

## **Signatone CM - 350 300 mm Semi-Automatic Probe System** For reliable and accurate DC/CV, High Power Test and RF Measurements

### ❖ FEATURES / BENEFITS

#### **Designed for a Variety of On-Wafer Analytical and Semi-Production Applications**

- DC, CV/IV, pulsed –IV applications
- High Power Application up to 12KV /600A
- IC Design / test verification Ambient, +300°C
- RF applications up to 110GHz 2 & 4 port setup
- mmW 110GHz -1.5THz 2-Port

#### **Product Versatility**

- Designed for full or partial wafer probing
- Roll-Out stage for ease of wafer loading
- Active Vibration Isolation table (optional)
- Ambient, Hot (+25°C to +300°C) configurations

#### **Options and Configurations**

- Standard Platen Supports up to 10x DC MicroPositioners or 2x RF + 4 DC and/or 4.5" wide probe card
- Available in multiple configurations including a variety of chuck options, DC/RF/High Power positioners, Computer Aided Probes, microscopes, camera's, Dark Box's, lasers for various applications



### ❖ ROLL - OUT STAGE -Optional

- Roll-Out Stage designed for easy Loading and Unloading of Wafer Samples and single ICs
- Excellent for use with probe cards and multi probe/complex setups
- Allows easy access to AUX -chucks
- Lock and Un-Lock position indicator
- Presentation 285mm / 95%
- Easy access to vacuum-zone selector knob

❖ **SPECIFICATIONS**

**Chuck XY Stage (Programmable)**

|                     |  |
|---------------------|--|
| Travel range        | 308 mm x 308 mm (12.126 x 12.126 in)               |
| Resolution          | 0.5 µm   |
| Accuracy            | ± 5.0 µm   |
| XY stage drive      | Closed-loop high precision servo motor PID control |
| Speed               | Variable Speed XY chuck stage control              |
| Max. movement speed | 120 mm / sec.                                      |

**Chuck Z Stage (Programmable)**

|                     |                                   |
|---------------------|-----------------------------------|
| Travel range        | 12.5 mm (0.5 in)                  |
| Resolution          | 0.25 µm                           |
| Accuracy            | ± 2.0 µm                          |
| Repeatability       | ± 1.0 µm                          |
| Z stage drive       | Closed-loop micro stepper motor   |
| Speed               | Variable Mode and Speed selection |
| Max. movement speed | 15 mm / sec.                      |

**Chuck Theta Stage (Programmable)**

|                   |   |
|-------------------|---|
| Travel range      | ± 10° (total range = 20°)                                     |
| Resolution        | 0.000035°   |
| Accuracy          | < 1.0 µm (measured at the edge of the 300 mm chuck)           |
| Repeatability     | < 1.5 µm  |
| Theta stage drive | High resolution stepper motor, rotary encoder feedback system |

**Roll Out / Loading Stage**

|                      |   |
|----------------------|---|
| Lock / Un-Lock       | Software indicates when in Un-Lock Position |
| Wafer Presentation   | 95% (see image pg. 1)                       |
| Return repeatability | < 1µm                                       |

**Motorized Microscope Stage (linear)**

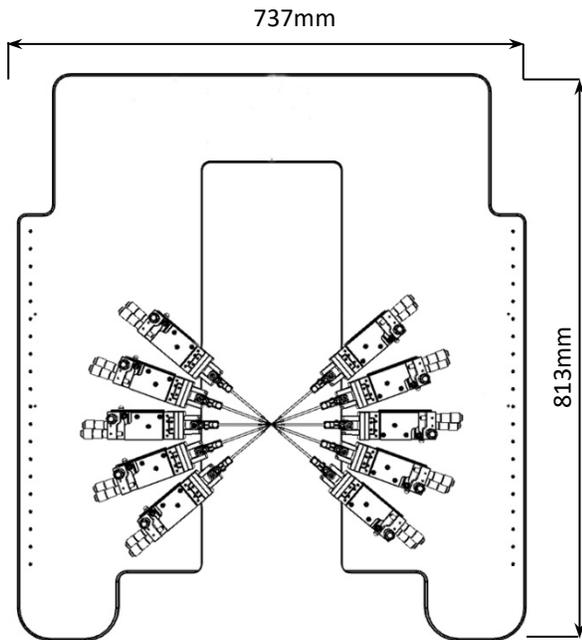
|                                 |   |
|---------------------------------|---|
| Movement range                  | 50mm X 50mm (2"x2")   |
| Resolution                      | 0.02µm (20 Nano meters)                                     |
| Scope lift                      | 101 mm (4") Vertical Pneumatic (Motorized- optional)        |
| Scope lift motorized (optional) | 50mm motorized + 50 mm pneumatic / combination = 101mm (4") |

