTC-C4</p>   | <p>EQ-MTC-A5</p>    | <p>EQ-MTC-Z3</p>   |
| <p>PPM Grade Dual Column Inert Gas Purifier</p> <ul style="list-style-type: none"> <li>• Built-in Regeneration Heater which can be heated up to 300°C</li> <li>• It removes H<sub>2</sub>O, O<sub>2</sub>, CO, CO<sub>2</sub>, H<sub>2</sub> and NMCH's to &lt;0.1 ppm from any 99.9% purity inert gas.</li> <li>• Max pressure up to 0.5 MPa</li> <li>• Max flow rate up to 400 mL/min</li> </ul> | <p>WK518P Temperature Control Unit</p> <ul style="list-style-type: none"> <li>• The controller uses PID via SCR power control with 30 segments programmable.</li> <li>• Designed for lab furnaces heated by resistant wire, SiC and MoSi<sub>2</sub> elements up to 1800°C at Max 4KW</li> <li>• Accept J, K, T, E, N, B, R and S thermocouple input</li> </ul> | <p>Single Zone Precision Temperature Control Unit</p> <ul style="list-style-type: none"> <li>• The controller uses PID via SCR power control with 30 segments programmable.</li> <li>• Designed for precision control high temperature furnace from 1000°C - 1500°C with heating elements of resistant wire or SiC</li> <li>• Accept K, S, R, J, B, C and D thermocouple input</li> </ul> | <p>Three Zone Precision Temperature Control System</p> <ul style="list-style-type: none"> <li>• The controller uses PID via SCR power control with 30 segments programmable.</li> <li>• Designed for precision control three zone tube furnace from 100°C - 1500°C with heating elements of resistant wire or SiC.</li> <li>• Accept K, S, R, J, B, C and D thermocouple input</li> </ul>     |
| <p>EQ-CGM-2F</p>    | <p>EQ-GSL-3F-SS</p>    | <p>EQ-W3000</p>   | <p>EQ-RH-800</p>   |
| <p>Two Channel Trace Gas Mixer</p> <ul style="list-style-type: none"> <li>• Two Flowmeter with flow rate range from 16 to 160 mL/min</li> <li>• Mechanical Pressure Gauge (mixing tank): 0 - 1.0 MPa, (0.02 MPa/grit)</li> <li>• Three Pipe fittings for 1/4" pipe (nylon or stainless steel)</li> <li>• No power required</li> </ul>  | <p>Gas Mixing Control Station</p> <ul style="list-style-type: none"> <li>• Three Channel Flowmeter and Valves are provided</li> <li>• To control up to 3 gases flowing through vacuum sealed MTI tube furnaces</li> <li>• Mechanical Pressure Gauge (mixing tank): -0.1-0.15 MPa, (0.01 MPa/grit)</li> </ul>  | <p>Trace Oxygen Analyzer</p> <ul style="list-style-type: none"> <li>• KF40 Connector is provided</li> <li>• Three auto-ranging scales available: 0.01 ppm to 3000 ppm</li> <li>• ZrO<sub>2</sub> fuel-cell as the oxygen sensor</li> <li>• Max pressure up to 90 psi</li> <li>• Up-limit and low-limit alarm signal programmable</li> </ul>   | <p>Precision Humidity Analyzer</p> <ul style="list-style-type: none"> <li>• KF25 Flange is provided</li> <li>• Measure humidity level up to 999.9 ppm</li> <li>• Working pressure range is 0.1 Pa - 30 MPa</li> <li>• Gas flow rate range is 1-5 lpm</li> <li>• Alarm signal when higher than 20 mA or lower than 4 mA</li> </ul>   |
| <p>EQ-RH-606B</p>   | <p>Humidity &amp; Temperature Monitor</p> <ul style="list-style-type: none"> <li>• Alarm can be set based on requirement</li> <li>• Detachable Probe and KF25 feedthrough are provided</li> <li>• Temperature range: 0°C-80°C</li> <li>• Humidity range: 2%RH to 95%RH</li> <li>• Accuracy: ±3%RH</li> <li>• Sensor cable length: 3 meters</li> </ul>           | <p>EQ-GD-01</p>    | <p>Laboratory Gas Drying Unit</p> <ul style="list-style-type: none"> <li>• Max working pressure: 90 psig</li> <li>• Max efficiency at 0.1 scfm</li> <li>• 50 grams of water capacity</li> <li>• Inlet and outlet connectors are SS 1/8" NPT female fittings with molded polycarbonate column.</li> <li>• Indicating dessicant turns blue when active and turns pink when exhausted</li> </ul> |

LABORATORY

MSK-SFM-1



MSK-SFM-2



SFM-12M

MSK-SFM-3



MSK-SFM-5 MSK-

MSK-SFM-8



| Model        | Speed (rpm)                                 | Dimension        | Features  |
|--------------|---|------------------|---|
| MSK-SFM-1    | Main plate: 30 -350<br>Mixing tank: 0 - 300 | 450 x 490 x 530  | <ul style="list-style-type: none"> <li>Granularity can be as small as 0.1 micron</li> <li>Digital display speed in rpm</li> <li>Timer controls major platen's running time from 1 - 999 min</li> <li>Timer control tank rotation time from clockwise to anticlockwise direction from 1 - 99 min</li> <li>4 alumina jars with various size of YSZ mill balls are included</li> </ul>   |
| MSK-SFM-2    | Main plate: 0 -100<br>Mixing tank: 60 - 700 | 450 x 490 x 530  | <ul style="list-style-type: none"> <li>Granularity can be as smaller than 0.5 micron</li> <li>Three dimensions rotation: major platen, individual tank and up-down gravity</li> <li>Digital display the speed of tank rotation in rpm</li> <li>Running time can be set from 1 - 999 min</li> <li>Four 1000 ml nylon jars, water-proof by rubber O-ring are included</li> <li>Four sets of agate milling balls included (96 balls in total)</li> </ul> |
| MSK-SFM-3    | 1200  | 405 x 365 x 260  | <ul style="list-style-type: none"> <li>Granularity can be as small as 0.1 micron</li> <li>Timing range from 0 - 120 min</li> <li>One 50 ml alumina jar with one set Zirconia mill balls are included</li> </ul>   |
| MSK-SFM-5    | 0 - 1200                                    | 700 x 600 x 1100 | <ul style="list-style-type: none"> <li>Granularity can be as small as 1 micron</li> <li>5 liter stainless steel container with water cooling jacket</li> <li>Programmable controller to set time, speed and rotation direction</li> </ul>   |
| MSK-SFM-7    | 320   | 330 x 300 x 530  | <ul style="list-style-type: none"> <li>To produce coating slurry by mixing small batch of chemical and compound under vacuum to remove gas bubble and protect sample from oxidation</li> <li>Built in vacuum pump with -0.08 - 0.09 MPa</li> <li>Vibration plate frequency at 1 kHz</li> <li>One 150 ml stainless steel and one 500 ml aluminum container are included</li> </ul>   |
| MSK-SFM-8    | Mortar: 0 -10<br>Pestle: 0 - 80             | 240 x 240 x 500  | <ul style="list-style-type: none"> <li>Granularity can be as small as nanometers</li> <li>5" agate mortar and agate head pestle</li> <li>Grinding pressure is adjusted by spring</li> <li>Grinding time can be set according to using the automated Controller</li> </ul>   |
| MSK-SFM- 12M | 2700 - 4000                                 | 170 x 210 x 135  | <ul style="list-style-type: none"> <li>3 x 2.0ml tube can be loaded on the device simultaneously</li> <li>Timer can be set within 3 sec to 3 min</li> <li>Two types of Pure High Impact Zirconia Beads are included for rapid milling</li> <li>The optimized mixing motion causes rapid milling through constant high velocity impact from the hardened micro-beads chosen</li> </ul>   |

## PLASMA CLEANER

Compact, benchtop units • Inductively coupled plasma • Valve assembly to control gas flow Hinged door with viewing window • Active fan cooling • Quick setup and easy to use



### BASIC PLASMA CLEANER

PDC-32G (115V) | PDC-32G-2 (230V)

A compact, inexpensive benchtop plasma instrument with a redesigned hinged door and viewing window, active fan cooling and improved metering valve, suitable for nanoscale surface cleaning and activation of small samples.

3" Dia. x 6.5" L Chamber 18 W  
Maximum RF Power 13 Lbs., 9" H x 10" W x 8" D



### EXPANDED PLASMA CLEANER

PDC-001 (115V) | PDC-002 (230V)

Our Expanded Plasma Cleaner is a larger benchtop plasma instrument with four times the capacity of the Basic Plasma Cleaner, extensively used for nanoscale surface cleaning and surface activation.

6" Dia. x 6.5" L Chamber 30 W  
Maximum RF Power 37 Lbs., 11" H x 18" W x 9" D



### HIGH POWER EXPANDED PLASMA CLEANER

PDC-001-HP (115V) | PDC-002-HP (230V)

With twice the cleaning rate as the Expanded Plasma Cleaner, the High Power Expanded Plasma Cleaner is a versatile instrument, suitable for etching organic thin films (10-100 nm) as well as surface activation and modification.

6" Dia. x 6.5" L Chamber 45 W  
Maximum RF Power 37 Lbs., 11" H x 18" W x 9" D

## REQUIREMENTS & ACCESSORIES

### MINIMAL REQUIREMENTS

- Gas-compatible vacuum pump with 23 L/min minimum pump speed and ≤ 200 mTorr ultimate total pressure

### OPTIONAL ACCESSORIES

- Quartz Chambers
- Quartz and Pyrex Sample Trays
- PlasmaFlo Gas Flow Mixer
- Vacuum Gauge and Digital Meter

### OIL-BASED VACUUM PUMPS

PDC-VP/VP-2 | PDC-VPE/VPE-2

- Use hydrocarbon pump oil
- Compatible with air and inert gases (Ar, N<sub>2</sub>), but NOT with O<sub>2</sub> gas

### OXYGEN SERVICE PUMPS

PDC-OPD/OPD-2 | PDC-OPE/OPE-2 | PDC-OPF/OPF-2

- Required to avoid hazardous combination of O<sub>2</sub> with hydrocarbon oil in oil-based pumps
- Compatible with O<sub>2</sub>, air, and inert gases (Ar, N<sub>2</sub>)
- Fomblin-based pump (PDC-OPF/OPF-2) uses Fomblin fluid instead of hydrocarbon oil
- Dry oxygen service pumps (PDC-OPD/OPD-2, PDC-OPE/OPE-2) use no oil or fluid
- No risk of oil contamination into chamber
- Beneficial even if not using O<sub>2</sub> but require a clean system for plasma processing



### VACUUM GAUGE & DIGITAL METER

PDC-VCG/VCG-2

- Vacuum gauge and digital meter as a stand-alone accessory
- Digital meter displays pressure range of 1 mTorr to 760 Torr
- Monitoring vacuum pressure is beneficial for process repeatability and consistency

### PLASMAFLO

PDC-FMG/FMG-2

- More precise, quantitative control of gas flowrate and monitoring of vacuum pressure to ensure process consistency
- Digital meter displays pressure range of 1 mTorr to 760 Torr

## CONTACT ANGLE GONIOMETER/ TENSIO METER

A contact angle can be measured by producing a drop of liquid on a solid. The angle formed between the solid/liquid interface and the liquid/vapor interface is referred to as the contact angle.



