



SERIES 260 & 261

3-COMPONENT DYNAMIC FORCE SENSORS

- Standard ranges available up to 10000 lbf in the Z axis and 4000 lbf in the the X and Y axis
- Stainless Steel Construction, Hermetically Sealed
- Choice of ICP® or Charge Versions

TYPICAL APPLICATIONS

- Automotive Chassis and Other Vehicle Dynamic Measurements
- Monitor Cutting Tool Forces and Detect Tool Wear
- Provide Feedback for Force Limited Vibration Testing
- Measure Input Forces for Modal Analysis and Structural Testing
- Assess and Study Biomechanic Ability, Chart Therapy Progress
- Monitor Machine and Engine Mounts for Imbalance or Looseness
- Measure Impact Forces During Drop Testing and Crash Testing



CONDUCT SIMULTANEOUS FORCE MEASUREMENTS IN THREE ORTHOGONAL DIRECTIONS

Three-component dynamic force sensors are offered in both ICP® and charge output configurations for dynamic and quasi-static force measurement applications. Each utilizes an array of precision-aligned, quartz sensing crystals. Measurements along the z-axis are proportional to applied compression, tension, and impact forces. Measurements along the x and y axes are proportional to shear forces that are imposed upon preloaded crystals by the test fixture.

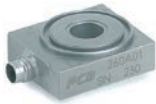
ICP® models contain built-in, microelectronic signal conditioning circuitry to provide clean, low-impedance output signals that can be transmitted over low cost cables and in adverse, industrial environments. Multi-pin connectors facilitate a single point hookup with common, multi-conductor cable. Charge output styles achieve higher temperature operation, and are suitable for applications requiring flexible setup and maximum signal-to-noise.

Versions are available with ranges to 10000 lb (45 kN) in the z-axis (perpendicular to top surface), and to 4000 lb (18 kN) in the x- and y-axes. Both ICP® and charge output styles are available. Metric mounting holes are also available.

As with all PCB® instrumentation, these sensors are complemented with toll-free applications assistance, 24-hour customer service, and are backed by a no-risk policy that guarantees satisfaction or your money refunded.

3-COMPONENT ICP® QUARTZ RING STYLES

CE



Model 260A01

CE



Model 260A02

CE



Model 260A03

COMPONENT QUARTZ FORCE SENSORS

		ICP® Models			Charge Output		
Model Number		260A01	260A02	260A03	260A11	260A12	260A13
Performance							
Compression or Tension Range (z-axis)	lb (N)	1000 (4500)	1000 (4500)	10k (45k)	1000 (4500)	1000 (4500)	10k (45k)
Shear Range (x-, y-axis)	lb (N)	500 (2200)	1000 (4500)	4000 (18k)	500 (2200)	1000 (4500)	4000 (18k)
Maximum Compression or Tension (z-axis)	lb (N)	1320 (6000)	1320 (6000)	11k (50k)	1320 (6000)	1320 (6000)	11k (50k)
Maximum Shear (x-, y-axis)	lb (N)	660 (3000)	1000 (4500)	4400 (19k)	660 (3000)	1000 (4500)	4400 (19k)
Sensitivity (± 20%) (z-axis)	–	2.5 mV/lb 0.56 mV/N	2.5 mV/lb 0.56 mV/N	0.25 mV/lb 0.06 mV/N	15 pC/lb 3.4 pC/N		
Sensitivity (± 20%) (x-, y-axis)	–	10 mV/lb 2.2 mV/N	5 mV/lb 1.1 mV/N	1.25 mV/lb 0.28 mV/N	32 pC/lb 7.2 pC/N		
Resolution (broadband) (z-axis) (x-, y-axis)	lb (N) rms	0.006 (0.027) 0.002 (0.009)	0.006 (0.027) 0.006 (0.027)	0.05 (0.22) 0.01 (0.045)	see note [4]		
Amplitude Linearity [5]	% FS				≤1		
Cross-Talk Fx ÷ Fy Fx, Fy ÷ Fz	%				±3 ±5		
Upper Frequency Limit	Hz	90k		39k	90k		39k
Low Frequency Response (-5%) (z-axis) (x-, y-axis)	Hz	0.01			see note [4]		
	Hz	0.001					
Environmental Specifications							
Temperature Range	°F °C	-65 to +250 -54 to +121			-100 to +350 -73 to +177		
Electrical Specifications							
Discharge Time Constant [1] (z-axis) (x-, y-axis)	seconds	≥50 ≥500			see note [4]		
Output Impedance	ohm	≤100			N/A		
Output Bias Voltage	+VDC	8 to 14			N/A		
Voltage Excitation	+VDC	20 to 30			N/A		
Constant Current Excitation	mA	2 to 20			N/A		
Capacitance (all axes)	pF	N/A			18	30	70
Insulation Resistance	ohm	N/A			>10 ¹²		
Polarity (in direction of markings)		positive			negative		
Physical Specifications							
Recommended Pre-Load	lb (N)	5000 (22k)	10k (44.5k)	40k (178k)	5000 (22k)	10k (44.5k)	40k (177k)
Connector	type	4-pin male			10-32 (three)		
Stiffness (z-axis) (x-, y-axis)	lb/μin (kN/μm)	10 (1.75) 4 (0.70)	19 (3.3) 6 (1.05)	40 (7) 15 (2.6)	10 (1.75) 4 (0.70)	19 (3.3) 6 (1.05)	40 (7) 15 (2.6)
Sealing	type	hermetic weld					
Material (stainless steel)	type	17-4					
Maximum Allowable Torque (z-axis)	ft-lb (N-m)	14 (19)	40 (54)	240 (325)	14 (19)	40 (54)	240 (325)
Maximum Allowable Bending Moment (x-, y-axis)	ft-lb (N-m)	13 (17.6)	70 (94)	325 (441)	13 (17.6)	70 (94)	325 (441)
Weight	oz (gm)	0.93 (26)	1.59 (45)	9.6 (271)	0.87 (24.6)	1.5 (42.5)	9.9 (280)
Supplied Accessories [2]							
Mounting Stud (beryllium-copper)	model	081A70	081A74	081A71	081A70	081A74	081A71
Mounting Stud Thread	size	5/16-24	1/2-20	7/8-14	5/16-24	1/2-20	7/8-14
Anti-Friction Washer	model	082B02	082M12	082B06	082B02	082M12	082B06
Pilot Bushing	model	083A10	083A13	083A11	083A10	083A13	083A11
Optional Models							
Reverse Shear Polarity	model	–			260A31	260A32	260A33
Options [3]	prefix	M,W					