\*All data relevant for use with Precision package

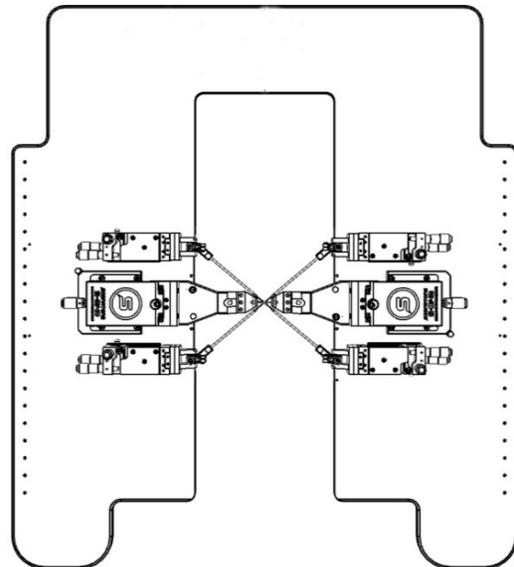
❖ **PROBE PLATEN**

**Specifications**

|                                 |   |
|---------------------------------|---|
| Material                        | Nickel Plated Aluminum (Steel optional)                 |
| Dimension                       | L = 813mm x W = 737mm x H = 12.7mm (See drawing)        |
| Chuck to Platen Separation      | Min. 2 mm (Variable Separation with Fine Platen Adjust) |
| Max. No of Micro Positioners    | 10 x DC or 2x RF + 4 x DC or a combination              |
| Quick Platen Lift Control (CVL) | Continuous Variable Lift (0 to 3.175 mm)                |
| Contact Repeatability           | < 1 µm (0.04 mils) by Manual Control                    |
| DC MicroPositioner mounting     | Magnetic or Vacuum (with Steel option)                  |
| RF MicroPositioner mounting     | Magnetic or Bolt Down (with Steel option)               |



Sample 1: Probe Configured with 10 DC Probes



Sample 2: Probe Configured with 2 RF + 4 DC Probes

❖ **ONE PLATEN - Three BENEFITS**

**Signatone Multi Benefit /Two in One Platen Features:**

- "Quick Lift" with CVL for easy probe to pad separation and alignment
- "Fine Adjust" for Probe card and variable Chucks and DUT thickness setup
- "Position Lock" allows for secure "lock" of user defined platen height setup



## ❖ SYSTEM CONTROLS

The S1080 thermal chuck controller features touch screen commands, triple safety circuits, and 0.1° resolution. **ProbeMaster** software features thermal control from the probe station.

