

Tips from Techs


Polarity of Quartz Force Sensors

The output voltage polarity of ICP® force sensors is positive for compression and negative for tension force measurements. The polarity of PCB® charge output force sensors is the opposite: negative for compression and positive for tension. This is because charge output sensors are used with external charge amplifiers that exhibit an inverting characteristic. Therefore, the resulting system output polarity of the charge amplifier system is positive for compression and negative for tension; same as for an ICP® sensor system (reverse polarity sensors are also available).

Quartz ICP® Force Links

Applications:

- Tensile Testing
- Press Monitoring
- Material Testing
- Machine Process Monitoring

Quartz ICP® Force Links					
					
Model Number	221B01	221B02	221B03	221B04	221B05
Measurement Range (Compression)	10 lb 0.04448 kN	100 lb 0.4448 kN	500 lb 2.224 kN	1000 lb 4.448 kN	5000 lb 22.24 kN
Measurement Range (Tension)	10 lb 0.04448 kN	100 lb 0.4448 kN	500 lb 2.224 kN	1000 lb 4.448 kN	1000 lb 4.448 kN
Maximum Static Force (Compression)	60 lb 0.2669 kN	600 lb 2.669 kN	3000 lb 13.34 kN	6000 lb 26.69 kN	6000 lb 26.69 kN
Maximum Static Force (Tension)	60 lb 0.2669 kN	500 lb 2.224 kN	1,000 lb 4.448 kN	1200 lb 5.34 kN	1200 lb 5.34 kN
Sensitivity	500 mV/lb 112404 mV/kN	50 mV/lb 11241 mV/kN	10 mV/lb 2248.2 mV/kN	5 mV/lb 1124.1 mV/kN	1 mV/lb 224.82 mV/kN
Broadband Resolution	0.0002 lb-rms 0.0008896 N-rms	0.002 lb-rms 0.008896 N-rms	0.01 lb-rms 0.04448 N-rms	0.02 lb-rms 0.08896 N-rms	0.1 lb-rms 0.445 N-rms
Upper Frequency Limit	15 kHz	15 kHz	15 kHz	15 kHz	15 kHz
Low Frequency Response (-5%)	0.01 Hz	0.006 Hz	0.002 Hz	0.001 Hz	0.003 Hz
Discharge Time Constant	≥ 50 sec	≥ 120 sec	≥ 400 sec	≥ 700 sec	≥ 2000 sec
Non-linearity	≤ 1%	≤ 1%	≤ 1%	≤ 1%	≤ 1%
Temperature Range	-65 to +250 °F -54 to +121 °C	-65 to +250 °F -54 to +121 °C	-65 to +250 °F -54 to +121 °C	-65 to +250 °F -54 to +121 °C	-65 to +250 °F -54 to +121 °C
Electrical Connector	10-32 Coaxial Jack	10-32 Coaxial Jack	10-32 Coaxial Jack	10-32 Coaxial Jack	10-32 Coaxial Jack
Stiffness	2 lb/μin 0.35 kN/μm	2 lb/μin 0.35 kN/μm	2 lb/μin 0.35 kN/μm	2 lb/μin 0.35 kN/μm	2 lb/μin 0.35 kN/μm
Housing Material	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Sealing	Hermetic	Hermetic	Hermetic	Hermetic	Hermetic
Size (Diameter x Height)	0.65 x 1.25 in 16.5 x 31.75 mm	0.65 x 1.25 in 16.5 x 31.75 mm	0.65 x 1.25 in 16.5 x 31.75 mm	0.65 x 1.25 in 16.5 x 31.75 mm	0.65 x 1.25 in 16.5 x 31.75 mm
Weight	31 gm	31 gm	31 gm	31 gm	31 gm
Mounting	1/4-28 Thread	1/4-28 Thread	1/4-28 Thread	1/4-28 Thread	1/4-28 Thread
Additional Versions					
Charge Output	—	—	—	—	231B
Metric Mounting Threads	M221B01	M221B02	M221B03	M221B04	M221B05
Additional Accessories					
Mating Cable Connectors	EB	EB	EB	EB	EB
Recommended Cables	002, 003 CE	002, 003 CE	002, 003 CE	002, 003 CE	002, 003 CE

Quartz ICP® Force Links

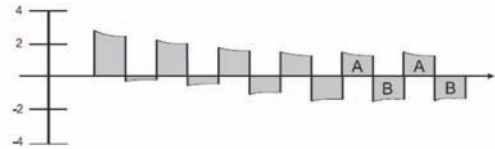
Applications:

- Tension & Compression
- Push Rod Testing
- Machinery Process Monitoring
- Repetitive Operations
- Press Force Monitoring
- Tensile Testing







Tips from Techs

Piezoelectric System Output

The output characteristic of piezoelectric sensors is that of an AC coupled system, where repetitive signals will decay until there is an equal area above and below the original base line. As magnitude levels of the monitored event fluctuate, the output will remain stabilized around the base line with the positive and negative areas of the curve remaining equal.



