

Capacitance Sensors for
Ungrounded Targets or
Poorly Grounded Targets

PUSH/PULL PROBES

LOW NOISE

HIGH LINEARITY

HIGH RESOLUTION CUSTOMIZABLE

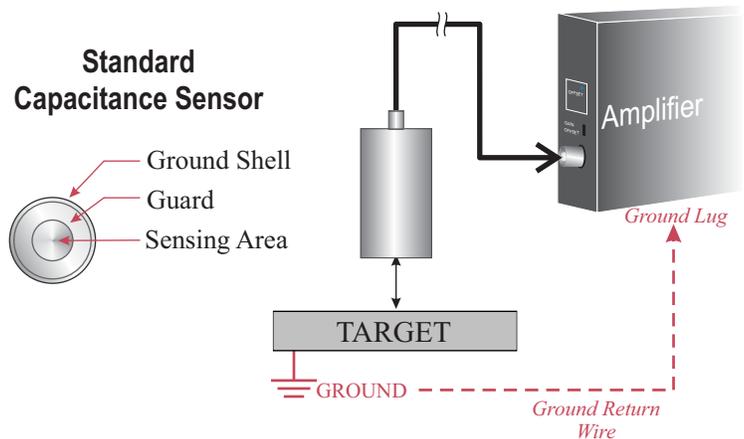
SUB NANOMETER RESOLUTION



TWO HIGH PRECISION SENSORS BUILT INTO ONE BODY

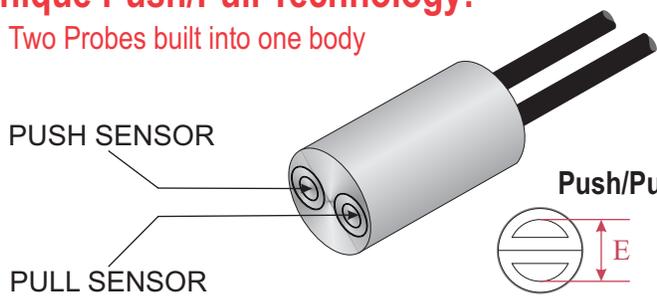
Capacitance Technology:

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.



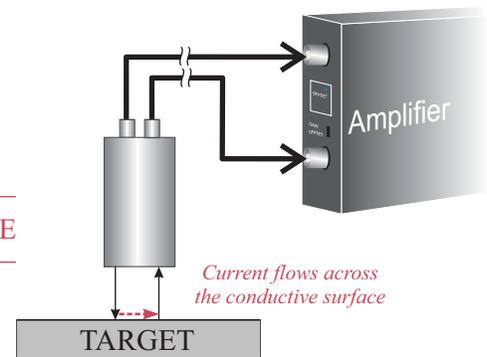
Unique Push/Pull Technology:

Two Probes built into one body



Push/Pull Sensor

E = Spot Size on Target



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.

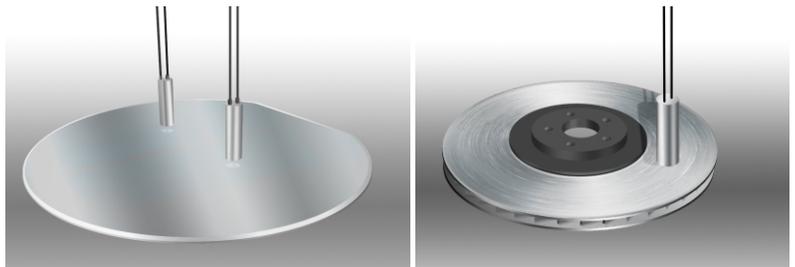


Push/Pull Probes provide better linearity and accuracy than 2 standard capacitance sensors in tandem through precision balanced currents and reduced fringe effects.

Additionally, the push/pull amplifier design cancels common mode electrical noise that may be induced in this target. Common mode noise may be encountered in magnetic bearing surfaces, semiconductor wafers, brake rotors and air bearing floating surfaces.