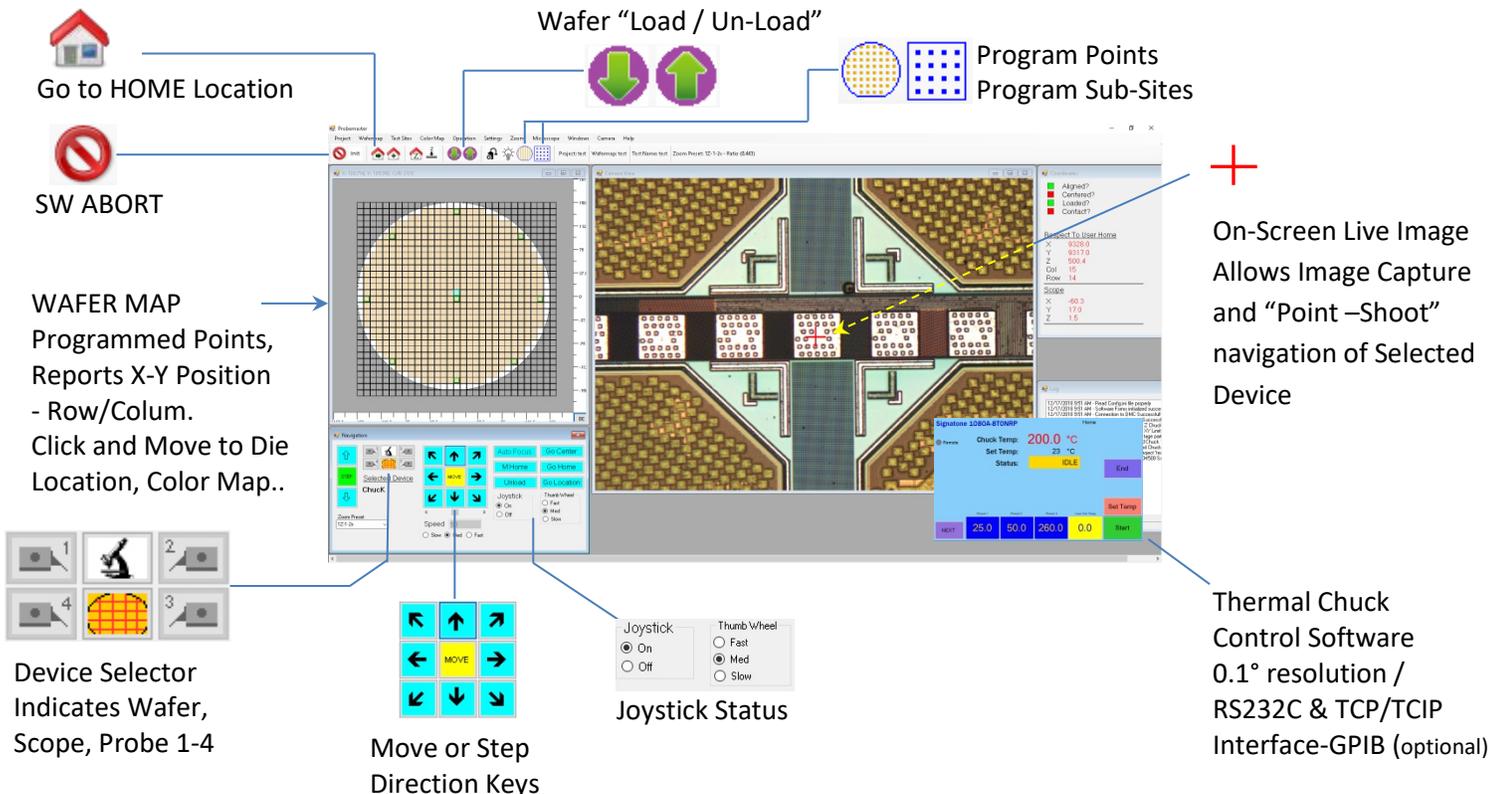
Hardware accessories including keyboards and mouse can be easily integrated into the table's instrumentation rack providing greater ease of use, ergonomics, and minimizing the overall system dimensions. System and thermal controllers may also be integrated.

Industry proven precision Joy Stick/ thumbwheel combination, intuitive selector panel for DUT, Microscope, and 1-4 Computer Aided Probes (CAP). LED indicator for active device, Multi-speed thumbwheels offer sub-micron positioning.



## ❖ SYSTEM SOFTWARE

Signatone's powerful navigation software **ProbeMaster** drives all Signatone semiautomatic probing systems. **ProbeMaster** simplifies navigation to a test site by using arrow keys, wafer graph or *point and shoot* on the live image. The optional vision control module includes *auto align*, *auto start*, *probe exact*, and *sure touch* features. Supports many popular interface protocols \* *see supported software platforms*