Notes: [1] The Discharge Time Constant (DTC) determines low frequency response according to the relationship $f-5\% = 3/(2\pi(DTC))$. Sensors accurately follow transient events lasting a few percent of the DTC. For square wave events, the DTC should be 100 times the event duration. For ramp shape events, the DTC should be 50 times the event duration and for a half sine pulse the DTC should be 25 times the pulse duration. To ensure measurement system compatibility, use DC coupled or Long Time Constant signal conditioners for long duration transient measurements. [2] See page 2.13 for complete accessory listings. [3] See page 1.17 for a description of options (specifications for optional versions may differ slightly. Consult factory before ordering). For complete listing of metric accessory model number and threads, see page 2.23. [4] Resolution, System Discharge Time Constant and Low Frequency range are dependent upon sensor cable and signal conditioning used. [5] Recommended pre-load is required to meet published specification and calibration.

3-COMPONENT ICP® TRIAXIAL FORCE LINK STYLES

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Model 261A01

CE



Model 261A02

CE



Model 261A03

3-COMPONENT QUARTZ FORCE LINKS

Model Number	ICP® Models			Charge Output			
	261A01	261A02	261A03	261A11	261A12	261A13	
Performance							
Compression or Tension Range (z-axis)	lb (N)	1000 (4500)	1000 (4500)	10k (45k)	1000 (4500)	1000 (4500)	10k (45k)
Shear Range (x-, y-axis)	lb (N)	500 (2200)	1000 (4500)	4000 (18k)	500 (2200)	1000 (4500)	4000 (18k)
Maximum Compression or Tension (z-axis)	lb (N)	1320 (6000)	1320 (6000)	11k (50k)	1320 (6000)	1320 (6000)	11k (50k)
Maximum Shear (x-, y-axis)	lb (N)	660 (3000)	1000 (4500)	4400 (19k)	660 (3000)	1000 (4500)	4400 (19k)
Sensitivity (± 20%) (x-, y-axis)	-	2.5 mV/lb 0.56 mV/N	2.5 mV/lb 0.56 mV/N	0.25 mV/lb 0.06 mV/N	15 pC/lb 3.4 pC/N		
Sensitivity (± 20%) (z-axis)	-	10 mV/lb 2.2 mV/N	5 mV/lb 1.1 mV/N	1.25 mV/lb 0.28 mV/N	32 pC/lb 7.2 pC/N		
Resolution (broadband) (z-axis) (x-, y-axis)	lb (N) rms	0.006 (0.027) 0.002 (0.009)	0.006 (0.027) 0.006 (0.027)	0.05 (0.22) 0.01 (0.045)	see note [4]		
Amplitude Linearity [5]	% FS				≤1		
Cross-Talk Fx ÷ Fy	%				±3		
Fx, Fy ÷ Fz	%				±5		
Upper Frequency Limit	Hz	11k	10k	6k	11k	10k	6k
Low Frequency Response (-5%) (z-axis) (x-, y-axis)	Hz	0.01			see note [4]		
	Hz	0.001					
Environmental Specifications							
Temperature Range	°F	-65 to +250			-100 to +350		
	°C	-54 to +121					
Electrical Specifications							
Discharge Time Constant [1] (z-axis) (x-, y-axis)	seconds	≥50 ≥500			see note [4]		
Output Impedance	ohm	≤100			N/A		
Output Bias Voltage	+VDC	8 to 14			N/A		
Voltage Excitation	+VDC	20 to 30			N/A		
Constant Current Excitation	mA	2 to 20			N/A		
Capacitance (all axes)	pF	N/A			18	30	70
Insulation Resistance	ohm	N/A			>10 ¹²		