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



Extended Range = Base Range x Range Extension

Extended Range Sensitivity = Base Sensitivity x Range Extension

E	11.58 mm (0.456 inch)
D	20 mm (0.787 inch)
L	100 mm (3.937 inch)

Base Range		Base Sensitivity		Base Min. Range		Spot Size		Linearity	Model	ASP-350MD-ILA/PP	ASP-14D-ILA/PP
μm	<i>mils</i>	$\mu\text{m}/\text{V}$	<i>mils/V</i>	μm	<i>mils</i>	mm	<i>Inch</i>	% FSR	Part #	8200-2109-420	8000-6937
350	14.0	35	1.4	35	1.4	7.417	0.292	0.02%	Range Extension	1X to 7X	1X to 5X

E	11.58 mm (0.456 inch)
D	16 mm (0.63 inch)
L	100 mm (3.937 inch)

Base Range		Base Sensitivity		Base Min. Range		Spot Size		Linearity	Model	ASP-250MD-ILA/PP Ext	ASP-10D-ILA/PP Ext
μm	<i>mils</i>	$\mu\text{m}/\text{V}$	<i>mils/V</i>	μm	<i>mils</i>	mm	<i>Inch</i>	% FSR	Part #	8200-2114-420	8000-6939
250	10	25	1.0	25	1.0	10.26	0.40	0.02%	Range Extension	1X to 8X	1X to 5X

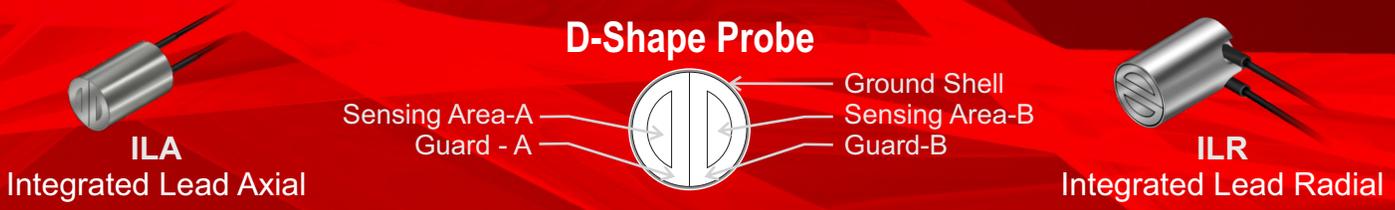
E	5.03 mm (0.198 inch)
D	14.86 mm (0.585 inch)
L	33.78 mm (1.33 inch)

Base Range		Base Sensitivity		Base Min. Range		Spot Size		Linearity	Model	ASP-250MD-ILA/PP	ASP-10D-ILA/PP
μm	<i>mils</i>	$\mu\text{m}/\text{V}$	<i>mils/V</i>	μm	<i>mils</i>	mm	<i>Inch</i>	% FSR	Part #	8200-2104-420	8000-6941
250	10	25	1.0	25	1.0	12.83	0.51	0.02%	Range Extension	1X to 7X	1X to 5X

E	7.11 mm (0.28 inch)
D	16 mm (0.63 inch)
L	50 mm (1.969 inch)

Base Range		Base Sensitivity		Base Min. Range		Spot Size		Linearity	Model	ASP-250MD-ILR/PP	ASP-10D-ILR/PP
μm	<i>mils</i>	$\mu\text{m}/\text{V}$	<i>mils/V</i>	μm	<i>mils</i>	mm	<i>Inch</i>	% FSR	Part #	8200-3104-420	8000-6943
250	10	25	1.0	25	1.0	16.15	0.64	0.02%	Range Extension	1X to 7X	1X to 5X

Ground shell must be grounded to amplifier ground for proper performance

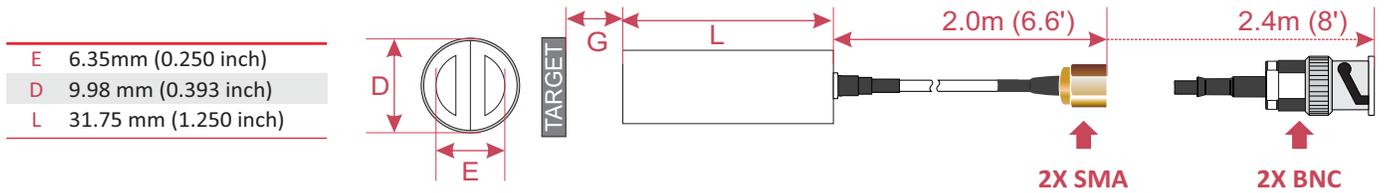


Extended Range = Base Range x Range Extension

Extended Range Sensitivity = Base Sensitivity x Range Extension

COMPACT
ASP-200MD-ILA/PP/HT
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.