❖ **DC PROBE –SELECTION GUIDE**

|                           | Coax Probe (C)   | Triax Probe (T)           | Kelvin Probe (K) |
|---------------------------|------------------|---------------------------|------------------|
| Max voltage               | 500 V            | 500 V                     | 500 V            |
| Temperature range         | -60 °C to 300 °C | -60 °C to 300 °C          | -60 °C to 300 °C |
| Leakage current           | < 50fA           | < 20fA                    | < 20fA           |
| Connectivity              | BNC              | Standard Triax            | SSMC             |
| Connectivity type         | Single Coaxial   | Single low noise Triaxial | Force/Sense Coax |
| Characteristics impedance | 50 Ohms          | 50 Ohms                   | 50 Ohms          |
| Residual capacitance      | < 80fF           | < 80fF                    | < 80fF           |
| Probe holder material     | Brass            | Brass                     | Brass            |
| Probe tips material       | Tungsten         | Tungsten                  | Tungsten         |
| Probe tips sizes          | 0.5 µm – 25 µm   | 0.5 µm – 25 µm            | 0.5 µm – 25 µm   |
| Minimum pad size          | 25 µm x 25 µm    | 25 µm x 25 µm             | 25 µm x 25 µm    |



Coax Probe



Triax Probe



Coax Kelvin Probe

\*All leakage tests conducted in an enclosed environment with Keithley 4200, or equivalent, in sampling mode with 10 PLC, auto-ranging. 0.25s interval

❖ **High Voltage/High Current PROBE –SELECTION**

|                   | High Voltage Probes               |                                   |                  | High Current Probe   |
|-------------------|-----------------------------------|-----------------------------------|------------------|----------------------|
| Model             | HVP-CX-3                          | HVP-TX-3                          | HVP-CX-10        | HCP 100              |
| Max Voltage       | 3 kV                              | 3 kV                              | 10 kV            | 500 V                |
| Max Current       | 1 A DC/30 A Pulsed                | 120 mA DC                         | 20 mA DC         | 10 A DC/100 A Pulsed |
| Temperature Range | -60 °C to 300 °C                  | -60 °C to 300 °C                  | -60 °C to 300 °C | -60 °C to 300 °C     |
| Leakage Current   | < 200 pA @ 3 kV,<br>< 5 pA @ 10 V | < 1 pA @ 3 kV,<br>< 100 fA @ 10 V | < 100 pA @ 10 kV | N/A                  |
| Connector Type    | SHV                               | HV Triax                          | UHV Coax         | HV Banana            |
| Replaceable Tip   | Yes                               | Yes                               | Yes              | Yes                  |
| Probe Material    | W                                 | W                                 | W                | BeCu or W            |



HVP-CX-3



HVP-TX-3



HVP-CX-10



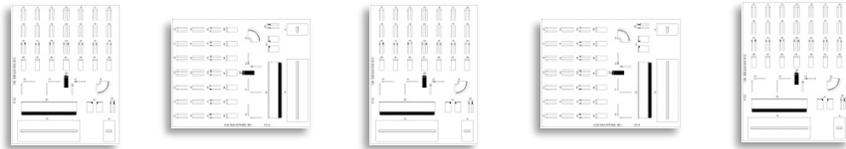
HCP-100

**❖ RF PROBE –SELECTION GUIDE**



**Cable Interface**

|                          | <b>SP-40A</b> | <b>SP-50A</b> | <b>SP-67A</b> | <b>SP-110H</b> | <b>SP-145</b> |
|--------------------------|---------------|---------------|---------------|----------------|---------------|
| <b>Frequency</b>         | DC-40GHz      | DC-50GHz      | DC-67GHz      | DC-110GHz      | DC-145GHz     |
| <b>Connector</b>         | 2.92mm        | 2.4mm         | 1.85mm        | 1.0mm          | 0.8mm         |
| <b>Tip Configuration</b> | GS/SG/GSG     | GS/SG/GSG     | GS/SG/GSG     | GS/SG/GSG      | GSG           |
| <b>Pitch Range</b>       | 50μ - 2540μ   | 50μ - 1250μ   | 50μ - 1250μ   | 50μ - 1250μ    | 50μ - 200μ    |
| <b>Insertion Loss</b>    | <.8db         | <1.0db        | <1.1db        | <1.5db         | <1.75db       |
| <b>Return Loss</b>       | > 18db        | >18db         | >14db         | >15db          | >15db         |