**BASIC**  
90



**STANDARD**  
210, 250G/T, 260 G/T EC  
290 AUTOMATE, 400W



**ADVANCE**  
500, 590

### RAMEHART PRODUCT MATRIX

|  | MODEL<br>90 | MODEL<br>210 | MODEL<br>250 | MODEL<br>260 | MODEL<br>290 | MODEL<br>400 | MODEL<br>500 | MODEL<br>590 |
|--|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Measures Contact Angle   | OK          | OK           | OK           | OK           | OK           | OK           | OK           | OK           |
| Measures Surface Energy (using suite of 7 SE tools)*   | OK          | OK           | OK           | OK           | OK           | OK           | OK           | OK           |
| Measures Surface Tension and Interfacial Tension*  | OK          | OK           | OK           | OK           | OK           | OK           | OK           | OK           |
| SuperSpeed Digital Camera Series   | U3          | U1           | U1           | U1           | U1           | U1           | U1           | U1           |
| Goniometer (G) or Goniometer / Tensiometer (G/T)   | G/T*        | G/T          | G/T          | G/T          | G/T          | G/T          | G/T          | G/T          |
| Edition of DROPimage: CA, Pro, or ADV (Advanced)   | CA/<br>PRO* | PRO          | ADV          | ADV          | ADV          | PRO          | ADV          | ADV          |
| System includes PC & LCD   |             | OK           | OK           | OK           | OK           | OK           | OK           | OK           |
| Supports U2 Series 750 FPS SuperSpeed Upgrade Kit (p/n 100-12-U2)  |             |              | OK           | OK           | OK           |              | OK           | OK           |
| 16" or 21" Optical Bench   | 16"         | 16"          | 16"          | 16"          | 16"          | 21"          | 21"          | 21"          |
| <u>Supports Manual Tilting Base</u>  |             | OK           | OK           | OK           | n/a          | OK           | OK           | n/a          |
| <u>Supports Automated Tilting Base</u>   |             | †            | OK           | OK           | Std          |              |              | Std          |
| Standard Precision Locking Leveling Leveling Stage (supports 2 lbs)  | OK          | OK           | OK           |              |              | OK           | OK           |              |
| Advanced Precision Graduated Heavy Duty 3-Axis Stage with fine and course vertical adjustment and Leveling (supports 20 lbs) |             |              |              | OK           | OK           |              |              | OK           |
| Includes Manual Microsyringe Dispensing  | OK          | OK           | OK           | OK           | OK           | OK           | OK           | OK           |
| <u>Supports optional Automated Dispensing System</u>   | OK          | OK           | OK           | OK           | Std          | OK           | OK           | Std          |
| <u>Supports optional Oscillator</u>  |             | †            | OK           | OK           | OK           | †            | OK           | OK           |
| <u>Supports Peltier Environmental Chamber</u>  | OK          | OK           | OK           | OK           | OK           | OK           | OK           | OK           |
| <u>Supports Environmental Fixture</u>  | OK          | OK           | OK           | OK           | OK           | OK           | OK           | OK           |
| <u>Supports Environmental Chamber</u>  |             |              |              | OK           |              |              | OK           | OK           |
| <u>Supports Heated Environmental Cell</u>  | OK          | OK           | OK           | OK           | OK           | OK           | OK           | OK           |
| <u>Supports Hot Plate</u>  | OK          | OK           | OK           | OK           | OK           | OK           | OK           | OK           |
| <u>Supports Advanced Chamber</u>   |             |              |              |              |              |              | OK           | OK           |
| Supports all modular accessories   |             |              |              |              |              |              | OK           | OK           |
| Maximum Wafer Support (diameter)   |             | 4"           | 4"           | 4"           | 4"           | 12" ♦        | 12"          | 12"          |
| <u>Supports Vacuum Chuck 6" or 8"</u>  |             |              |              |              |              | OK           | OK           | OK           |
| Includes 1-year Parts and Labor Warranty and Priority Software Support   | OK          | OK           | OK           | OK           | OK           | OK           | OK           | OK           |
| Halogen Fiber Optic Illuminator  | LED^        | OK           | OK           | OK           | OK           | OK           | OK           | OK           |
| Available in 115V and 230V   | OK          | OK           | OK           | OK           | OK           | OK           | OK           | OK           |

\* - Model 90 Base Edition would require a software upgrade; Model 90 Pro Edition (and all other models) can measure contact angle, surface energy, surface tension, and interfacial tension.

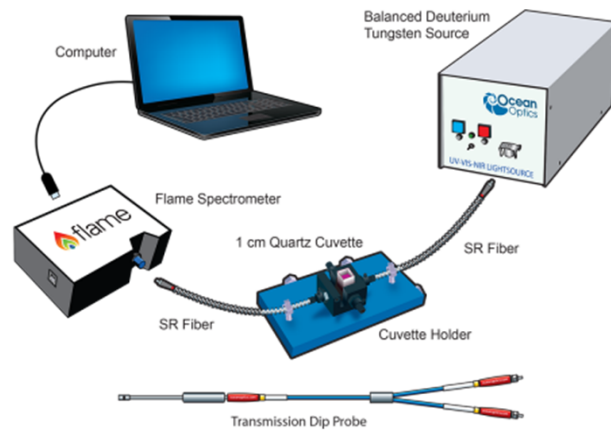
† - requires software upgrade

^ - Model 90 includes LED backlight but there is an upgrade option that will replace the LED with the Fiber Optic Illuminator (p/n 90-FOI)

♦ - Model 400 includes an 8" Wafer Support but supports up to 12".

MODULAR SPECTROMETER

Ocean Optics customers choose our spectrometers and accessories for their spectroscopy applications. Everyday scientists and researchers, manufacturers, farmers, food and beverage producers and medical professionals use the power of spectroscopy to fuel their analysis. From protein analysis to semiconductor processing and solar energy research, Ocean Optics provides the technology and spectroscopy applications know-how to help you solve measurement challenges. We collaborate with bold, passionate innovators who believe in the power of spectroscopy to improve the quality of life Available from 165 to 1100 nm



UV-VIS

A UV/Vis spectroscopy encompasses a broad range of applications including absorbance/transmittance, reflection, irradiance, fluorescence, colour measurements and much much more. These compact Ocean Optics spectrometers are portable, intuitive to use, with a comprehensive range to suit your every need. Use the comparison chart or the interactive product search utility to help get you started today.

For absorbance, irradiance, reflectance, fluorescence

VERSATILE



USB 2000



USB 4000



FLAM

| Parameter          | USB2000+     |
|--------------------|--------------|
| Select Range       | 200-1100nm   |
| Detector           | Sony ILX511B |
| Integration Time   | 1 ms to 65 s |
| A/D Converter      | 14 bit, 2MHz |
| Dynamic Range      | 1300:1       |
| S/N                | 250:1        |
| Optical Resolution | ~0.3-10.0 nm |
| Resolution         | FWHWHM       |

**USB400:** Detector: Toshiba TCD1304AP linear, **Optical Resolution:** ~1.5 nm FWHM, S/N: 300:1

For laser characterization, atomic emission line analysis

HIGH RESOLUTION



HR SERIES

| Parameter          | HR2000+       |
|--------------------|---------------|
| Spectral Range     | 200-1100nm    |
| Detector           | Sony ILX511   |
| Integration Time   | 1ms – 20s     |
| A/D Converter      | 14 bit, 2MHz  |
| Dynamic Range      | 1300:1        |
| S/N                | 250:1         |
| Optical Resolution | ~0.035-6.8 nm |
| Resolution         | FWHM          |

**HR 400:** Detector: Toshiba TCD1304AP linear, **Optical Resolution:** ~0.02-8.4 nm FWHM, S/N: 300:1

HIGH SENSITIVITY

For low-light level applications including Fluorescence, Raman, DNA sequencing Astronomy & Thin-film



QE SERIES



MAYA

| Parameter      | Maya2000                       | QE65000               |
|----------------|--------------------------------|-----------------------|
| Spectral Range | 200-1100 nm deep UV (<190 nm)  | 200-1100 nm           |
| Detector       | Hamamats u S9840               | Hamamats u S7031-1006 |
| Integrate Time | 5ms – 20s                      | 8ms – 1500s           |
| A/D Con.       | 16 bit, 500KHz                 | 16 bit, 150KHz        |
| Dynamic Range  | Spec 5000:1<br>Typical 8000:1+ | 25000:1               |
| S/N            | 350:1                          | 1000:1                |

For NIR applications Agriculture, Chemical analysis, Materials science, 900 -2500nm

VERSATILE



NIR SERIES



FLAM NIR SERIES

- TE Cooled down to -20°C
- Internal shutter option
- Interchangeable entrance slit Applications
- Absorbance
- Reflectance & Transmittance
- Moisture content
- Polymer sorting

NIRQuest512 (900-1700 nm), NIRQuest512-1.9 (1100-1900 nm), NIRQuest512-2.2(900-2200 nm), NIRQuest512-2.5 (900-2500 nm), NIRQuest256-2.1 (900-2050 nm), NIRQuest256-2.5 (900-2500 nm), and custom configurations from 900-2500 nm

## SPECIAL MODEL

### Keywords HDX- HIGH DEFINITION

- High resolution
- Low stray light
- High throughput

#### Techniques

- Absorbance
- Fluorescence
- Emission



|                  |  |
|------------------|--|
| Range:           | 200-925 nm                             |
| SNR              | 400:1 (at full signal)                 |
| Dynamic range    | 12,000:1 for a single acquisition      |
| Integration time | 6 μs to 10 seconds                     |
| Stray light      | >3AU                                   |
| Throughput       | f/4 cone on detector with 300 μm fiber |

#### Applications

- Biomolecule quantification
- Plasma monitoring
- Thin film characterization

### Experiment Possibilities

Absorbance / Emission /  
Fluorescence / pH Measurement /  
Color measurement



|                      |                         |
|----------------------|-------------------------|
| STS-VIS-L-25-400-SMA | 350-800nm               |
| ECO-VIS              | light source 400-2500nm |
| P400-1-VIS-NIR       | 400 μm cord, 1 m length |
| CVD-UV1S-SAM         | 8 of plastic cuvettes   |
| PH-BCG-TRANS-CUV     | pH Patches Cuvettes (3) |
| EDU-CUV-DARK         | Dark reference          |
| CC-3                 | Cosine corrector        |
| OCEANVIEW            | Spectroscopy software   |
| STARGAGE CASE        | Rugged case             |

### EDUCATION KIT

### STS-VIS Microspectrometer Kit

The Jaz spectrometer is a handheld analytical instrument that combines low-power optical sensing and onboard computing

### JAS MOBILE



|                    |   |
|--------------------|---|
| Size (LWH)         | 109 mm x 64 mm x 57 mm                      |
| Weigh              | 352 g                                       |
| Range:             | within 200-1100 nm                          |
| SNR                | 250:1 (at full signal)                      |
| Dynamic range      | 1300:1 for a single acquisition             |
| Integration time   | 870 μs to 65 seconds (20 s typical maximum) |
| Optical resolution | ~0.3-10.0 nm FWHM                           |

Speed up to 4,500 scans per second For UV-Vis helps with **food sorting and processing; biomedical sciences**, especially for absorbance measurements requiring enhanced UV sensitivity; **rapid events measurements and security and authenticity**,

### FAST AQUISITION

|                       |   |
|-----------------------|---|
| Detector:             | CMOS detector   |
| Preconfigured models: | UV-Vis (200-850 nm), Vis-NIR (350-1000 nm) and extended-range (200-1025 nm) |
| Signal-to-noise ratio | 290:1   |
| Dynamic range         | 5,000:1   |
| Integration time:     | 10 μs-10 seconds  |
| Scan rate (maximum):  | 4,500 scans/second  |



### FX SERIES

## RAMAN SPECTROSCOPY

### RAMAN SPECTROSCOPY

Raman spectroscopy is a powerful technique that provides information about vibrational and rotational transitions in molecules that can be used for detailed chemical analysis of solids, powders, liquids, and gases. This fast and non-destructive measurement technique can be applied to a wide range of applications including fundamental research, routine process control and materials identification.

### WHAT ARE THE MAIN APPLICATIONS?

- Materials identification
- Nanotechnology
- Mineralogy/geology



Maya2000 Pro (Custom)  
HIGH SENSITIVITY SPECTROMETER



Ventana-785-Raman  
HIGH-SENSITIVITY SPECTROMETER FOR RAMAN MEASUREMENTS



QE Pro-Raman  
HIGH-SENSITIVITY SPECTROMETER FOR RAMAN



Ventana-532-Raman  
HIGH-SENSITIVITY SPECTROMETER FOR RAMAN MEASUREMENTS



Maya2000 Pro-NIR  
HIGH-SENSITIVITY SPECTROMETER FOR RAMAN AND NIR APPLICATIONS



Ventana-785L Raman  
HIGH-SENSITIVITY SPECTROMETER FOR RAMAN MEASUREMENTS

LIGHT SOURCES



| Type  | Product                | Range                                   | Output               | Measure Type  |
|---|------------------------|---|----------------------|---|
| <b>Deuterium Tungsten Halogen</b>           | DH-2000-BAL<br>DH-2000 | ~230-2000 nm                            | Continuous           | Absorbance, Fluorescence, Reflectance, Transmission |
| <b>Miniature Deuterium Tungsten Halogen</b> | DT-MINI                | ~200-2500 nm                            | Continuous           | Absorbance, Fluorescence, Reflectance, Transmission |
| <b>Xenon</b>                                | PX-2<br>HPX-2000       | ~220-750 nm<br>185-2000nm               | Pulsed<br>Continuous | Absorbance, Fluorescence, Reflectance, Transmission |
| <b>Tungsten Halogen</b>                     | HL-2000                | ~360-2400 nm                            | Continuous           | Absorbance, Reflectance, Transmission               |
| <b>Raman light sources</b>                  | LASER 532<br>LASER 785 | 532 nm and 785 nm excitation lasers use | Continuous           | Raman   |

FIBER OPTICS & PROBE

Patch Cord Assemblies



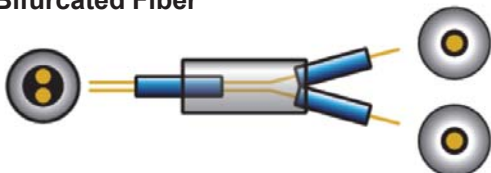
Our standard, premium-grade options are stainless steel BX (top drawing) or silicone monocoil jacketing and PVDF.