Polarity (in direction of markings)	-	positive			negative		
Physical Specifications							
Connector	type	4-pin male			10-32 (three)		
Stiffness (z-axis) (x-, y-axis)	lb/μin (kN/μm)	10 (1.75) 4 (0.70)	19 (3.3) 6 (1.1)	40 (7) 15 (2.6)	10 (1.75) 4 (0.70)	19 (3.3) 6 (1.1)	40 (7) 15 (2.6)
Sealing	type	hermetic weld					
Material	type	17-4 stainless steel					
Maximum Allowable Torque (z-axis)	ft-lb (N-m)	14 (19)	40 (54)	240 (325)	14 (19)	40 (54)	240 (325)
Maximum Allowable Bending Moment (x-, y-axis)	ft-lb (N-m)	13 (17.6)	70 (94)	325 (441)	13 (17.6)	70 (94)	325 (441)
Weight	oz (gm)	14 (386)	34 (975)	96 (2.9k)	14 (386)	34 (975)	96 (2.9k)
Options [3]	prefix	M,W					

Notes: [1] The Discharge Time Constant (DTC) determines low frequency response according to the relationship $f-5\%=3/(2\pi(DTC))$. Sensors accurately follow transient events lasting a few percent of the DTC. For square wave events, the DTC should be 100 times the event duration. For ramp shape events, the DTC should be 50 times the event duration and for a half sine pulse the DTC should be 25 times the pulse duration. To ensure measurement system compatibility, use DC coupled or Long Time Constant signal conditioners for long duration transient measurements. [2] See page 2.13 for complete accessory listings. [3] See page 1.17 for a description of options (specifications for optional versions may differ slightly. Consult factory before ordering). For complete listing of metric accessory model number and threads, see page 2.23. [4] Resolution, System Discharge Time Constant and Low Frequency range are dependent upon sensor cable and signal conditioning used. [5] Recommended pre-load is required to meet published specification and calibration.

4-CHANNEL, LINE-POWERED, ICP® SENSOR SIGNAL CONDITIONER

MODEL 482C15

- Sensor Input Type: ICP®, Voltage
- Voltage Gain: x1, x10, x100
- Adjustable ICP® current
- Optional input filtering



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4-CHANNEL, LINE-POWERED, ICP® & CHARGE SENSOR SIGNAL CONDITIONER

MODEL 482C54

- Sensor Input Type: ICP®, Charge
- Voltage Gain: x0 to x200 Gain
- Frequency Range (-5%): 0.05 to 75000 Hz
- DC Power: +9 to +18 VDC

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8-CHANNEL, LINE-POWERED, ICP® SENSOR SIGNAL CONDITIONER

MODEL 483C15

- Sensor Input Type(s): ICP®, Voltage
- Voltage Gain ($\pm 1\%$): x1, x10, x100
- Optional input filtering
- Power Required: AC Power

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8-CHANNEL, LINE-POWERED, ICP® & CHARGE SENSOR SIGNAL CONDITIONER

MODEL 483C30

- Sensor Input Type(s): ICP®, Voltage, Charge
- Voltage Gain: x0.1 to x200
- TEDS Sensor Support: Yes
- Power Required: AC Power

CE



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TM-FTO-260-Series-0919



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