**Calibration Substrates**

| <b>GSG</b>  | <b>SP-CS-5</b>                          | <b>SP-CS-9</b> | <b>SP-CS-10</b> | <b>SP-CS-18</b> |
|-------------|---|----------------|-----------------|-----------------|
| Pad Size    | 50μ X 50μ<br>100μ X 100μ<br>150μ X 150μ | 100μ X 100μ    | 150μ X 150μ     | 300μ X 300μ     |
| Pitch Range | 75μ - 250μ                              | 250μ - 600μ    | 600μ - 1250μ    | 1250μ - 2540μ   |

| <b>GS/SG</b> | <b>SP-CS-8</b>                          | <b>SP-CS-14</b> | <b>SP-CS-11</b> | <b>SP-CS-17</b> |
|--------------|---|-----------------|-----------------|-----------------|
| Pad Size     | 50μ X 50μ<br>100μ X 100μ<br>150μ X 150μ | 100μ X 100μ     | 150μ X 150μ     | 300μ X 300μ     |
| Pitch Range  | 50μ - 200μ                              | 200μ - 400μ     | 400μ - 1250μ    | 750μ - 2540μ    |

| <b>GSG &gt; 110GHz</b> | <b>SP-CS-15</b>                       |
|------------------------|---------------------------------------|
| Pad Size               | 25μ X 25μ                             |
| Pitch Range            | 40μ - 150μ (SOLT)<br>30μ - 150μ (LRM) |



**RF Cables**

|                 | <b>RFC-40</b>   | <b>RFC-50</b> | <b>RFC-67</b>   | <b>RFC-110</b> |
|-----------------|-----------------|---------------|-----------------|----------------|
| Frequency Range | DC - 40GHz      | DC - 50GHz    | DC - 67GHz      | DC - 110GHz    |
| Length          | 4 Ft.           | 4 Ft.         | 3 Ft.           | *              |
| Connectors      | 2.92 M – 2.92 F | 2.4 M – 2.4 F | 1.85 M - 1.85 F | 1.0 M - 1.0 F  |

\* Contact Factory

❖ **NON-THERMAL CHUCKS**

**Standard Wafer Chuck**

|  |  |
|--|--|
| Connectivity                           | Coax BNC (m)   |
| Diameter                               | 308 mm   |
| Material                               | Nickel Plated Brass (gold optional)                        |
| Chuck surface                          | Zone selector knob with Peppered vacuum patterns           |
| Vacuum hole pattern sections(diameter) | 22mm, 50mm, 91mm, 135mm, 168mm, 265mm                      |
| Vacuum actuation                       | Selector Knob allows individual activation of vacuum zones |
| Supported DUT sizes                    | 25mm, 75mm, 100mm, 150mm, 200mm, 300mm                     |
| Surface planarity                      | ±6.5μ  |
| Rigidity                               | <3μ / 10N at edge of the chuck                             |

**Electrical Specification (Coax)**

|   |   |
|---|---|
| Operation voltage                         | Designed for operation at -200V to + 200VDC |
| Maximum voltage between chuck top and GND | 500 V DC                                    |
| Isolation                                 | > 150 GΩ                                    |

**Wafer Chuck (Triaxial)**

|  |  |
|--|--|
| Connectivity                           | Triax (m)                                  |
| Diameter                               | 308 mm                                     |
| Material                               | Gold Plated Brass                          |
| Chuck surface                          | Independent Vacuum zones with vacuum rings |
| Vacuum hole pattern sections(diameter) | 0mm, 65mm, 112mm, 162mm, 265mm             |
| Vacuum actuation                       | Multi-Zone Adjustable Control              |
| Supported DUT sizes                    | 3mm, 75mm, 125mm, 200mm, 300mm             |
| Surface planarity                      | ± 5 μm                                     |
| Rigidity                               | <3μ / 10N near at edge of the chuck        |

**Electrical Specification (Triax)**

|                 |                   |
|-----------------|-------------------|
| Chuck isolation | Measured @ 10V DC |
| Force to guard  | > 2 TΩ            |
| Guard to shield | > 7 TΩ            |
| Force to shield | > 15 TΩ           |