Round to Keyed Linear Fiber



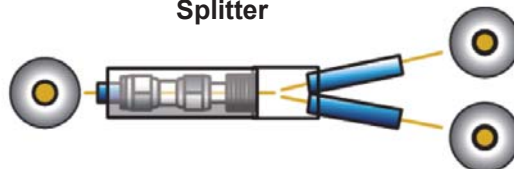
At one end of this seven-fiber assembly, the fibers are aligned linearly to more efficiently direct light into the optical bench and onto the detector. The collection end of the fiber has a six fibers-around-one design.

Bifurcated Fiber



Bifurcated assemblies have two fibers side-by-side in the common end and break out into two legs at the other end. Each leg can be UV-VIS or VIS-NIR or mixed.

Splitter



A splitter comprises three fibers – two fibers at one end that deliver light into the third fiber at the common end. All the fibers are epoxied together at the nexus of the assembly.

Transmission Dip Probe



We offer several versions of this standard two-fiber transmission probe, designed for immersion in process streams and solutions. Various pathlength tips are available.

Premium Reflection Probe



Our standard reflection probe arrangement has seven optical fibers – six illumination fibers around one read fiber – in a stainless steel ferrule. Additional configurations are available.

SAMPLE HANDELING

Absorbance and Transmission

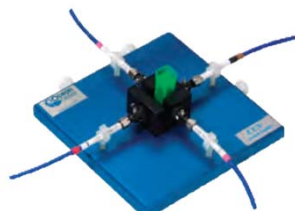


1-cm Cuvette Holder

10-cm Cuvette Holder

Longpass Flow Cells

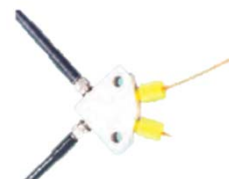
Cuvettes



4-way Cuvette



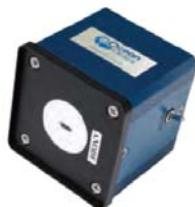
Linear Variable Filters



Flow Cells



Cosine Correctors



LED Power Supply



Integrating Spheres



Collimating Lenses



Diffuse Reflectance Standards



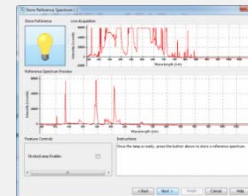
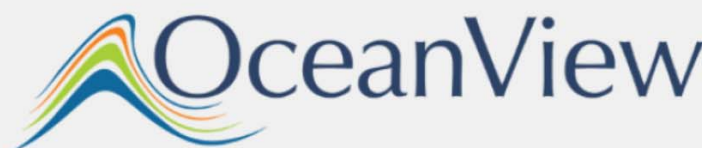
Integrating



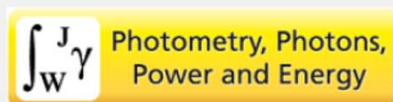
Reflection Stage

OCEANVIEW SOFTWARE

Once you have installed your software and connected your spectrometer, you are ready start using OceanView



Set up a Spectroscopy Application with our Spectroscopy Wizards





## MODEL

Raman analysis is nondestructive, requires very limited sample preparation, and allows for sample volumes in the micro liter range. In fact, Raman techniques can be used to acquire data through vial walls, pill pack windows and bags- packaging forms that are frequently used in the biomedical and pharmaceutical industries.



| Specification                                 | PinPointer  | PEK-785     | Pro-785          | Pro-785E                                    | Pro-532          |
|---|---|-------------|------------------|---|------------------|
| <b>Excitation Wavelength (nm)</b>             | 785   | 785         | 785              | 785   | 532              |
| <b>Laser Power (mW)</b>                       | 5 to 300  | 5 to 300    | 5 to 300         | 5 to 300                                    | 10               |
| <b>Raman Spectral Range (cm<sup>-1</sup>)</b> | 200 to 3000   | 200 to 3000 | 200 to 2000      | 200 to 3900                                 | 200 to 4500      |
| <b>Spectral Resolution (cm<sup>-1</sup>)</b>  | ~12   | ~12         | ~6               | ~10   | ~10              |
| <b>Raman Shift Stability</b>                  | < in 12 hours   |             |                  |   |                  |
| <b>Photometric Stability</b>                  | < 4% in 12 hours                                      |             | < 4% in 12 hours |   | < 1% in 12 hours |
| <b>Optics</b>                                 | NA = 0.28, working distance = 5 mm spot size < 0.2 mm |             |                  | NA = 0.28, sample spot size = 0.1 to 0.3 mm |                  |
| <b>Power</b>                                  | >4 hr charge  |             |                  |   |                  |
| <b>Size (cm)</b>                              | 21.5x.11x64   |             |                  | 36x29x11                                    |                  |
| <b>Weight</b>                                 | 3lb(1.4kg)  |             |                  | < 8 lb ( 3.6 Kg)                            |                  |
| <b>Operating Temperature</b>                  | -25 °C to 70 °C                                       |             |                  | -25 °C to 45 °C                             |                  |

## SOFTWARE

### RSIQ™ (included)

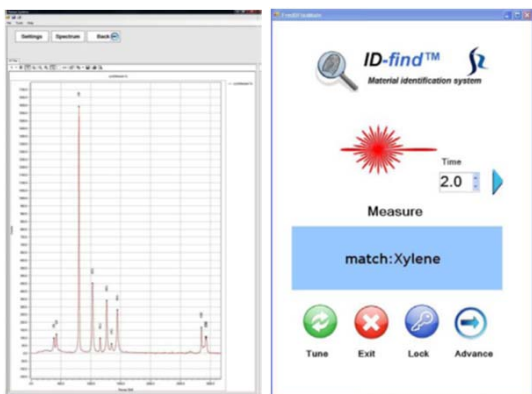
#### Raman Spectroscopy Software Spectral Acquisition and Display

- User-friendly interface, routine analysis
- One-touch data acquisition
- Two data formats: SPC and ASCII
- Easy instrument verification
- Spectral smoothing & peak labeling

### RSIQ-QUAL (sold separately)

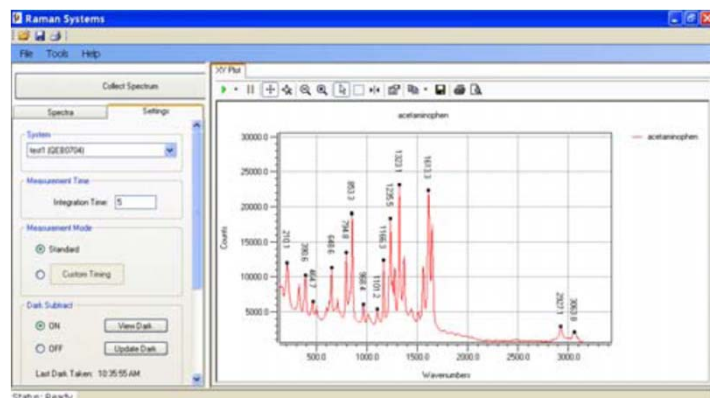
#### Simplified User Interface for Routine Material-ID

- Database matching and reporting
- Build unique spectral database
- Calculation of search "hit quality"
- Commercial database with over 8000 materials (sold separately)



#### ID-find™ for PinPointer Simplified User Interface for Routine Material-ID

- Easy to use GUI for the non-expert
- One-touch data acquisition
- Build a unique spectral database
- Add a commercial spectral database with thousands of materials



#### Add-on Options

- RSIQ-QUANT  
*multivariate analysis tool*
- RSIQ-CFR  
*supports 21 CFR Part 11*

FIA Flow Injection Analysis

FIALab Instruments is a leading manufacturer of *flow injection analysis* (FIA) and sequential injection analysis (SIA) instrumentation. These instruments are used to automate and streamline many liquid-handling procedures. Our instruments are mostly used for environmental and agricultural analysis. However, research departments and industries ranging from fertilizer to semiconductor manufacturing have found our instruments vital to their operations. Other applications include on-line process monitoring and sensor development.

For agricultural, it will analyzes soil, plant tissue, manure samples, and other substances related to the growing of crops. These include nutrients like: nitrate, phosphate, ammonia, and other soil fertility indicators such as sulfate and chloride. For environmental, the FIAlyzer-1000 analyzes a wide variety of nutrients and toxic substances in runoff, drinking water, and wastewater.



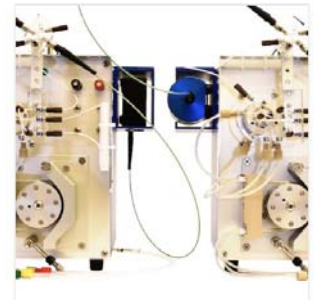
FIAlyzer-1000



FIAlyzer 2000



FLEX

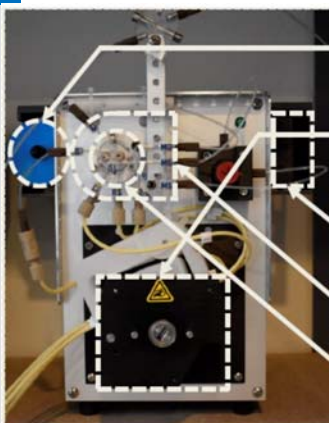


Multi-Channel

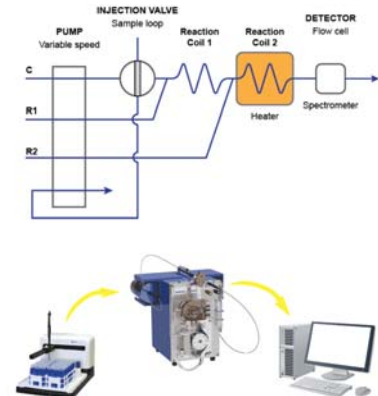
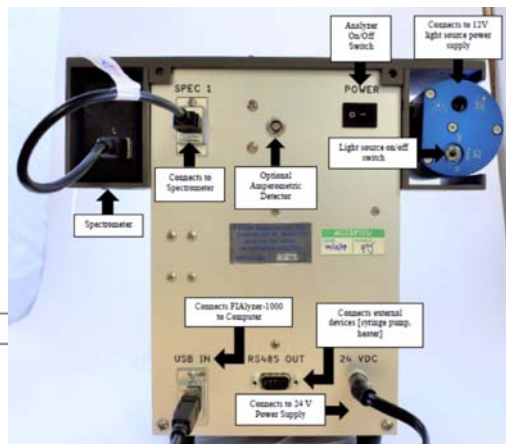
Feature

|                            | FIA1000  | FIA1 2000  |
|----------------------------|--|--|
| <b>Analyzer</b>            | Type: Single Channel Flow Injection Analyzer   | Type: Two-Channel Flow Injection Analyzer  |
| <b>Enclosure material:</b> | Aluminum (powder-coated / anodized)  | Aluminum (powder-coated / anodized)  |
| <b>Peristaltic Pump</b>    | Type: 4-channel peristaltic, common pressure plate   | Type: 10-channel peristaltic, common pressure plate  |
| <b>Materials:</b>          | Aluminum, stainless steel  | Aluminum, stainless steel  |
| <b>Tubing type:</b>        | 2-stop elastic tubing (Tygon, Pharmed etc)   | 2-stop elastic tubing (Tygon, Pharmed etc)   |
| <b>Flow rate:</b>          | 0.5-5.0 mL/min per channel (1.02 mm ID tubing)<br>0.3-2.8 mL/min per channel (0.76 mm ID tubing)<br>Valve                    | 0.5-5.0 mL/min per channel (1.02 mm ID tubing) 0.3-2.8 mL/min per channel (0.76 mm ID tubing)  |
| <b>Valve</b>               | Type: 6-port; Two Position Injection Valve<br>Wetted materials: Plexiglas, Valcon E2 (proprietary reinforced PTFE composite) | Type: 12-port; Two Position Injection Valve<br><u>Wetted materials: Plexiglas, Valcon E2 (proprietary reinforced PTFE composite)</u> |
| <b>Port type:</b>          | Flat-bottom ¼-28   | Flat-bottom 1/4-28 Relay output Voltage: 24 V Current: Max 4mA   |
| <b>Dimensions</b>          | H(24 cm) x W(15 cm) x D(24 cm)   | H (29cm)xW(18cm)xD(24cm)   |
| <b>Weight:</b>             | 9 lb (4 kg)  | 18 lb (8 kg)   |
| <b>Communication</b>       | <u>Input: USB</u>  | <u>Input: USB</u>  |
| <b>Output:</b>             | none   | none   |
| <b>Control options:</b>    | FIAsoft software   | FIAsoft software   |
| <b>Power requirements</b>  | <u>Voltage: 24 Vdc / Current: Max. 2.5 A</u>   | <u>Voltage: 24 Vdc / Current: Max. 2.5 A</u>   |

MODULAR SPECTROSCOPY



- Light source
- Peristaltic Pump
- Spectrometer
- Lab on Valve [LOV]
- Valve



SIA Sequential Injection Analysis

FIALab's Sequential Injection instruments are the ultimate solution for automated liquid handling. Built with high-precision pumps and valves, and backed by decades of expertise in the field of fluidic engineering, they are the perfect choice for applications in microfluidics or any other type of fluid manipulation.

