Capacitance Sensors for
Ungrounded Targets or
Poorly Grounded Targets

PUSH/PULL PROBES

LOW NOISE  HIGH LINEARITY
HIGH RESOLUTION CUSTOMIZABLE
SUB NANOmeter RESOLUTION

TWO HIGH PRECISION SENSORS BUILT INTO ONE BODY
Capacitance Technology:

Standard capacitive sensors require the target to be electrically grounded. Current flows from the probe face to the target and back to the amplifier to complete the circuit. The capacitance between probe and target is proportional to the distance and converted to a 0 - 10V output from the amplifier. The measurement of electrically grounded targets can be, however, affected by changes in the electrical conductivity or ground path of the target.

Unique Push/Pull Technology:

Two Probes built into one body

To eliminate the effects of these variations, MTII developed a unique version of the Accumeasure sensor called the push-pull. In this design each probe consists of two capacitance sensors, built into one probe body. Each sensor is driven at the same voltage, however, there is a 180 degree phase shift between signals. This shift allows the current path to travel across the target surface rather than through the target to ground, eliminating any inaccuracies created by poorly grounded targets. Additionally, highly resistive targets can be measured with this technology allowing capacitance sensors to be used on semi-insulating and semi-conducting targets.

Best for Applications, Such As:

- Semiconductor Thickness
- Sheet Metal Thickness
- Photovoltaic Wafer Thickness
- Automotive Brake Rotor Run-out
- Thickness Variation
- Leveling or Flatness Measurements
- Wafer Mask Alignment
Ground shell must be grounded to amplifier ground for proper performance.
COMPACT
ASP-200MD-ILA/PP
HIGH TEMPERATURE PROBE

This high-temperature capacitance probe is made from Inconel and its face will withstand 300°C. The probe back end will withstand 200°C. Ideal for break rotor measurement.

<table>
<thead>
<tr>
<th>Base Range</th>
<th>Base Sensitivity</th>
<th>Base Min. Range</th>
<th>Spot Size</th>
<th>Linearity</th>
<th>Model</th>
<th>Part #</th>
<th>Range Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 µm</td>
<td>8 mils</td>
<td>20 µm/V</td>
<td>0.8 µm/V</td>
<td></td>
<td>ASP-200MD-ILA/PP</td>
<td>8200-2111-420</td>
<td>1X to 10X</td>
</tr>
</tbody>
</table>

ASP-250MD-ILA/PP
PRINTED CIRCUIT BASED PROBE

Ideally suited for photovoltaic applications as the long body allows for good clearance above and below the PV cell.

<table>
<thead>
<tr>
<th>Base Range</th>
<th>Base Sensitivity</th>
<th>Base Min. Range</th>
<th>Spot Size</th>
<th>Linearity</th>
<th>Model</th>
<th>Part #</th>
<th>Range Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 µm</td>
<td>10 mils</td>
<td>25 µm/V</td>
<td>1.0 µm/V</td>
<td></td>
<td>ASP-250MD-ILA/PP</td>
<td>8200-9001-420</td>
<td>1X to 7X</td>
</tr>
</tbody>
</table>

Ground shell must be grounded to amplifier ground for proper performance
**Ground shell must be grounded to amplifier ground for proper performance.**

### Model Specifications

#### Product Information
- **Model**: ASP-5R-ILA/PP, ASP-125MR-ILA/PP, ASP-25MR-ILA/PP
- **Part #**: 8000-6933, 8200-2003-420

#### Extended Range
- **Extended Range Formula**: $\text{Extended Range} = \text{Base Range} \times \text{Range Extension}$
- **Example**:
  - **Base Range**: 125 µm
  - **Range Extension**: 1X to 5X
  - **Extended Range**: 625 µm

#### Extended Range Sensitivity
- **Extended Range Sensitivity Formula**: $\text{Extended Range Sensitivity} = \text{Base Sensitivity} \times \text{Range Extension}$
- **Example**:
  - **Base Sensitivity**: 0.5 µm/V
  - **Range Extension**: 1X to 7X
  - **Extended Range Sensitivity**: 3.5 µm/V