❖ **SIGNATONE THERMAL CHUCKS**

**Typical Specifications of *Signatone* Thermal Technology**

|   | <b>300mm Standard Hot</b>                  | <b>300mm Hot/ Triax</b>                  | <b>300mm Hot/ 3kV Triax</b>              |
|---|--|--|--|
| Temperature Range                               | +25 °C to +300 °C                          | +25 °C to +200 °C                        | +25 °C to +200 °C                        |
| Connectivity                                    | Coax (m)                                   | Triax (m)                                | HV Triax (m)                             |
| Temperature control method                      | Liquid Cooled / Resistance heater          | Liquid Cooled / Resistance heater        | Liquid Cooled / Resistance heater        |
| Coolant   | Water                                      | Water                                    | Water                                    |
| Smallest temperature selection step             | 0.1 °C                                     | 0.1 °C                                   | 0.1 °C                                   |
| Chuck temperature display resolution            | 0.01 °C                                    | 0.01 °C                                  | 0.01 °C                                  |
| External touchscreen display operation          | Yes  | Yes                                      | Yes                                      |
| Temperature stability                           | ±0.1 °C                                    | ±0.1 °C                                  | ±0.1 °C                                  |
| Temperature accuracy                            | ±0.5 °C                                    | ±0.5 °C                                  | ±0.5 °C                                  |
| Control method                                  | Low noise DC/PID                           | Low noise DC/PID                         | Low noise DC/PID                         |
| Interfaces                                      | RS232C & TCP/TCIP                          | RS232C & TCP/TCIP                        | RS232C & TCP/TCIP                        |
| Optional Interfaces                             | GP-IB                                      | GP-IB                                    | GP-IB                                    |
| Chuck surface plating                           | Nickel                                     | Gold                                     | Gold                                     |
| Temperature sensor                              | RTD  | RTD                                      | RTD                                      |
| Temperature uniformity                          | ±0.5 °C at ≤ 200 °C<br>±1.5 °C at > 200 °C | ±0.5 °C at ≤ 100 °C<br>±2.5 °C at 200 °C | ±0.5 °C at ≤ 100 °C<br>±3.5 °C at 200 °C |
| Surface flatness                                | < ±10 μm                                   | < ±8 μm                                  | < ±15μ                                   |
| Electrical isolation - Coax BNC (m) / SHV Triax | 150nA                                      | > 5TΩ                                    | > 5TΩ                                    |
| Heating Rates                                   | 25°C to 300°C < 12 min                     | 25°C to 200°C < 9 min                    | 25°C to 200°C < 28 min                   |
| Cooling Rates                                   | 300°C to 25°C < 9min                       | 200°C to 25°C < 8min                     | 200°C to 25°C < 8min                     |
| Leakage @ 10 V Kelvin Triax                     | N/A  | <25fA                                    | <400fA                                   |
| Residual Capacitance                            |  | <200fF                                   | <1pF                                     |
| Maximum voltage between chuck top and GND       | 500V                                       | 500V                                     | 3kV                                      |
| 3 Safety Circuits                               | Yes  | Yes                                      | Yes                                      |
| Vacuum Pattern                                  | Rings                                      | Pin hole                                 | Pin hole                                 |
| Vacuum Zone (DUT Size)                          | 50, 100, 150, 200,300mm                    | 2, 50, 100, 150, 200,300mm               | 2,50, 100, 150, 200, 300mm               |