Our Sequential Injection devices have been used to address an extremely wide variety of needs such as:

- traditional wet chemistry colorimetric assays
- radiochemical separations and analyses
- sample pretreatment for HPLC and mass spectrometry (dilution, derivatization, preconcentration, interference removal)
- detection of bacterial infestation in raw water input reservoirs
- color monitoring in textile dyeing baths
- on-line surfactant measurements for semiconductor processing



|                            | Micro SIA  | ProSIA (FIALab-3200)  | OmniSIA (FIALab-3500)\   |
|----------------------------|--|---|--|
| <b>Analyzer</b>            | <u>Type: Sequential Injection Analyzer</u>   | <u>Type: Sequential Injection Analyzer</u>  | <u>Type: Sequential Injection Analyzer</u>   |
| <b>Enclosure material:</b> | <u>Enclosure material: Aluminum (powder-coated / anodized)</u>   | <u>Enclosure material: Aluminum (powder-coated / anodized)</u>  | <u>Enclosure material: Aluminum (powder-coated / anodized)</u>   |
| <b>Peristaltic Pump</b>    |  | <u>Type: 2-channel peristaltic, common pressure plate</u>   | <u>Type: 4-channel peristaltic, common pressure plate</u>  |
| <b>Materials:</b>          |  | <u>Materials: Delrin, stainless steel</u>   | <u>Materials: Aluminum, stainless steel</u>  |
| <b>Tubing type:</b>        |  | <u>Tubing type: Bioprene</u>  | <u>Tubing type: 2-stop elastic tubing</u>  |
| <b>Flow rate:</b>          |  | <u>Flow rate: 0.5-2.0 mL/min per channel (1.0 mm ID tubing) 2.0-8.0 mL/min per channel (2.0 mm ID tubing)</u>                                 | <u>Flow rate: 0.5-5.0 mL/min per channel (1.02 mm ID tubing)</u>   |
|                            |  |   | <u>0.3-2.8 mL/min per channel (0.76 mm ID tubing)</u>  |
| <b>Syringe Pumps</b>       | <u>Type: High-precision syringe pump</u>   | <u>Type: XCalibur High-precision syringe pump</u>   | <u>Type: High-precision syringe pump</u>   |
|                            | <u>Wetted materials: Glass, Teflon®, PCTFE</u>   | <u>Wetted materials: Glass, Teflon®, PCTFE</u>  | <u>Wetted materials: Glass, Teflon®, PCTFE</u>   |
|                            | <u>Syringe sizes: 50 µL, 100 µL, 250 µL, 500 µL, 1.0 mL, 2.5 mL and 5.0 mL</u>   | <u>Syringe sizes: 50 µL, 100 µL, 250 µL, 500 µL, 1.0 mL, 2.5 mL, and 5.0 mL</u>   | <u>Syringe sizes: 50 µL, 100 µL, 250 µL, 500 µL, 1.0 mL, 2.5 mL, 5.0 mL, 10 mL, and 25 mL</u>  |
|                            | <u>Resolution: 24,000 steps per full stroke</u>  | <u>Resolution: 24,000 steps per full stroke</u>   | <u>Resolution 48,000 steps per full stroke</u>   |
|                            | <u>Speed: 1.2 sec – 20 min per full stroke</u>   | <u>Speed: 1.2 sec – 20 min per full stroke</u>  | <u>Speed: 1.2 sec – 20 min per full stroke</u>   |
|                            |  | <u>Port type: Flat-bottom ¼-28</u>  | <u>Port type: Flat-bottom ¼-28</u>   |
| <b>Valve</b>               | <u>Type: 8-port multiposition selector valve. 6-port and 10-port also available. Optional Lab on valve® manifold for 6- and 8-port valves.</u>   | <u>Type: 8-port multiposition selector valve. 6-port and 10-port also available. Optional Lab on Valve® manifold for 6- and 8-port valves</u> | <u>Type: 8-port multiposition selector valve. 6-port and 10-port also available. Optional Lab on Valve® manifold for 6- and 8-port valves.</u>   |
| <b>Wetted materials:</b>   | <u>Wetted materials: PPS, Valcon E2 (proprietary reinforced PTFE composite). In the case of Lab on valve® manifold also Ultem® or Plexiglas.</u> | <u>PPS, Valcon E2 (proprietary reinforced PTFE composite). In the case of Lab on Valve® manifold also Ultem® or Plexiglas</u>                 | <u>Wetted materials: PPS, Valcon E2 (proprietary reinforced PTFE composite). In the case of Lab on Valve® manifold also Ultem® or Plexiglas.</u> |
| <b>Port type:</b>          | <u>Port type: Flat-bottom 1/4-28</u>   | <u>Flat-bottom ¼-28</u>   | <u>Port type: Flat-bottom ¼-28</u>   |
| <b>Dimensions</b>          | <u>H (18cm)xW(13cm)xD(18cm)</u>  | <u>H (29cm)xW(18cm)xD(24cm)</u>   | <u>H (29cm)xW(29cm)xD(24cm)</u>  |
| <b>Weight:</b>             | <u>Weight: (3.5 kg)</u>  | <u>Weight: (7g)</u>   | <u>Weight: (9 kg)</u>  |
| <b>Communication</b>       | <u>Type: USB</u>   | <u>Type: USB</u>  | <u>Type: USB</u>   |
| <b>Outputs:</b>            | <u>None</u>  | <u>Output: 1 Serial RS-485 port</u>   | <u>Output: 1 Serial RS-485 port</u>  |
| <b>Control options:</b>    | <u>Control options: SIAsoft – FIALab's proprietary software</u>  | <u>Control options: SIAsoft software</u>  | <u>Control options: SIAsoft software</u>   |
| <b>Power requirements</b>  | <u>Voltage: 24 Vdc / Current: Max. 2.5 A</u>   | <u>Voltage: 24 Vdc / Current: Max. 2.5 A</u>  | <u>Voltage: 24 Vdc / Current: Max. 2.5 A</u>   |

SYRINGE PUMP



NEW ERA's programmable syringe pumps provide an affordable solution for the sophisticated dispensing and flow control applications. Features include infusion and withdrawal, computer interface and advanced programming option.

The programmable syringe pumps can be applied in Chemistry, Tissue Engineering, Nanotechnology, Electrospinning, Microfluids, Neuroscience, Biology and Physics.

| Mode          | Description                                     | Infusion Rates   | Features   | Price |
|---------------|---|--|--|-------|
| NE-1000       | Single Syringe Pump                             | 0.73 µl/hr to 2100 ml/hr<br>(1 cc syringe to 60 cc syringe)      | <ul style="list-style-type: none"> <li>• Holds 1 syringe from the smallest size available up to 60 cc</li> <li>• 35 lbs. at minimum speed, 18 lbs. at maximum speed</li> </ul>   |       |
| DUAL-NE-1000X | Continuous Dual Syringe Pump System             | 0.73 µl/hr to 2100 ml/hr<br>(1 cc syringe to 60 cc syringe)      | <ul style="list-style-type: none"> <li>• Holds 1 syringe up to 60 cc for each syringe pump</li> <li>• Allow continuous infusion or emulsification</li> <li>• 35 lbs. at minimum speed, 18 lbs. at maximum speed</li> </ul>                               |       |
| NE-1002X      | Microfluid Syringe Pump                         | 0.008 nl/hr to 2545 µl/min<br>(0.5 ml syringe to 140 ml syringe) | <ul style="list-style-type: none"> <li>• Holds 1 syringe up to 140 cc syringe but can only open up to about 120 cc lengthwise</li> <li>• Advance Per Step: 4.252232 Nanometers</li> <li>• 100 lbs. at minimum speed, 18 lbs. at maximum speed</li> </ul> |       |
| NE-1600       | Six Channel Syringe Pumps                       | 0.452µl/hr to 1451 ml/hr<br>(1 cc syringe to 60 cc syringe)      | <ul style="list-style-type: none"> <li>• Holds 2, 4, or 6 syringes of up to 60 cc each</li> <li>• 160 lbs. at minimum speed, 30 lbs. at maximum speed</li> </ul>   |       |
| NE-4000       | Double Syringe available up Pump variable sizes | 1.459 µl/hr to 7635 ml/hr<br>(1 cc syringe to 60 cc syringe)     | <ul style="list-style-type: none"> <li>• Hold 2 different syringes from the smallest size to 60 cc each of</li> <li>• 100 lbs. at minimum speed, 18 lbs. at maximum speed</li> </ul>   |       |

The NE-1000 Family of Syringe Pumps Features:

- Built for automation
- Infuses and withdraws
- Applications range from simple infusions to complex pumping programs
- Operates stand-alone or from a computer with programmable preset protocols
- Program up to 41 pumping phases: change pumping rates, set dispensing volumes, insert pauses, control and respond to external signals, sound the buzzer.
- RS-232 and TTL logic control interfaces

| 'Just Infusion' Syringe Pump  | Peristaltic Dispensing Pump   |
|---|---|
| NE-300  | NE-9000   |
| <ul style="list-style-type: none"> <li>• Holds small or big syringes up to 60 ml</li> <li>• Infuses continuously until the user stop the pump</li> <li>• Variable infusion rate can be changed while pumping</li> <li>• Power failure mode allows pump to continue pumping after a reset</li> <li>• Maximum pumping rate of 1568 ml/hr with a 60 ml syringe</li> <li>• Does not withdraw, volume target or have computer interface</li> </ul> | <ul style="list-style-type: none"> <li>• Pump from a reservoir through replaceable continuous tubing</li> <li>• Continuous pumping up to 900 ml/min</li> <li>• Measured dispenses for production filling of bottles</li> <li>• Learn and Repeat™ for quick setup of production dispenses</li> <li>• Slow down mode to improve accuracy of dispenses</li> <li>• Programmable Phases allowing complex pumping applications and interaction with external devices</li> </ul> |

SYRINGE HEATER



The syringe heater constantly monitors and displays the temperature measured on the primary heating pad. While regulating the temperature, the Heat Clamping will hold the set temperature. Thermo-Kinetic Mode reduces temperature swings and tightens the Heat Clamping at the set temperature by dynamically adjusting the heating by reacting to changes in the temperature measurement and rate of temperature change.