### Key Dimensions
- **Shaft Diameter (D)**
- **Length (L)**
- **Throat Diameter (E)**

### Table of Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Part #</th>
<th>Range Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASP-5R-ILA/PP</td>
<td>8000-6933</td>
<td>1X to 5X</td>
</tr>
<tr>
<td>ASP-125MR-ILA/PP</td>
<td>8200-2003-420</td>
<td>1X to 7X</td>
</tr>
<tr>
<td>ASP-25MR-ILA/PP</td>
<td>8200-2004-420</td>
<td>1X to 7X</td>
</tr>
<tr>
<td>ASP-10R-ILA/PP Ext</td>
<td>8000-6934</td>
<td>1X to 5X</td>
</tr>
<tr>
<td>ASP-250MR-ILA/PP</td>
<td>8200-2004-420</td>
<td>1X to 7X</td>
</tr>
<tr>
<td>ASP-10R-ILA/PP Ext</td>
<td>8000-6935</td>
<td>1X to 5X</td>
</tr>
<tr>
<td>ASP-500MR-ILA/PP</td>
<td>8200-2005-420</td>
<td>1X to 7X</td>
</tr>
<tr>
<td>ASP-20R-ILA/PP</td>
<td>8000-6936</td>
<td>1X to 5X</td>
</tr>
</tbody>
</table>
NOTE:

- Probe resolution is approximately 0.00000085 V/Hz FSR.
- Noise increases proportionally to range extension selected.
- As range extension increases, linearity decreases. (i.e. X2 range extension will decrease resolution by 2X.
- Increasing the averaging function will decrease noise but also decrease the amplifier’s bandwidth [consult users manual].
- Increasing the probe’s cable length will also increase system noise and decrease resolution.

Compatible with the following MTI Capacitance Amplifiers

**Accumeasure™ 500**
Choose Probes with BNC Connectors
Analog Output Benchtop Capacitance Modular System with AS-562 Amplifiers

**Accumeasure™ AS-562**
Choose Probes with BNC Connectors
Analog Output OEM Board

**Accumeasure™ D series**
with Push/Pull option
Choose Probes with SMA Connectors

Optional Accessories

<table>
<thead>
<tr>
<th>Product #</th>
<th>Product Description</th>
<th>Model Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>8000-6899-412</td>
<td>90 Ω Low Noise Extension Cable</td>
<td>BNC-M to BNC-M Extension Cable</td>
</tr>
<tr>
<td>8000-6899-424</td>
<td>2.4 meters (8 feet) length</td>
<td></td>
</tr>
<tr>
<td>8000-6899-436</td>
<td>3.6 meters (12 feet) length</td>
<td></td>
</tr>
<tr>
<td>8000-6891-410</td>
<td>Special Low Noise Probe Extension Cables, 1 meter</td>
<td>SMA-M to SMA-F Extension Cable</td>
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<tr>
<td>8000-6891-420</td>
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<tr>
<td>8000-6891-440</td>
<td></td>
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<tr>
<td>8000-6952</td>
<td>Probe Calibrator</td>
<td>KD-CH4D</td>
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<tr>
<td>2100-2104</td>
<td>BNC Adapter to join two Extension Cables</td>
<td>BNC-F to BNC-F Adapter</td>
</tr>
<tr>
<td>8000-6892-503</td>
<td>Converter cable for BNC Probes to Digital Output Amplifiers</td>
<td>BNC-F to SMA-M Cable</td>
</tr>
<tr>
<td>8000-6890</td>
<td>Converter for SMA probes to Analog Output Amplifiers</td>
<td>SMA-F to BNC-M Adapter</td>
</tr>
<tr>
<td>2100-1876A</td>
<td>BNC Bulkhead Feedthru</td>
<td>BNC-F to BNC-F Adapter</td>
</tr>
<tr>
<td>8000-6257</td>
<td>SMA Bulkhead Feedthru</td>
<td>SMA-M to SMA-F Adapter</td>
</tr>
</tbody>
</table>

xxx-M = Male Type Connector  
xxx-F = Female Type Connector

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A subsidiary of Mechanical Technology, Inc. (MKTY)

Document No. 7001-0126 Revision 3.1