

Quartz

Type 9301B ... 9372A

High Impedance, Charge Mode Force Links

The 9300 Series force sensing links measure quasi-static and dynamic events in a wide variety of applications.

Available in eight different cell size configuration, they span a full scale measuring range of ± 550 lbf to $\pm 26,000$ lbf.

- Compression and tension measurements
- High natural frequency and rigidity
- Dynamic and quasi-static events
- Calibrated assembly
- Easy to install

Description

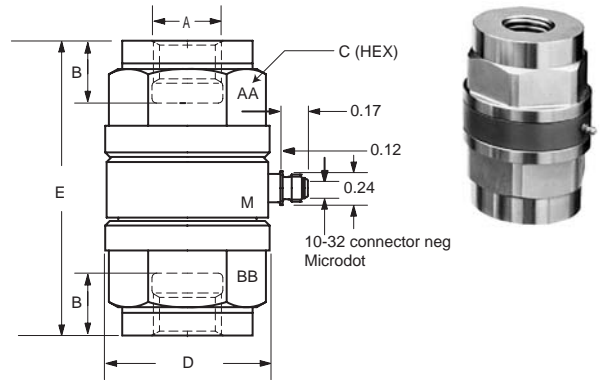
The 9300 series quartz force links measure dynamic and short-term static compression and tension forces with near infinite resolution. Extremely small forces throughout the total range can also be measured with great accuracy. Tension or compressive tare components may be eliminated prior to making measurements by simply activating the reset switch function located on the charge amplifier.

The charge signal of the force link is transformed into an output voltage directly proportional to the applied force through the addition of a Kistler charge amplifier. Within limits, the resultant output voltage is independent of the length of the sensor output cable and has a maximum value of 10 volts. With the charge amplifier set on the most sensitive range, 0.1lbf/V can be obtained with sensors having -17pC/lbf. sensitivity. The negative charge output resulting from an increasing applied force is inverted when passing through a charge amplifier.

The force being measured acts on the load washer (M) via the two special nuts (AA and BB), which are preloaded by a preload bolt. Tension is measured as a decrease of the preload force. The quartz discs contained in the load washer transform the force to be measured into an electrostatic charge. The longitudinal piezoelectric effect is utilized. The connector is welded to the body. The cable connection can be sealed against adverse environment with a thermo-shrink sleeve.

CE Compliant Information

Because high impedance, charge mode sensors contain no electronics, CE certification to the EMC Directive is not appropriate. When a high impedance accelerometer is used with a CE certified signal conditioner (i.e., charge amplifier...), it is said that this system is CE compliant.



Type	Measuring Range, max. (\pm lbs F)	Dimensions (inches)				
		A THD.	B DIM.	C HEX	D DIA.	E DIM.
9301B	550	M5 x 0.8	0.196	0.35	0.394	0.985
9312A	1000	1/4-28	0.236	0.50	0.551	1.260
9322A	2000	3/8-24	0.295	0.75	0.866	1.614
9332A	4000	1/2-20	0.394	1.00	1.102	2.007
9342A	7000	5/8-18	0.591	1.25	1.340	2.520
9352A	9000	3/4-16	0.768	1.37	1.575	2.992
9362A	13 000	1-14	0.866	1.75	2.050	3.504
9372A	26000	1 1/4-12	1.083	2.50	2.953	4.252

Application

The high rigidity, of a quartz force links makes them ideally suited for measuring dynamic forces and they have minimum influence on the properties of the measured objects. Quasi-static measurements for several minutes are possible.

- Force exerted on car safety belts
- Forces on impact and fatigue testers
- Thrust of rocket engines or fluid jets
- Forces in pressing, stamping, coining and welding machines
- Transmitted forces in shakers or vibration exciters (for mechanical impedance measurements)
- Forces in suspension or vibration isolation systems and in balancing machines, (where the use of force links simplifies mounting problems compared to using a of preload bolt and washer

Technical Data

Type	Units	9301B	9312A	9322A	9332A	9342A	9352A	9362A	9372A
Measuring Range: Fz	±lbf	550	1000	2000	4000	7000	9000	13000	26000
Calibrated Partial Range (Compression)	lbf	55	100	200	400	700	900	1300	2600
Maximum Force	±lbf	600	1100	2200	4400	7700	9900	14300	28600
Threshold	lbf	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
Sensitivity nom.	pC/lbf	-17	-17	-17	-17	-17	-17	-17	-17
Non-Linearity	%FSO	≤±1	≤±1	≤±1	≤±1	≤±1	≤±1	≤±1	≤±1
Mounting Torque** max.	lbf-ft	≤1.5	≤2	≤10	≤20	≤35	≤65	≤135	≤300
Bending Moment max.	lbf-ft	3.6	11	44	88	177	272	612	1840
Rigidity	lbf/μin	1.7	3.4	5.1	7.4	10.3	11.7	15.6	28.5
Shear Force* max.	lbf	78	168	337	674	1010	1348	2023	4040
Natural Frequency nom.	kHz	75	70	55	45	40	33	28	22
Capacitance	pF	≈8	≈23	≈37	≈55	≈65	≈65	≈150	≈200
Temperature Coefficient of Sensitivity	°F	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Temperature Range Operating	°F	-40 ... 250	-40 ... 250	-40 ... 250	-40 ... 250	-40 ... 250	-40 ... 250	-40 ... 250	-40 ... 250
Insulation Resistance	Ω	>10 ¹³	>10 ¹³	>10 ¹³	>10 ¹³	>10 ¹³	>10 ¹³	>10 ¹³	>10 ¹³
Weight	oz	0.4	1	3.5	6	12	17	37	92

* Fz = 0 **Fx,y Fz = 0

1N (Newton) = 0.1019 kp = 0.2248 lbf; 1kgf = 9.80665 N; 1 inch = 25.4 mm; 1kg = 2.2046; 1Nm = 0.7376 lbf

Mounting

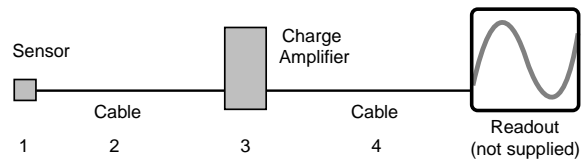
For mounting force links it is necessary to have mounting surfaces machined absolutely flat and use mounting bolts or studs, that do not impose side loads.

Application of force: should be perpendicular to the axis. Eccentric loading and bending moments are allowed up to a certain level.

Torsional moment and shear forces: Because of the limited capability of the force links to withstand torsional moments and shear forces (especially when measuring tension) they must be adequately protected by appropriate means.

Parallel connection: if necessary, several force links may be connected in parallel to one charge amplifier whereby the charges are added electrically.

Ordering Information



- sp = specify cable length in meters
- 1 - 9300 series quartz force links, specify type
- 2 - 1631Asp low noise sensor cable or premium, low noise sensor cable, 10-32 pos to BNC pos.
- 1631Csp
- 3 - 5000 charge amplifier series
- 4 - 1511sp output cable, BNC pos. to BNC pos.

000-433a-01.04 (K6.013)