HEATER-KIT-1LG    HEATER-PAD2-1LG

| HEATER-KIT-1LG  | HEATER-PAD2-1LG       | HEATER-PAD3-1LG    |
|---|-----------------------|--------------------|
| Syringe Heater Kit Control Unit (Primary Heating Pad with Temperature Sensor)   | Secondary Heating Pad | Third+ Heating Pad |
| <ul style="list-style-type: none"> <li>• Maximum temperature of 185°C</li> <li>• User adjustable Thermo-Kinetic Heat Clamping for regulation of Set Point temperature</li> <li>• RS-232 bidirectional control from a computer with built-in RS-232 network driver</li> <li>• RS-232 network supports up to 100 heaters, pumps &amp; other devices from one PC port</li> <li>• Power Failure Mode: Restarts the heater Active Mode after a power interruption</li> <li>• Selectable temperature units of Celsius or Fahrenheit</li> <li>• Soft power switching for long life</li> <li>• Non-volatile memory of all operating parameters</li> </ul> |                       |                    |

*Syringe pump & syringe are not included with syringe heater.*

SYRINGE PUMP SOFTWARE



Syringe Pump Pro is an easy to use computer interface for programmable syringe pumps. It permits faster programming and operation of one or more pumps. The user can configure and control multi-pump protocols, log pump activity and send commands to selected pumps. Alternative license examples to purchase SyringePumpPro:

- Connecting 5 pumps to a single computer, at the same time, you will need one 5 pump license
- If you have 5 pumps connected one at a time, to one computer, a 1 pump license will do
- If you need to connect 5 single pumps to 5 separate computers, purchase five 1 pump licenses

| Model               | Description                           |
|---------------------|---------------------------------------|
| SYRINGE-PUMP-PRO-01 | SyringePumpPro Software License for 1 |
| SYRINGE-PUMP-PRO-02 | SyringePumpPro Software License for 2 |
| SYRINGE-PUMP-PRO-03 | SyringePumpPro Software License for 3 |
| SYRINGE-PUMP-PRO-04 | SyringePumpPro Software License for 4 |
| SYRINGE-PUMP-PRO-05 | SyringePumpPro Software License for 5 |



Flow rates vary with the selection of syringe and the type of motor and gearing in the pump. The following are example flow rates for a sample of syringes. Higher flow rates are available.

| Syringe Size | Maximum Rate | Minimum Rate |
|--------------|--------------|--------------|
| 0.5 µl       | 25.49 µl/hr  | 0.001 µl/hr  |
| 1 ml         | 53.09 ml/hr  | 0.73 µl/hr   |
| 5 ml         | 406.1 ml/hr  | 5.581 µl/hr  |
| 10 ml        | 600 ml/hr    | 8.244 µl/hr  |
| 20 ml        | 975.8 ml/hr  | 13.41 µl/hr  |
| 30 ml        | 1282 ml/hr   | 17.63 µl/hr  |
| 60 ml        | 2120 ml/hr   | 29.13 µl/hr  |

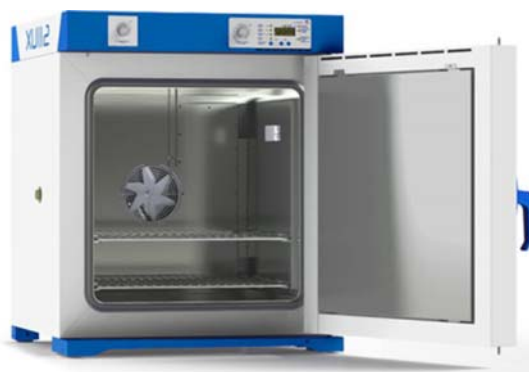
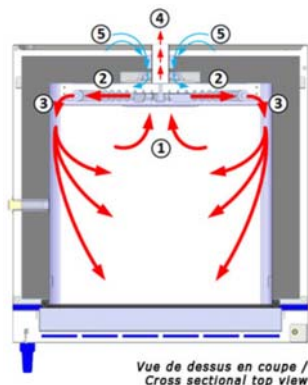
PRODUCT RANGE

A forced convection for an amazing temperature homogeneity !

The C3000 temperature is a highly accurate and highly reliable microprocessor.



Work safely !



LABORATORY EQUIPMENT



| Universal ovens             |  |                   |   |  |
|-----------------------------|--|-------------------|---|--|
| Model                       | Description  | Max temperature : | Application                                       |  |
| <u>XU - Universal ovens</u> | universal ovens are suitable for all applications for drying, heating, heat preservation, sterilization, component aging, curing,... in laboratories and industries. | 300°C             | Drying, heating / Heating treatment /Laboratories |  |



| Laboratories           |   |                   |  |  |
|------------------------|---|-------------------|--|--|
| Model                  | Description   | Max temperature : | Application                                  |  |
| <u>XB - Incubators</u> | Natural or forced convection. Our incubators are designed for most standard incubation processes, quality controls, tempering, thermal storage... | 80°C              | Process at 37°C<br>Pharmaceutical<br>Medical |  |



|                                |   |                  |   |  |
|--------------------------------|---|------------------|---|--|
| <u>XBR - Cooled incubators</u> | The cooled incubators are ideal for keeping products at low temperature. Suitable for biology and microbiology medical laboratory and for controls in industries. | from 0°C to 60°C | Incubation<br>Pharmaceutical<br>Medical |  |
|--------------------------------|---|------------------|---|--|



|                                     |   |      |   |  |
|-------------------------------------|---|------|---|--|
| <u>XAS - Glassware drying ovens</u> | The drying cabinets are used to dry and store glassware at a temperature adjustable up to 60°C. The moderate ventilation inside the cabinet is also suitable for gentle drying. | 60°C | Glassware drying<br>Storage<br>Laboratories |  |
|-------------------------------------|---|------|---|--|



| Industrial oven              |  |                       |   |  |
|------------------------------|--|-----------------------|---|--|
| Model                        | Description  | Max temperature :     | Application   |  |
| <u>XL - Industrial ovens</u> | Industrial ovens XL are suitable for all processes requiring a powerful airflow and air change. For all drying applications, heating, polymerization, resin drying,... | 200°C (300°C option). | Drying, heating<br>Heating treatment<br>Vulcanization,<br>burning |  |



|                                     |   |                       |  |  |
|-------------------------------------|---|-----------------------|--|--|
| <u>XXL - Large industrial ovens</u> | Industrial ovens XXL are designed for easy loading of your products without weight limit! For all application of curing, polymerization, coating, preheating, heating, drying, vitrification, stabilization.. | 200°C (300°C option). | Polymérisation<br>Composites curing<br>Coating |  |
|-------------------------------------|---|-----------------------|--|--|



|                           |  |                |   |  |
|---------------------------|--|----------------|---|--|
| <u>XM - Modular ovens</u> | Our range of XM ovens is ultra-modular, their size is adapted to the size of the product. These ovens are adapted to composites curing, polymerization, coating and drying applications. | 200°C (300°C). | Composite curing<br>Aeronautics<br>Polymerization |  |
|---------------------------|--|----------------|---|--|



| Vacuum Drying Oven        |   |  |   |  |
|---------------------------|---|--|---|--|
| Model                     | Description   | Max temperature :                            | Application                                   |  |
| <u>XFL - Vacuum ovens</u> | They are suitable for gentle drying of sensitive products, thermal treatments of oxidizable materials, quick drying of powders and granulate... | 200°C (300°C option).<br>Vacuum up to 1mbar. | Degassing<br>Quick drying<br>Chemical process |  |

**MICROBIOLOGICAL INCUBATOR - XB**

Our incubators are designed to answer to all biological, medical, pharmaceutical, hygiene industry laboratories for microbiological and most standard incubation processes, quality controls, tempering, thermal storage...

Temperature : max 80Å°C

Accurate and efficient incubators, natural or forced convection !

On models **XB032, XB058 and XB112** , it is possible for you to completely stop the ventilation inside the incubator.



| XB Range:                       |       | XB032                             | XB058                  | XB112                  | XB225                  | XB343                  | XB490                  | XB686                   | XB980                   |
|---------------------------------|-------|-----------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|-------------------------|
| <b>Performances:</b>            |       |                                   |                        |                        |                        |                        |                        |                         |                         |
| Temperature range:              |       | Ambient temperature + 5°C to 80°C |                        |                        |                        |                        |                        |                         |                         |
| Maximum temperature standard:   |       | 80°C                              |                        |                        |                        |                        |                        |                         |                         |
| Temperature uniformity at 37°C: | ± °C  | < 0.0                             | < 1.2                  | < 1.2                  | < 1.3                  | < 1.3                  | < 1.3                  | < 1.3                   | < 1.3                   |
| Temperature fluctuation::       | ± °C  | < 0.2                             | < 0.2                  | < 0.2                  | < 0.2                  | < 0.2                  | < 0.2                  | < 0.2                   | < 0.2                   |
| <b>Dimensions of the room:</b>  |       |                                   |                        |                        |                        |                        |                        |                         |                         |
| Chamber volume:                 | dm³   | 32                                | 58                     | 112                    | 225                    | 343                    | 490                    | 686                     | 980                     |
| Width:                          | mm    | 300                               | 400                    | 500                    | 500                    | 700                    | 700                    | 700                     | 1000                    |
| Depth:                          | mm    | 270                               | 360                    | 450                    | 450                    | 700                    | 700                    | 700                     | 700                     |
| Height:                         | mm    | 400                               | 400                    | 500                    | 1000                   | 700                    | 1000                   | 1400                    | 1400                    |
| <b>External dimensions:</b>     |       |                                   |                        |                        |                        |                        |                        |                         |                         |
| Volume about:                   | m³    | 0.19                              | 0.26                   | 0.4                    | 0.65                   | 0.95                   | 1.24                   | 1.62                    | 2.18                    |
| Width:                          | mm    | 464                               | 564                    | 664                    | 664                    | 864                    | 864                    | 864                     | 1164                    |
| Depth:                          | mm    | 566                               | 656                    | 746                    | 746                    | 1092                   | 1092                   | 1092                    | 1092                    |
| Height:                         | mm    | 712                               | 712                    | 812                    | 1312                   | 1012                   | 1312                   | 1712                    | 1712                    |
| <b>Shelves:</b>                 |       |                                   |                        |                        |                        |                        |                        |                         |                         |
| Supplied / Maximum:             |       | 2 / 6                             | 2 / 6                  | 2 / 8                  | 2 / 17                 | 2 / 11                 | 2 / 17                 | 2 / 25                  | 2 / 25                  |
| Dimensions WxD:                 | mm    | 270*240                           | 370*330                | 470*420                | 470*420                | 670*670                | 670*670                | 670*670                 | 970*670                 |
| Max weight shelf/Total:         | kg    | 30/60                             | 30/60                  | 30/60                  | 30/120                 | 30/100                 | 30/160                 | 30/160                  | 30/180                  |
| <b>Other informations:</b>      |       |                                   |                        |                        |                        |                        |                        |                         |                         |
| Number of doors:                |       | 1                                 | 1                      | 1                      | 1                      | 1                      | 1                      | 1                       | 2                       |
| Fan air flow:                   | m³/h  | 200                               | 200                    | 200                    | 400                    | 500                    | 500                    | 1000                    | 1000                    |
| Glasswindow WxH: (option)       | mm    | 130x200                           | 200x200                | 180x350                | 350x350                | 350x550                | 350x550                | 350x550                 | 180x350 (x2)            |
| Weight (empty):                 | kg    | 39                                | 50                     | 65                     | 84                     | 123                    | 148                    | 178                     | 258                     |
| <b>Electrical supply:</b>       |       |                                   |                        |                        |                        |                        |                        |                         |                         |
| Standard heating 80°C:          | Watts | 145                               | 165                    | 240                    | 500                    | 750                    | 750                    | 1000                    | 2000                    |
| Voltage:                        | Volts | 230V ~1P<br>50/60Hz 5A            | 230V ~1P<br>50/60Hz 5A | 230V ~1P<br>50/60Hz 5A | 230V ~1P<br>50/60Hz 5A | 230V ~1P<br>50/60Hz 5A | 230V ~1P<br>50/60Hz 5A | 230V ~1P<br>50/60Hz 10A | 230V ~1P<br>50/60Hz 16A |



**UNIVERSAL OVEN - XU**

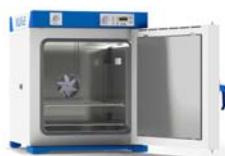
Temperature : max. 300 C

The FRANCE ETUVES XU universal ovens are suitable for all applications for drying, heating, heat preservation, sterilization, component aging, curing or any other thermal test in laboratories and in all sectors of industry. There are 8 standard

volumes : 32, 58, 112, 225, 343, 490, 686 and 980 liters.