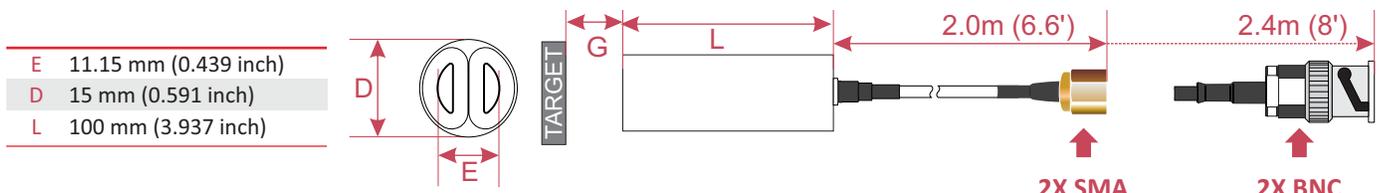


E	6.35mm (0.250 inch)
D	9.98 mm (0.393 inch)
L	31.75 mm (1.250 inch)

Base Range		Base Sensitivity		Base Min. Range		Spot Size		Linearity	Model	ASP-200MD-ILA/PP	ASP-8D-ILA/PP
μm	mils	μm/V	mils/V	μm	mils	mm	Inch	% FSR	Part #	8200-2111-420	8000-7061-424
200	8	20	0.8	20	0.8	6.5	0.256	0.02%	Range Extension	1X to 10X	1X to 5X

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.

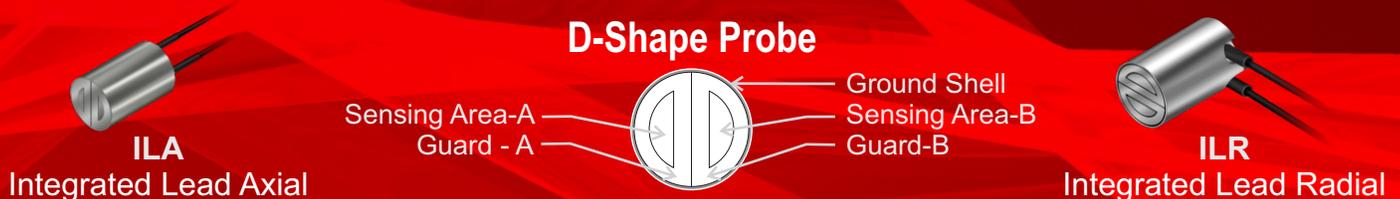


E	11.15 mm (0.439 inch)
D	15 mm (0.591 inch)
L	100 mm (3.937 inch)

Base Range		Base Sensitivity		Base Min. Range		Spot Size		Linearity	Model	ASP-250MD-ILA/PP	ASP-10D-ILA/PP
μm	mils	μm/V	mils/V	μm	mils	mm	Inch	% FSR	Part #	8200-9001-420	8000-6388-424
250	10	25	1.0	25	1.0	10.26	0.40	0.02%	Range Extension	1X to 7X	1X to 5X

Ground shell must be grounded to amplifier ground for proper performance

D-Shape Probe



Extended Range = Base Range x Range Extension

Extended Range Sensitivity = Base Sensitivity x Range Extension

E	7.42 mm (0.292 inch)
D	10.3 mm (0.406 inch)
L	31.75 mm (1.25 inch)

Base Range		Base Sensitivity		Base Min. Range		Spot Size		Linearity	Model	ASP-125MR-ILA/PP	ASP-5R-ILA/PP
μm	<i>mils</i>	$\mu\text{m}/\text{V}$	<i>mils/V</i>	μm	<i>mils</i>	mm	<i>Inch</i>	% FSR	Part #	8200-2003-420	8000-6933
125	5.0	12.5	0.5	12.5	0.5	11.6	0.456	0.02%	Range Extension	1X to 7X	1X to 5X