**System Controller / Dimensions /Weight / Power Consumption**

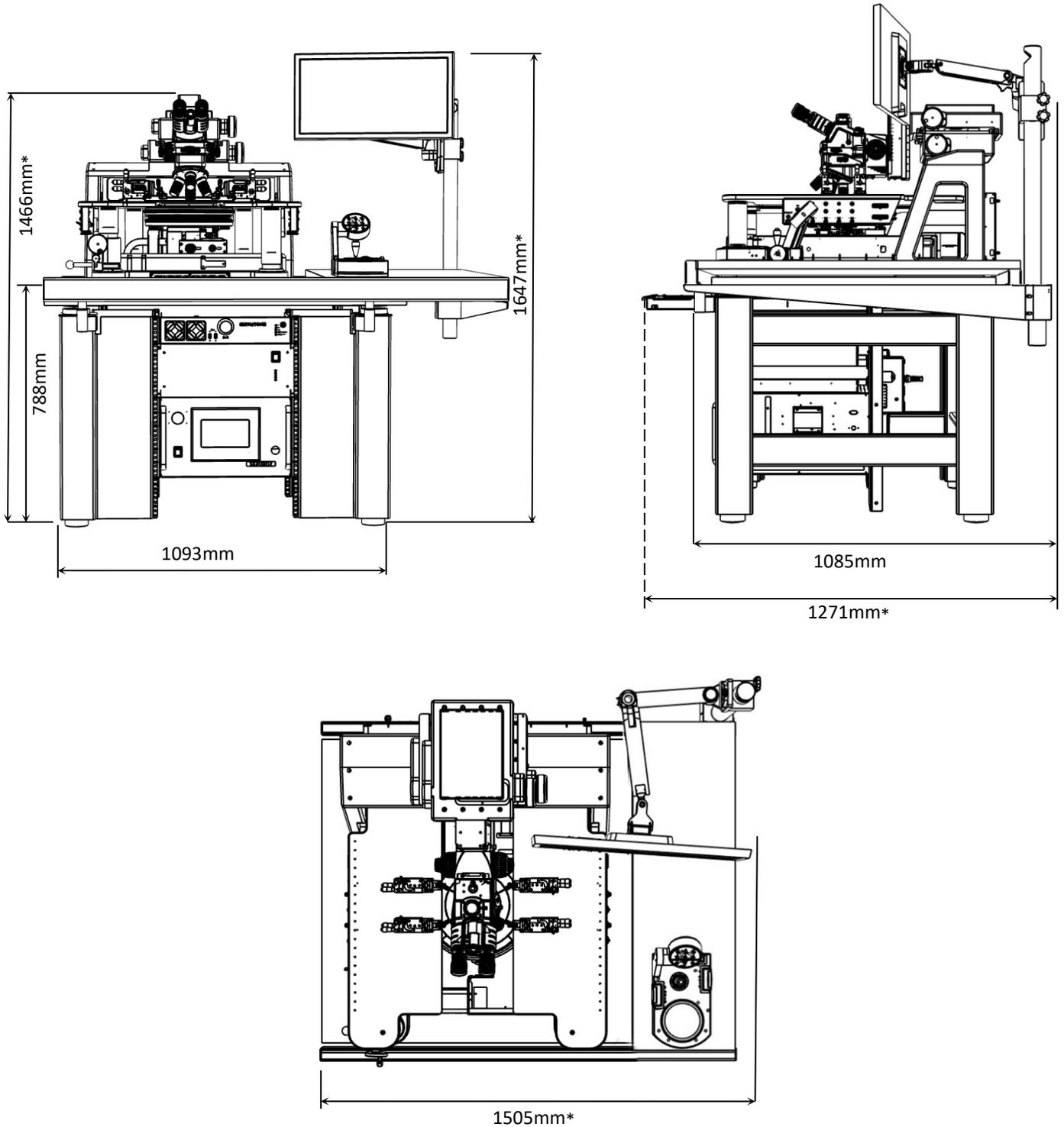
| System Model | W x D x H (mm)  | Weight (kg) | Weight (Lbs.) | Power cons. (VA) |
|--------------|-----------------|-------------|---------------|------------------|
| S-1080       | 558 x 483 x 178 | 20.4        | 45            | 2000             |
| TC-II        | 355 x 711 x 610 | 50.8        | 112           | 1500             |

❖ **SYSTEM DIMENSIONS INCLUDING TABLE**

**CM-350 / Vibration Isolation Table /Monitor and Keyboard Mount**

|                        |                     |                      |
|------------------------|---------------------|----------------------|
| Dimensions (L x D x H) | 863x 1085 x 1466 mm | (34 x 42.7 x 57 In ) |
| Weight                 | 340 kg              | (750 lbs.)           |

\* Can vary dependent on monitor, keyboard (roll out drawer) position and Microscope selection



## ❖ WARRANTY

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- Standard Warranty 12 months \*
- For Extended Warranty and Service Contracts : Contact Signatone Corp. for more information

\* See *Signatone Corporate Terms and Conditions of Sale* for further details.

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