| XU Range:                        |                   | XU032                               | XU058                   | XU112                   | XU225                   | XU343                | XU490                | XU686                | XU980                    |
|----------------------------------|-------------------|-------------------------------------|-------------------------|-------------------------|-------------------------|----------------------|----------------------|----------------------|--------------------------|
| <b>Performances:</b>             |                   |                                     |                         |                         |                         |                      |                      |                      |                          |
| Temperature range:               |                   | Ambient temperature + 10°C to 300°C |                         |                         |                         |                      |                      |                      |                          |
| Maximum temperature standard:    |                   | 300°C                               |                         |                         |                         |                      |                      |                      |                          |
| Temperature uniformity at 105°C: | ± °C              | < 1.2                               | < 1.2                   | < 1.2                   | < 1.5                   | < 1.2                | < 1.2                | < 1.2                | < 1.2                    |
| Temperature fluctuation::        | ± °C              | < 0.2                               | < 0.2                   | < 0.2                   | < 0.2                   | < 0.2                | < 0.2                | < 0.2                | < 0.2                    |
| <b>Dimensions of the room:</b>   |                   |                                     |                         |                         |                         |                      |                      |                      |                          |
| Chamber volume:                  | dm <sup>3</sup>   | 32                                  | 58                      | 112                     | 225                     | 343                  | 490                  | 686                  | 980                      |
| Width:                           | mm                | 300                                 | 400                     | 500                     | 500                     | 700                  | 700                  | 700                  | 1000                     |
| Depth:                           | mm                | 270                                 | 360                     | 450                     | 450                     | 700                  | 700                  | 700                  | 700                      |
| Height:                          | mm                | 400                                 | 400                     | 500                     | 1000                    | 700                  | 1000                 | 1400                 | 1400                     |
| <b>External dimensions:</b>      |                   |                                     |                         |                         |                         |                      |                      |                      |                          |
| Volume about:                    | m <sup>3</sup>    | 0.19                                | 0.26                    | 0.4                     | 0.65                    | 0.95                 | 1.24                 | 1.62                 | 2.18                     |
| Width:                           | mm                | 464                                 | 564                     | 664                     | 664                     | 864                  | 864                  | 864                  | 1164                     |
| Depth:                           | mm                | 566                                 | 656                     | 746                     | 746                     | 1092                 | 1092                 | 1092                 | 1092                     |
| Height:                          | mm                | 712                                 | 712                     | 812                     | 1312                    | 1012                 | 1312                 | 1712                 | 1717                     |
| <b>Shelves:</b>                  |                   |                                     |                         |                         |                         |                      |                      |                      |                          |
| Supplied / Maximum:              |                   | 2 / 6                               | 2 / 6                   | 2 / 8                   | 2 / 17                  | 2 / 11               | 2 / 17               | 2 / 25               | 2 / 25                   |
| Dimensions WxD:                  | mm                | 270*240                             | 370*330                 | 470*420                 | 470*420                 | 670*670              | 670*670              | 670*670              | 970*670                  |
| Max weight shelf/Total:          | kg                | 30/60                               | 30/60                   | 30/60                   | 30/120                  | 30/100               | 30/160               | 30/160               | 30/180                   |
| <b>Other informations :</b>      |                   |                                     |                         |                         |                         |                      |                      |                      |                          |
| Number of doors:                 |                   | 1                                   | 1                       | 1                       | 1                       | 1                    | 1                    | 1                    | 2                        |
| Fan air flow:                    | m <sup>3</sup> /h | 200                                 | 200                     | 200                     | 400                     | 500                  | 500                  | 1000                 | 1000                     |
| Glasswindow WxH: (option)        | mm                | 130x200                             | 200x200                 | 180x350                 | 350x350                 | 350x550              | 350x550              | 350x550              | 180x350 (x2)             |
| Weight (empty):                  | kg                | 39                                  | 50                      | 65                      | 84                      | 123                  | 148                  | 178                  | 258                      |
| <b>Electrical supply:</b>        |                   |                                     |                         |                         |                         |                      |                      |                      |                          |
| Standard heating 300°C:          | Watts             | 1000                                | 1500                    | 1500                    | 2000                    | 3000                 | 3000                 | 4000                 | 6000                     |
| Voltage:                         | Volts             | 230V ~1P<br>50/60Hz 10A             | 230V ~1P<br>50/60Hz 10A | 230V ~1P<br>50/60Hz 10A | 230V ~1P<br>50/60Hz 10A | 230V ~1P<br>50Hz 16A | 230V ~1P<br>50Hz 16A | 230V ~1P<br>50Hz 20A | 400V ~3P + N<br>50Hz 10A |





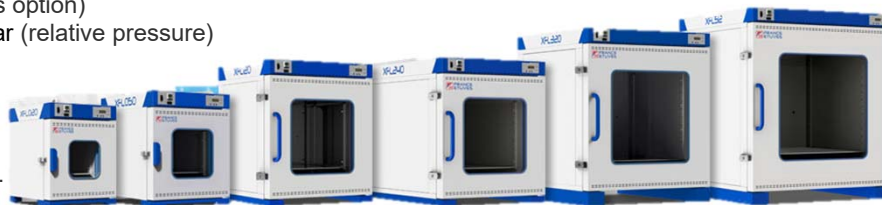
VACUUM DRYING OVEN - XFL

Our Vacuum ovens XFL are suitable for gentle drying of sensitive products, thermal treatments of oxidizable materials, quick drying of powders and granulated in pharmaceutical, cosmetics, plastics, electronics, chemical, agriculture, laboratories or industries.

Max temperature : 200 C / 300 C\* (as option)

Vacuum range : from 0 to -1000 mbar (relative pressure)

\* 300 C max temperature during few minutes, 250 C maximum continuously. 6 sizes : 20, 51, 110, 220, 316 and 512 liters.



| XFL Range:                     |                 | XFL020                             | XFL050               | XFL120               | XFL240               | XFL320                   | XFL512                   |
|--------------------------------|-----------------|------------------------------------|----------------------|----------------------|----------------------|--------------------------|--------------------------|
| <b>Performances:</b>           |                 |                                    |                      |                      |                      |                          |                          |
| Temperature range:             |                 | Ambient temperature + 0°C to 200°C |                      |                      |                      |                          |                          |
| Maximum temperature standard:  |                 | 200°C                              |                      |                      |                      |                          |                          |
| Temperature fluctuation::      | ± °C            | < 0.2                              | < 0.2                | < 0.2                | < 0.2                | <                        | <                        |
| <b>Dimensions of the room:</b> |                 |                                    |                      |                      |                      |                          |                          |
| Chamber volume:                | dm <sup>3</sup> | 20                                 | 51                   | 110                  | 220                  | 316                      | 512                      |
| Width:                         | mm              | 250                                | 320                  | 470                  | 470                  | 650                      | 800                      |
| Depth:                         | mm              | 320                                | 500                  | 500                  | 1000                 | 750                      | 800                      |
| Height:                        | mm              | 250                                | 320                  | 470                  | 470                  | 650                      | 800                      |
| <b>External dimensions:</b>    |                 |                                    |                      |                      |                      |                          |                          |
| Volume about:                  | m <sup>3</sup>  | 0.18                               | 0.3                  | 0.61                 | 0.97                 | 1.22                     | 1.76                     |
| Width:                         | mm              | 516                                | 580                  | 810                  | 810                  | 992                      | 1130                     |
| Depth:                         | mm              | 576                                | 751                  | 844                  | 1347                 | 1098                     | 1228                     |
| Height:                        | mm              | 610                                | 680                  | 890                  | 890                  | 1120                     | 1270                     |
| <b>Shelves:</b>                |                 |                                    |                      |                      |                      |                          |                          |
| Supplied / Maximum:            |                 | 1 / 4                              | 1 / 5                | 1 / 8                | 1 / 8                | 1 / 11                   | 1 / 15                   |
| Dimensions WxD:                | mm              | 224*280                            | 294*460              | 444*460              | 444*960              | 624*710                  | 772*760                  |
| Max weight shelf/Total:        | kg              | 30/60                              | 30/60                | 30/90                | 30/90                | 30/120                   | 30/200                   |
| <b>Other informations:</b>     |                 |                                    |                      |                      |                      |                          |                          |
| Number of doors:               |                 | 1                                  | 1                    | 1                    | 1                    | 1                        | 1                        |
| Glasswindow WxH: (option)      | mm              | 0                                  | 0                    | 0                    | 0                    |                          |                          |
| Weight (empty):                | kg              | 60                                 | 85                   | 170                  | 235                  | 315                      | 370                      |
| <b>Electrical supply:</b>      |                 |                                    |                      |                      |                      |                          |                          |
| Standard heating 200°C:        | Watts           | 800                                | 1200                 | 2400                 | 3600                 | 6000                     | 9000                     |
| Voltage:                       | Volts           | 230V ~1P 50Hz<br>16A               | 230V ~1P 50Hz<br>16A | 230V ~1P 50Hz<br>16A | 230V ~1P 50Hz<br>20A | 400V ~3P + N<br>50Hz 16A | 400V ~3P + N<br>50Hz 20A |



Interior Design Overview



Why is it worth investing in KIRSCH refrigerators and freezers? Because we use the experience we have gained worldwide to manufacture refrigerators according to the most stringent quality, functionality and efficiency requirements. Your benefit: systems you can rely on 100 % – because we know about the sensitivity of the goods you need to cool.\*

Forced-air cooling

Robust Housing.

Low-noise compressor

Thick insulation

ECOOL



Self-closing doors

Easy-to-maintain interior container

Comfortable access

Flexible handling of drawers

Custom door hinge

Automatic defrosting

LED-Illumination

Glass doors

LABORATORY EQUIPMENT

REFRIGERATOR & FREEZER

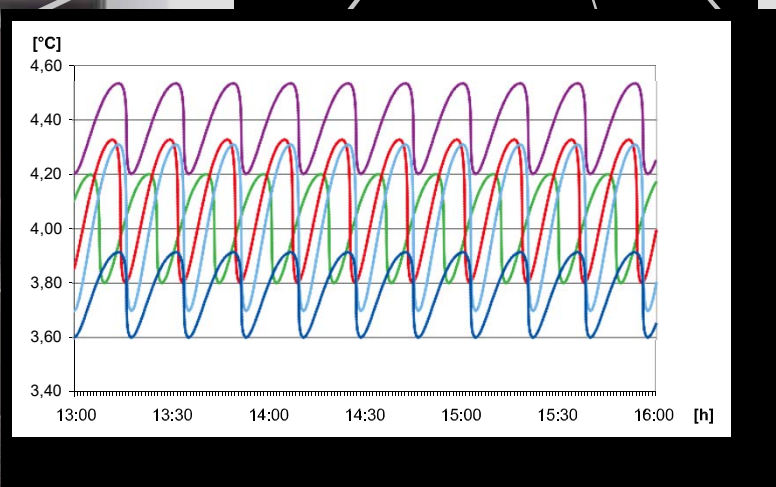
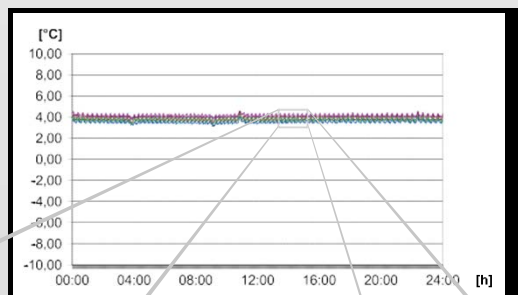
Blood Bank / Pharmaceutical / Laboratory

Temperature measurement with log file for optimum quality control

KIRSCH refrigerators and freezers are used in demanding storage settings (e.g., pharmaceutical re- search, pharmaceutical manufacturing, bioengineering, health, etc.) Temperature measurement with log file enables you to prove that our products fulfill the requirements in real-life applications (valida- tion, such as IQ, OQ, PQ, etc.).

Extensive tests and precise calibration

Before our products are ready for market, they are exposed to the widest range of exterior conditions in the climate chamber to guarantee that the temperature can be maintained even under extreme circumstances. Before we deliver our systems, they undergo precise calibrated during a default test run lasting several hours.



Optimal air-guiding concept

The combination of forced-air cooling and temperature control ensures an almost constant cooling temperature in the entire interior, even in case of changing ambient temperatures.

Refrigerator



**Blood Bank  
BL-330**



**Pharmaceutical  
MED-340**



**Laboratory Basic  
LABO-330**



**Laboratory Explosion  
Proof  
LABEX®-340**

Freezer



**Blood Plasma Freezer  
FROSTER-BL-330**



**Pharmaceutical Freezer  
FROSTER-MED-95**



**Laboratory Freezer  
FROSTER-LABO-330**



**Laboratory Freezer  
FROSTER-LABEX®-330**



Leaving with a secure feeling –  
Text message alarm forwarding














The GSM-Module is used to forward alarm text messages to a mobile or landline phone network. This requires an activated SIM card and sufficient reception at the installation location. Connect the GSM-Module using the potential-free

contact. Reaching the alarm limits triggers a visual and audible signal at the GSMModule and the sending of an alarm text message.