Quartz ICP® Force Links

						
Model Number	222B	223B	224C	225C	226C	227C
Measurement Range (Compression)	6000 lb 26.69 kN	12k lb 53.38 kN	25k lb 111.2 kN	35k lb 155.69 kN	45k lb 200.16 kN	50k lb 222.40 kN
Measurement Range (Tension)	2500 lb 11.12 kN	4000 lb 17.79 kN	8000 lb 35.58 kN	12k lb 53.38 kN	20k lb 88.96 kN	30k lb 133.44 kN
Sensitivity	0.90 mV/lb 202.34 mV/kN	0.42 mV/lb 94.42 mV/kN	0.20 mV/lb 44.96 mV/kN	0.14 mV/lb 31.47 mV/kN	0.11 mV/lb 24.73 mV/kN	0.10 mV/lb 22.48 mV/kN
Maximum Static Force (Compression)	6500 lb 31.14 kN	10k lb 44.48 kN	29k lb 137.89 kN	43k lb 189.05 kN	55k lb 244.65 kN	66k lb 293.57 kN
Maximum Static Force (Tension)	2800 lb 12.45 kN	4500 lb 20.02 kN	10k lb 44.48 kN	15k lb 66.73 kN	25k lb 111.21 kN	37.5k lb 166.8 kN
Broadband Resolution	0.2 lb-rms 0.8896 N-rms	0.4 lb-rms 1.779 N-rms	0.6 lb-rms 2.67 N-rms	0.1 lb-rms 0.445 N-rms	0.44 lb-rms 1.96 N-rms	1 lb-rms 4.45 N-rms
Upper Frequency Limit	12 kHz	10 kHz	8 kHz	6 kHz	5 kHz	4 kHz
Low Frequency Response (-5%)	0.0003 Hz	0.0003 Hz	0.0003 Hz	0.0003 Hz	0.0003 Hz	0.0003 Hz
Discharge Time Constant	≥ 2000 sec	≥ 2000 sec	≥ 2000 sec	≥ 2000 sec	≥ 2000 sec	≥ 2000 sec
Non-Linearity	≤ 1% FS	≤ 1% FS	≤ 1.5% FS	≤ 1.5% FS	≤ 1% FS	≤ 1% FS
Temperature Range	-65 to +250 °F -54 to +121 °C	-65 to +250 °F -54 to +121 °C	-65 to +250 °F -54 to +121 °C	-65 to +250 °F -54 to +121 °C	-65 to +250 °F -54 to +121 °C	-65 to +250 °F -54 to +121 °C
Stiffness	3 lb/μin 0.53 kN/μm	4 lb/μin 0.7 kN/μm	6 lb/μin 1.05 kN/μm	6 lb/μin 1.05 kN/μm	11 lb/μin 1.9 kN/μm	29 lb/μin 5 kN/μm
Housing Material	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Sealing	Hermetic	Hermetic	Hermetic	Hermetic	Hermetic	Hermetic
Electrical Connector	10-32 Coaxial Jack	10-32 Coaxial Jack	10-32 Coaxial Jack	10-32 Coaxial Jack	10-32 Coaxial Jack	10-32 Coaxial Jack
Size (Diameter x Height)	0.87 in x 1.62 in 22.1 mm x 41.5 mm	1.1 in x 2.0 in 27.94 mm x 50.8 mm	1.34 in x 2.5 in 34.04 mm x 63.5 mm	1.58 in x 3.0 in 40.13 mm x 76.2 mm	2.05 in x 3.5 in 52.07 mm x 88.9 mm	2.95 in x 4.25 in 74.93 mm x 108 mm
Weight	58 gm	120 gm	246 gm	412 gm	907 gm	2353 gm
Mounting Thread	3/8-24 Thread	1/2-20 Thread	5/8-18 Thread	3/4-16 Thread	1-12 Thread	1 1/4-12 Thread
Additional Versions						
Charge Output	232B	233B	234B	235B	236B	237B
Metric Mounting Thread	M222B	M223B	M224C	M225C	M226C	M227C
Additional Accessories						
Mating Cable Connector	EB	EB	EB	EB	EB	EB
Recommended Cables	002, 003 CE	002, 003 CE	002, 003 CE	002, 003 CE	002, 003 CE	002, 003 CE

3-Component Quartz Force Links







Highlights

- Easy flange mounting
- Fixed preloaded assembly
- Measures 3 orthogonal (Fx, Fy, Fz)
- ICP® & charge models
- English & metric models

Applications

- Impact Testing
- Biomechanics
- Force Plates
- Force-limited Vibration
- Vehicle Dynamics
- Cutting Tool Force Monitoring