E	10.26 mm (0.404 inch)
D	14 mm (0.551 inch)
L	31.75 mm (1.25 inch)

Base Range		Base Sensitivity		Base Min. Range		Spot Size		Linearity	Model	ASP-250MR-ILA/PP	ASP-10R-ILA/PP
μm	<i>mils</i>	$\mu\text{m}/\text{V}$	<i>mils/V</i>	μm	<i>mils</i>	mm	<i>Inch</i>	% FSR	Part #	8200-2004-420	8000-6934
250	10	25	1.0	25	1.0	11.6	0.456	0.02%	Range Extension	1X to 7X	1X to 5X

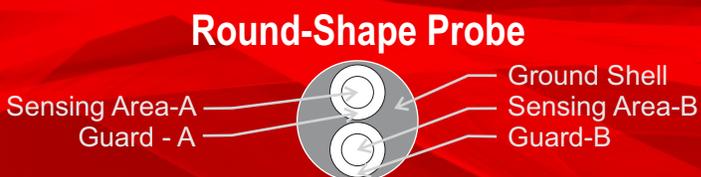
E	12.83 mm (0.505 inch)
D	19 mm (0.748 inch)
L	31.75 mm (1.25 inch)

Base Range		Base Sensitivity		Base Min. Range		Spot Size		Linearity	Model	ASP-250MR-ILA/PP Ext	ASP-10R-ILA/PP Ext
μm	<i>mils</i>	$\mu\text{m}/\text{V}$	<i>mils/V</i>	μm	<i>mils</i>	mm	<i>Inch</i>	% FSR	Part #	8200-2014-420	8000-6935
250	10	25	1.0	25	1.0	9.4	0.372	0.02%	Range Extension	1X to 8X	1X to 5X

E	16.15 mm (0.636 inch)
D	23 mm (0.906 inch)
L	31.75 mm (1.25 inch)

Base Range		Base Sensitivity		Base Min. Range		Spot Size		Linearity	Model	ASP-500MR-ILA/PP	ASP-20R-ILA/PP
μm	<i>mils</i>	$\mu\text{m}/\text{V}$	<i>mils/V</i>	μm	<i>mils</i>	mm	<i>Inch</i>	% FSR	Part #	8200-2005-420	8000-6936
500	20	50	2.0	50	2.0	7.1	0.280	0.02%	Range Extension	1X to 7X	1X to 5X

Ground shell must be grounded to amplifier ground for proper performance



NOTE:



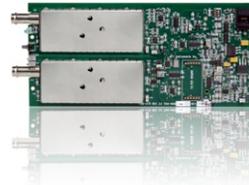
- Probe resolution is approximately 0.00000085 VHz FSR.
- Noise increases proportionally to range extension selected.
- As range extension increases, linearity decreases. (i.e. X2 range extension will decrease resolution by 2X).
- Increasing the averaging function will decrease noise but also decrease 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

Product #	Product Description	Model Name
	90 Ω Low Noise Extension Cable	
8000-6899-412	1.2 meters (4 feet) length	BNC-M to BNC-M Extension Cable
8000-6899-424	2.4meters (8 feet) length	
8000-6899-436	3.6 meters (12 feet) length	
	Special Low Noise Probe Extension Cables	
8000-6891-410	1 meter (3.3 feet) length	SMA-M to SMA-F Extension Cable
8000-6891-420	2 meters (6.5 feet) length	
8000-6891-440	4 meters (13.1 feet) length	
8000-6952	Probe Calibrator	KD-CH4D
2100-2104	BNC Adapter to join two Extension Cables	BNC-F to BNC-F Adapter
8000-6892-503	Converter cable for BNC Probes to Digital Output Amplifiers	BNC-F to SMA-M Cable
8000-6890	Converter for SMA probes to Analog Output Amplifiers	SMA-F to BNC-M Adapter
2100-1876A	BNC Bulkhead Feedthru	BNC-F to BNC-F Adapter
8000-6257	SMA Bulkhead Feedthru	SMA-M to SMA-F Adapter

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

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