Interior Design Overview

Blood Bank

| Interior description   | Blood Bank Refrigerators according to DIN 58371 |        |        |        |        | Blood Plasma Freezers according to DIN 58375 |                |                |                     |                |
|--|---|--------|--------|--------|--------|--|----------------|----------------|---------------------|----------------|
|  | BL-100  | BL-176 | BL-300 | BL-520 | BL-720 | FROSTER-BL-178                               | FROSTER-BL-180 | FROSTER-BL-330 | FROSTER-BL-530/-730 | FROSTER-BL-650 |
|  <b>Capacity</b>   | 95 l  | 170 l  | 280 l  | 500 l  | 700 l  | 170 l  | 170 l          | 300 l          | 500 l / 700 l       | 650 l          |
|  <b>Temperature setting</b><br>The temperature is set according to the current DIN standard.   | +4 °C   | +4 °C  | +4 °C  | +4 °C  | +4 °C  | -32 °C                                       | -41 °C         | -32 °C         | -32 °C              | -41 °C         |
|  <b>Ambient temperature</b><br>Maximum temperature at the refrigerator's or freezer's place of installation. Correct operation is possible up to this temperature.   | 38 °C   | 38 °C  | 38 °C  | 38 °C  | 38 °C  | 32 °C  | 32 °C          | 32 °C          | 32 °C               | 32 °C          |
|  <b>Forced-air cooling</b><br>Integrated forced-air cooling reduces temperature reductions caused by the law of physics and ensures a uniform temperature in the entire interior.  | ●   | ●      | ●      | ●      | ●      | ●  | ●              | ●              | ●                   | ●              |
|  <b>RS485 interface</b><br>for digital temperature documentation. When used together with the optional KIRSCH-PC-KIT, the refrigerator can be connected to a PC or network using this interface.   | ●   | ●      | ●      | ●      | ●      | ●  | ●              | ●              | ●                   | ●              |
|  <b>Potential-free contact for forwarding alarms</b><br>The potential-free contact allows you to forward alarms. Connect the optional GSM-Module to receive alarms as text messages to your mobile phone. You can also connect the system to the control centre. | ●   | ●      | ●      | ●      | ●      | ●  | ●              | ●              | ●                   | ●              |
|  <b>Automatic defrosting and condensate evaporation</b><br>Time and temperature are monitored. Manual defrosting is no longer required. Condensate evaporates automatically.   | ●   | ●      | ●      | ●      | ●      | ●  | ●              | ●              | ●                   | ●              |
|  <b>Number of drawers</b><br>Standard number of integrated aluminium, stainless steel or plastic drawers with stops.   | 2   | 2      | 4      | 5      | 5      | 3  | 3              | 4              | 5                   | 5              |
|  <b>Capacity per drawer</b><br>Number of blood bags of 500 ml.<br>FROSTER-BL models: number of blood plasma car- tons of 400 ml (19 x 13 x 2.5 cm).  | 18  | 25     | 28     | 30     | 45     | 28   | 30             | 30             | 64 / 96             | 104            |
|  <b>Gibs</b><br>For interior containers made from aluminium, gibs allow a particularly varied use of the interior. Drawers can be positioned as desired every 15 mm.   | ○   | ○      | ●      | ●      | ●      | ○  | ○              | ●              | ●                   | ○              |
|  <b>Undercounter installation</b><br>Models of this type can be integrated into existing furniture and are therefore particularly space saving. When the system is installed, ensure that the refrigerating machine is sufficiently ventilated.                  | ●   | ○      | ○      | ○      | ○      | ○  | ○              | ○              | ○                   | ○              |
|  <b>Comfortable access</b><br>Now you no longer have to jerk doors open – all you need is one finger!  | ○   | ●      | ●      | ●      | ●      | ●  | ●              | ●              | ●                   | ●              |
|  <b>Self-closing door</b><br>Doors left open accidentally are a thing of the past.   | ○   | ●      | ●      | ●      | ●      | ●  | ●              | ●              | ●                   | ○              |

## Interior Design Overview

## Pharmaceutical

| Interior description  | Refrigerator |              |              |              |              |              |              |              |              |              | Freezers       |                |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|----------------|----------------|
|   | MED 85 DIN   | MED-85       | MED-100      | MED-125      | MED-200      | MED-288      | MED-340      | MED-468      | MED-520      | MED-600-S    | FROSTER-MED-70 | FROSTER-MED-95 |
| <b>Capacity</b><br>80 l   | 80 l         | 80 l         | 95 l         | 120 l        | 170 l        | 280 l        | 330 l        | 460 l        | 500 l        | 600 l        | 70 l           | 95 l           |
| <b>Temperature setting/temperature range</b><br>+2 to +20 °C<br>Large temperature ranges are available for storage.   | +2 to +12 °C | +2 to +12 °C | +2 to +20 °C | +2 to +20 °C | +2 to +20 °C | +2 to +20 °C | +2 to +20 °C | +2 to +20 °C | +2 to +20 °C | +2 to +20 °C | -15 to -22 °C  | -5 to -25 °C   |
| <b>PRO-ACTIVE- Control</b><br><b>USB</b><br>Permanent, proactive monitoring of the performance data and alerts in the case of deviations – so that you can take countermeasures in good time before a fault threatens your chilled goods; world's most accurate temperature control in refrigerated areas thanks to two standard PT-1000 sensors. | ○            | ○            | ●            | ○            | ●            | ●            | ●            | ●            | ●            | ○            | ○              | ●              |
| <b>RJ45 interface (RS485 interface only for MED 600-S)</b><br>For digital temperature documentation. When used together with the optional KIRSCH-PC-KIT, the refrigerator/freezer can be connected to a PC or network using this interface.   | ○            | ○            | ●            | ○            | ●            | ●            | ●            | ●            | ●            | ○            | ○              | ●              |
| <b>Ambient temperature</b><br>32 °C<br>Maximum temperature at the refrigerator's or freezer's place of installation. Correct operation is possible up to this temperature.  | 38 °C        | 38 °C        | 38 °C        | 38 °C        | 38 °C        | 38 °C        | 38 °C        | 38 °C        | 38 °C        | 38 °C        | 32 °C          | 32 °C          |
| <b>Forced-air cooling</b><br>Integrated forced-air cooling reduces temperature reductions caused by the law of physics and ensures a uniform temperature in the entire interior.  | ○            | ●            | ●            | ●            | ●            | ●            | ●            | ●            | ●            | ●            | ○              | ○              |
| <b>Potential-free contact for forwarding alarms</b><br>The potential-free contact allows you to forward alarms. Connect the optional GSM-Module to receive alarms as text messages to your mobile phone. You can also connect the system to a control centre.   | ●            | ○            | ●            | ●            | ●            | ●            | ●            | ●            | ●            | ●            | ○              | ●              |
| <b>Automatic defrosting and condensate evaporation</b><br>Time and temperature are monitored. Manual defrosting is no longer required. Condensate evaporates automatically.   | ●            | ●            | ●            | ●            | ●            | ●            | ●            | ●            | ●            | ●            | ○              | ○              |
| <b>Number of drawers</b><br>x1<br>Standard number of integrated plastic drawers with stops. The drawers are equipped with adjustable length and cross dividers.   | 3            | 3            | 3            | 3            | 4            | 5            | 9            | 10           | 12           | 13           | ○              | 1              |
| <b>Number of shelves</b><br>x1<br>Standard number of integrated plastic-coated shelves.   | 1            | 1            | 1            | 1            | 1            | ○            | ○            | ○            | ○            | ○            | 4              | 2              |
| <b>Moulded-in shelves</b><br>Interior containers made from impact-resistant plastic with moulded-in shelves guarantee a particularly high level of stability. The wire shelves and drawers can be easily inserted at the desired heights.   | ●            | ●            | ●            | ●            | ○            | ○            | ○            | ○            | ○            | ○            | ●              | ●              |
| <b>Gibs</b><br>For interior containers made from aluminium, gibs allow a particularly varied use of the interior. Wire shelves and drawers can be positioned as desired every 15 mm.  | ●            | ○            | ○            | ○            | ●            | ●            | ●            | ●            | ●            | ○            | ○              | ○              |
| <b>Undercounter installation</b><br>Models of this type can be integrated into existing furniture and are therefore particularly space saving. When the system is installed, ensure that the refrigerating machine is sufficiently ventilated.  | ●            | ●            | ●            | ●            | ●            | ○            | ○            | ○            | ○            | ●            | ●              | ●              |
| <b>Comfortable access</b><br>Now you no longer have to jerk doors open – all you need is one finger!  | ○            | ○            | ○            | ○            | ○            | ●            | ●            | ●            | ●            | ○            | ○              | ○              |
| <b>Self-closing door</b><br>Doors left open accidentally are a thing of the past.   | ○            | ○            | ○            | ○            | ○            | ○            | ●            | ●            | ●            | ○            | ○              | ○              |

● = Yes, ○ = No

Interior design overview of laboratory refrigerators and freezers with explosion-proof interior

## Interior Design Overview

**Refrigerators**  
with explosion-proof interior

**Freezers**  
with explosion-proof interior













| Interior description   |   | LABEX®<br>-288  | LABEX®<br>-340  | LABEX®<br>-468  | LABEX®<br>-520/<br>-720 | FROSTER-<br>LABEX®<br>-330    | FROSTER-<br>LABEX®<br>-530 | FROSTER-<br>LABEX®<br>-730 |
|--|---|-----------------|-----------------|-----------------|-------------------------|-------------------------------|----------------------------|----------------------------|
| <b>95 l</b>  | <b>Capacity</b>   | 280 l           | 330 l           | 460 l           | 500 l /<br>700 l        | 300 l                         | 500 l                      | 700 l                      |
| <b>2 to<br/>20 °C</b>  | <b>Temperature setting</b><br>Adjustable temperature range.   | +2 to<br>+20 °C | +2 to<br>+20 °C | +2 to<br>+20 °C | +0 to<br>+20 °C         | -5 to<br>-30 °C               | -5 to<br>-30 °C            | -5 to<br>-30 °C            |
|    | <b>Ambient temperature</b><br>Maximum temperature at the refrigerator's or freezer's place of installation. Correct operation is possible up to this temperature.   | 38 °C           | 38 °C           | 38 °C           | 38 °C                   | 32 °C                         | 32 °C                      | 32 °C                      |
|    | <b>Forced-air cooling</b><br>Integrated forced-air cooling reduces temperature reductions caused by the law of physics and ensures a uniform temperature in the entire interior.  | ●               | ●               | ●               | ●                       | ●                             | ●                          | ●                          |
|    | <b>RS485 interface</b><br>for digital temperature documentation. When used together with the optional KIRSCH-PC-KIT, the machine can be connected to a PC or network using this interface.  | ●               | ●               | ●               | ●                       | ●                             | ●                          | ●                          |
|    | <b>Potential-free contact for forwarding alarms</b><br>The potential-free contact allows you to forward alarms. Connect the optional GSM-Module to receive alarms as text messages to your mobile phone. You can also connect the system to a control centre. | ●               | ●               | ●               | ●                       | ●                             | ●                          | ●                          |
|   | <b>Automatic defrosting</b><br>Time and temperature are monitored. Manual defrosting is no longer required.<br>The condensate tray must be emptied manually.  | ●               | ●               | ●               | ●                       | ●                             | ●                          | ●                          |
|  | <b>Explosion-proof interior</b><br>LABEX®-Intrinsic Safety  | ●               | ●               | ●               | ●                       | ●                             | ●                          | ●                          |
|  | <b>Number of drawers</b><br>Standard number of integrated drawers equipped with adjustable length and cross dividers:   | ○               | ○               | ○               | ○                       | Optional, depending on model. |                            |                            |
|  | Plastic with stops  | ○               | ○               | ○               | ○                       |                               |                            |                            |
|  | Conductive material with stops (LABEX®-Intrinsic Safety)  | 1               | 2               | ○               | ○                       |                               |                            |                            |
|  | <b>Number of shelves</b><br>Standard number of integrated plastic-coated shelves.   | 3               | 4               | 6               | 5                       | 4                             | 5                          | 5                          |
|  | <b>Moulded-in shelves</b><br>Interior containers made from impact-resistant plastic with moulded-in shelves guarantee a particularly high level of stability. The wire shelves and drawers can be easily inserted at the desired heights.                     | ○               | ○               | ○               | ○                       | ○                             | ○                          | ○                          |
|  | <b>Gibs</b><br>For interior containers made from aluminium, gibs allow a particularly varied use of the interior. Wire shelves and drawers can be positioned as desired every 15 mm.  | ●               | ●               | ●               | ●                       | ●                             | ●                          | ●                          |
|  | <b>Undercounter installation</b><br>Models of this type can be integrated into existing furniture and are therefore particularly space saving. When the system is installed, ensure that the refrigerating machine is sufficiently ventilated.                | ○               | ○               | ○               | ○                       | ○                             | ○                          | ○                          |
|  | <b>Comfortable access</b><br>Now you no longer have to jerk doors open – all you need is one finger!  | ●               | ●               | ●               | ●                       | ●                             | ●                          | ●                          |
|  | <b>Self-closing door</b><br>Doors left open accidentally are a thing of the past.   | ○               | ●               | ●               | ●                       | ●                             | ●                          | ●                          |