3-Component Quartz Force Links

						
Model Number	261A01	261A02	261A03	261A11	261A12	261A13
Measurement Range (z axis)	1000 lb 4.45 kN	1000 lb 4.45 kN	10k lb 44.48 kN	1000 lb 4.45 kN	1000 lb 4.45 kN	10k lb 44.48 kN
Measurement Range (x or y axis)	500 lb 2.22 kN	1000 lb 4.45 kN	4000 lb 17.79 kN	500 lb 2.22 kN	1000 lb 4.45 kN	4000 lb 17.7 kN
Sensitivity (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 3.37 pC/N	32 pC/lb 7.19 pC/N	15 pC/lb 3.37 pC/N
Sensitivity (x or y axis)	10 mV/lb 2.25 mV/N	5 mV/lb 1.12 mV/N	1.25 mV/lb 0.28 mV/N	32 pC/lb 7.19 pC/N	15 pC/lb 3.37 pC/N	32 pC/lb 7.19 pC/N
Maximum Force (z axis)	1320 lb 5.87 kN	1320 lb 5.87 kN	11k lb 48.93 kN	1320 lb 5.87 kN	1320 lb 5.87 kN	11k lb 48.93 kN
Maximum Force (x or y axis)	660 lb 2.94 kN	1000 lb 4.45 kN	4400 lb 19.57 kN	660 lb 2.94 kN	1000 lb 4.45 kN	4400 lb 19.57 kN
Maximum Moment (z axis)	14 ft-lb 18.98 N-m	40 ft-lb 54.23 N-m	240 ft-lb 325.4 N-m	14 ft-lb 18.98 N-m	40 ft-lb 54.23 N-m	240 ft-lb 325.4 N-m
Maximum Moment (x or y axis)	13 ft-lb 17.63 N-m	70 ft-lb 94.91 N-m	325 ft-lb 440.7 N-m	13 ft-lb 17.63 N-m	70 ft-lb 94.91 N-m	325 ft-lb 440.7 N-m
Broadband Resolution (z axis)	0.006 lb-rms 0.027 N-rms	0.006 lb-rms 0.027 N-rms	0.05 lb-rms 0.222 N-rms	[1]	[1]	[1]
Broadband Resolution (x or y axis)	0.002 lb-rms 0.0089 N-rms	0.006 lb-rms 0.027 N-rms	0.01 lb-rms 0.04 N-rms	[1]	[1]	[1]
Upper Frequency Limit	10 kHz	10 kHz	10 kHz	10 kHz	10 kHz	10 kHz
Low Frequency Response (-5%) (z axis)	0.01 Hz	0.01 Hz	0.01 Hz	[2]	[2]	[2]
Low Frequency Response (-5%) (x or y axis)	0.001 Hz	0.001 Hz	0.001 Hz	[2]	[2]	[2]
Discharge Time Constant (z axis)	≥ 50 sec	≥ 50 sec	≥ 50 sec	N/A	N/A	N/A
Discharge Time Constant (x or y axis)	≥ 500 sec	≥ 500 sec	≥ 500 sec	N/A	N/A	N/A
Non-Linearity	≤ 1% FS	≤ 1% FS	≤ 1% FS	≤ 1% FS	≤ 1% FS	≤ 1% FS
Temperature Range	-65 to +250 °F -54 to +121 °C	-65 to +250 °F -54 to +121 °C	-65 to +250 °F -54 to +121 °C	-100 to +350 °F -73 to +177 °C	-100 to +350 °F -73 to +177 °C	-100 to +350 °F -73 to +177 °C
Stiffness (z axis)	10 lb/μin 1.75 kN/μm	19 lb/μin 3.3 kN/μm	40 lb/μin 7 kN/μm	10 lb/μin 1.75 kN/μm	19 lb/μin 3.3 kN/μm	40 lb/μin 7 kN/μm
Stiffness (x or y axis)	4 lb/μin 0.7 kN/μm	6 lb/μin 1 kN/μm	15 lb/μin 2.6 kN/μm	4 lb/μin 0.7 kN/μm	6 lb/μin 1 kN/μm	15 lb/μin 2.6 kN/μm
Housing Material	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Sealing	Hermetic	Hermetic	Hermetic	Hermetic	Hermetic	Hermetic
Electrical Connector(s)	1/4-28 4-Pin Jack	1/4-28 4-Pin Jack	1/4-28 4-Pin Jack	10-32 Coaxial Jacks	10-32 Coaxial Jacks	10-32 Coaxial Jacks
Size (Length x Width x Height)	1.65 x 1.65 x 1.65 in 42 x 42 x 42 mm	2.16 x 2.16 x 2.35 in 55 x 55 x 60 mm	3.15 x 3.15 x 3.54 in 80 x 80 x 90 mm	1.65 x 1.65 x 1.65 in 42 x 42 x 42 mm	2.16 x 2.16 x 2.35 in 55 x 55 x 59.60 mm	3.15 x 3.15 x 3.54 in 80 x 80 x 90 mm
Weight	386 gm	975 gm	2994 gm	386 gm	975 gm	2994 gm
Mounting	1/4-28 Thread	5/16-24 Thread	3/8-24 Thread	1/4-28 Thread	5/16-24 Thread	3/8-24 Thread
Additional Versions						
Metric Mounting Threads	M261A01	M261A02	M261A03	M261A11	M261A12	M261A13
Additional Accessories						
Mating Cable Connectors	AY	AY	AY	EB	EB	EB
Recommended Cables	010	010	010	003 CE	003 CE	003 CE

Notes

[1] Resolution is dependent upon cable length and signal conditioner [2] Low frequency is dependent upon system discharge time constant

Hochwertige Messtechnik und Beratung aus einer Hand



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