● = Yes, ○ = No

## Interior Design Overview

## Laboratory

Interior design overview of laboratory refrigerators and freezers without explosion-proof interior

| Interior description  | Refrigerators without explosion-proof interior |              |              |               |               |               |                  | Freezers without explosion-proof interior |                  |                  |
|---|--|--------------|--------------|---------------|---------------|---------------|------------------|---|------------------|------------------|
|   | LABO-85  | LABO-100     | LABO-125     | LABO-288      | LABO-340/-468 | LABO-520/-720 | LABO-720-CHROMAT | FROSTER-LABO-330                          | FROSTER-LABO-530 | FROSTER-LABO-730 |
| <b>95 l</b><br><b>Capacity</b>  | 80 l   | 95 l         | 120 l        | 280 l         | 330 l / 460 l | 500 l / 700 l | 700 l            | 300 l                                     | 500 l            | 700 l            |
| <b>-15 to -22 °C</b><br><b>Temperature setting</b><br>Adjustable temperature range.   | +2 to +12 °C                                   | +2 to +20 °C | +2 to +20 °C | +2 bis +20 °C | +2 to +20 °C  | 0 to +20 °C   | +4 to +20 °C     | -5 to -30 °C                              | -5 to -30 °C     | -5 to -30 °C     |
|  <b>Ambient temperature</b><br>Maximum temperature at the refrigerator's or freezer's place of installation. Correct operation is possible up to this temperature.   | 38 °C  | 38 °C        | 38 °C        | 38 °C         | 38 °C         | 38 °C         | 38 °C            | 32 °C                                     | 32 °C            | 32 °C            |
|  <b>Forced-air cooling</b><br>Integrated forced-air cooling reduces temperature reductions caused by the law of physics and ensures a uniform temperature in the entire interior.  | ○  | ●            | ○            | ●             | ●             | ●             | ●                | ●   | ●                | ●                |
|  <b>RS485 interface</b><br>For digital temperature documentation. When used together with the optional KIRSCH-PC-KIT, the machine can be connected to a PC or network using this interface.   | ○  | ●            | ○            | ●             | ●             | ●             | ●                | ●   | ●                | ●                |
|  <b>Potential-free contact for forwarding alarms</b><br>The potential-free contact allows you to forward alarms. Connect the optional GSM-Module to receive alarms as text messages to your mobile phone. You can also connect the system to a control centre. | ○  | ●            | ●            | ●             | ●             | ●             | ●                | ●   | ●                | ●                |
|  <b>Automatic defrosting and condensate evaporation</b><br>Time and temperature are monitored. Manual defrosting is no longer required. The condensate evaporates automatically.   | ●  | ●            | ●            | ●             | ●             | ●             | ●                | ●   | ●                | ●                |
|  <b>Number of drawers</b><br>Standard number of integrated drawers with adjustable length and cross dividers.  | 1  | ○            | ○            | ○             | 1/○           | ○             | ○                | Optional, depending on model.             |                  |                  |
|  <b>Number of shelves</b><br>Standard number of integrated plastic-coated shelves.   | 2  | 2            | 2            | 3             | 3/4           | 5             | 5                | 4   | 5                | 5                |
|  <b>Moulded-in shelves</b><br>Interior containers made from impact resistant plastic with moulded-in shelves guarantee a particularly high level of stability. The wire shelves and drawers can be easily inserted at the desired heights.                     | ●  | ●            | ●            | ○             | ○             | ○             | ○                | ○   | ○                | ○                |
|  <b>Gibs</b><br>For interior containers made from aluminium, gibs allow a particularly varied use of the interior. Wire shelves and drawers can be positioned as desired every 15 mm.  | ○  | ○            | ○            | ●             | ●             | ●             | ●                | ●   | ●                | ●                |
|  <b>Undercounter installation</b><br>Models of this type can be integrated into existing furniture and are therefore particularly space saving. When the system is installed, ensure that the refrigerating machine is sufficiently ventilated.                | ●  | ●            | ●            | ○             | ○             | ○             | ○                | ○   | ○                | ○                |
|  <b>Comfortable access</b><br>Now you no longer have to jerk doors open – all you need is one finger!  | ○  | ○            | ○            | ●             | ●             | ●             | ●                | ●   | ●                | ●                |
|  <b>Self-closing door</b><br>Doors left open accidentally are a thing of the past.   | ○  | ○            | ○            | ●             | ●             | ●             | ●                | ●   | ●                | ●                |

● = Yes, ○ = No



Product Range



Standard Oven

Inert Oven

Vacuum Oven

Fine Oven

Convection Oven



Furnace

Incubator

Water Bath



Autoclave (Built-in Cooling Fan) – SN Series

Autoclave (with Drying Function) – SM –Series

Benchtop Sterilizer



Organic Solvent

Inert Gas Loop Solvent

Spray Granulation GB-210

-DL410



Freeze Dryer DC41A/41B

Flask

Freeze Dryer DC401

WATER SPRAY RETORT



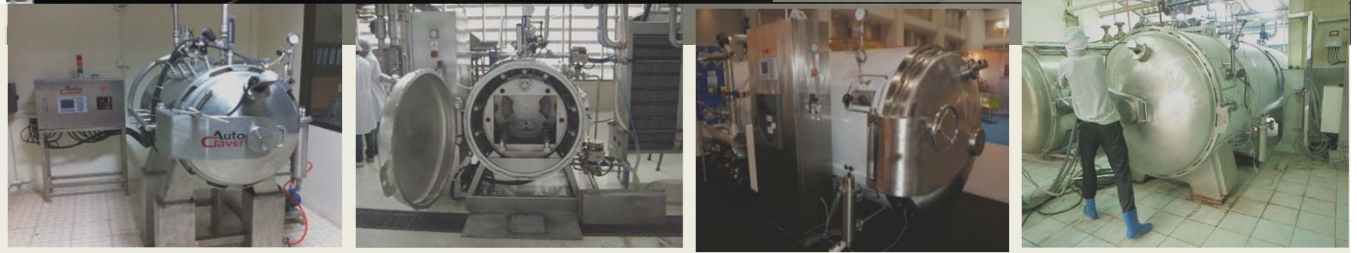
**STERILIZATION FOR**

- o Food products in cans, jars and pouches
- o Pharmaceuticals & intravenous solutions
- o Surgical Instruments & hospital hardware
- o Medical waste sterilization
- o Pilot system for research & development



**Excellence retort produces excellence result**

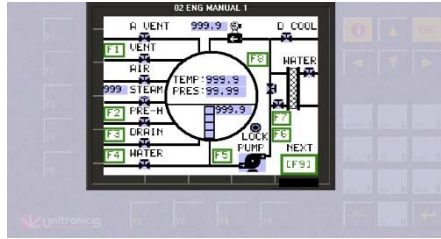
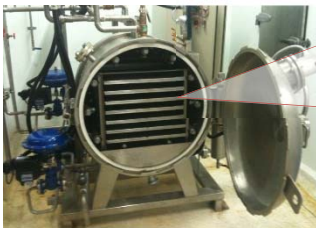
We make efficiency, functionality and surprisingly affordable and produced in optimum condition at lowest possible cost



| Description      | 610D     | 95D      | 141D     | 142D     | 144D     | 146D     |
|------------------|----------|----------|----------|----------|----------|----------|
| No. of baskets   | 1        | 1        | 1        | 2        | 4        | 6        |
| Diameter (m.)    | 0.6      | 0.95     | 1.4      | 1.4      | 1.4      | 1.4      |
| Length (m.)      | 1        | 0.85     | 1        | 2        | 4        | 6        |
| Power (kw)       | 3        | 3        | 5.5      | 8.75     | 12.3     | 14.9     |
| Steam(Kg/batch)  | 100      | 100      | 175      | 200      | 420      | 500      |
| Water, (L/batch) | 520      | 650      | 3,500    | 5,000    | 10,000   | 13,500   |
| Air,(L/batch)    | 1,000    | 1,000    | 3,000    | 3,000    | 5,000    | 8,000    |
| Can Capacity*    | 48       | 100      | 550      | 1,100    | 2,000    | 3,000    |
| Weight,(Kg)      | 800      | 900      | 1,000    | 1,350    | 2,000    | 2,900    |
| Basket size, cm  | 40x95x35 | 60x75x55 | 95x95x90 | 95x95x90 | 95x95x90 | 95x95x90 |

\*Can Capacity calculate by standard can size of 102x119mm

## General Feature



- Structure made of stainless steel grade 304, thickness 6 mm, can support the atmosphere inside at 0-3 bar pressure
- The control cabinet is made of stainless steel. Strong Inside the cabinet contains important equipment for operation control. And a 1,000 VA power backup device can reserve electricity for 15 minutes in the event of a power failure or power outage
- The door is open - closed on the front of the tank. With a 2-layer safe door lock system and a heat resistant gasket of up to 125 C to prevent heat loss and pressure while working
- There is a sight glass with a lamp for use as a channel for viewing inside the pot while the machine is working.
- Control with Programmable Logic Controller (PLC) system, can enter commands via the control panel on the front of the machine with key pad or touch screen. Can display working status such as temperature, pressure and time, including warning (Alarm)
- Can record 40 work programs and while working, can skip steps (Fast Step)
- can adjust the work from the automatic system to the manual system as needed Or used in the event that the automatic control system has problems
- There is a memory card slot for disinfection data to be used on the computer.
- There is a lamp set showing the operation of the machine. Including warning systems such as flashing light in case of system malfunction
- In the event of an emergency Can press the emergency stop switch All devices will stop working.
- 50 mm thickness insulation and covered with a 0.7 mm thick jacket and polished surface for beauty And prevent heat transfer from the inside to the outside Helps the heater to work efficiently. In addition, it also helps prevent danger from exposure as well.
- Use 2 pressure safety valves to control the pressure inside the pot to not exceed the specified value. By one working with another (Solenoid Valve) as an automatic safety, working when the electrical safety is not working
- Vacuum safety valve controls vacuum pressure in the case of lowering the temperature inside the pot.
- Thermometer range 75-135 C Temperature resolution 0.5C
- Cooling control system using temperature control system And water level in automatic water filling To reduce food product temperature after sterilization The system will maintain the pressure and reduce the temperature inside the disinfectant by adding water and compressed air into the tank. In order to maintain the original packaging With flood protection system The system will release the effluent automatically.
- Available in both steam-powered boilers for the 75D model or using (heater) submersible electric type For producing - supplying steam for model 75DH

### Heater

- For the Autoclaver model 75DH is designed by using a total of 20 kilowatts of water heater (heater) in order to produce steam. And use a water pump to spray hot water To heat food products during the sterilization process of food products
- The power cable that enters the heater is a heat-resistant type.

### Water Circulating Pump

- 5.5 HP / 380 V 3 Phase hot water pump can spray hot water or hot water vapor sufficiently and evenly throughout the entire pot. As well as changing the seal (mechanical seal) to be heat resistant
- Install a strainer before entering the nozzle. The filter hole is 1 mm in size and the material is made of stainless steel.
- Install pressure gauge for 4-inch dials at the pump outlet area of Pump.

### Air Compressor

- 2 HP 3 cylinder air compressor and air tank with a capacity of 500 liters, along with control equipment such as solenoid valves, pressure gauges, shut-off valves - Open the air duct size 1/2 inch, 3/4 inch wind pipe, length not less than 3 m.

### Basket – Tray – Trolley

- Rack or basket, material made of stainless steel and strong With 4 wheels per basket to slide on rails By having to be able to pack up to 5 layers of soft products (25 mm high packaging trays) can be put in cans of 303x408 size
- Rails for supporting baskets, materials made of stainless steel Strong The size fits the width of the basket for easy sliding in-out. And can support the weight of the basket and products within the basket Including shock
- Cart made of stainless steel For basket loading With strength and size suitable for mobile work Move the basket into - out the pot



## PRODUCT



THANK YOU

## CONTACT US

**National Direct Network Co., Ltd.**  
 240 Soi Petchkasem 63/4  
 Petchkasem Road, Bangkae,  
 Bangkae, Bangkok,  
 Thailand 10160  
 Tel : 02 4444-655 Fax: 02 4444-650  
 email : [sales@ndn.co.th](mailto:sales@ndn.co.th)

บริษัท เนชั่น แอนด์ไดเร็ก เน็ทเวิร์ค จำกัด  
 240 ซอย เพชรเกษม 63/4  
 ถนน เพชรเกษม, แขวง บางแค,  
 เขต บางแค, กรุงเทพมหานคร,  
 ประเทศไทย 10160  
 โทร : 02 4444-655  
 แฟกซ์ : 02 4444-650  
 อีเมล : [sales@ndn.co.th](mailto:sales@ndn.co.th)