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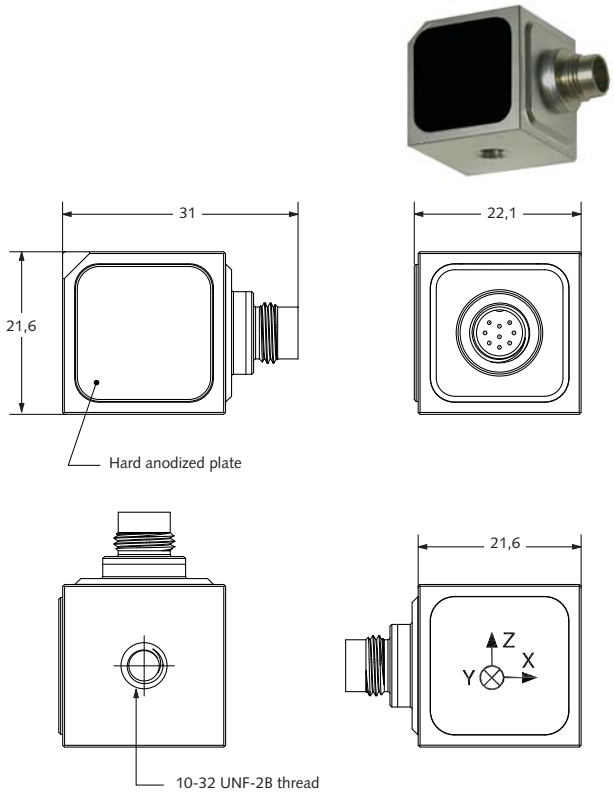
K-Beam® Accelerometer

Type 8395A...

Capacitive MEMS, Triaxial Accelerometer

Type 8395A… is a high sensitivity, low noise triaxial accelerometer which simultaneously measures acceleration and/or low-frequency vibration in three mutually perpendicular axes (x, y, z). The accelerometer features include:

- Measuring ranges: ±2 g, ±10 g, ±30 g, ±50 g, ±100 g, ±200 g
- Frequency response: 0 ... 1 000 Hz (5 %) (except ±2 g)
- Bipolar, ±4 V accelerometer output
- Operating temperature –55 … 125 °C
- Low noise
- Excellent thermal stability
- Small cube, 30 grams mass
- Wide supply voltage range, 6 … 50 VDC
- 6 000 gpk shock rated
- Conforming to CE



Description

Type 8395A… triaxial capacitive accelerometer family utilizes a silicon Micro-Electro-Mechanical System (MEMS) variable capacitance sensing element. The sensing element of each axis consists of a very small inertial mass and a flexure element cantilever positioned between two plates. As the mass deflects under acceleration, the capacitance between these plates changes. AC excitation and synchronous amplitude demodulation circuitry contained in the accelerometer's internal signal conditioner provides an analog output signal proportional to the applied acceleration. This output signal is scaled as a voltage which is proportional to the applied acceleration.

The output signal format is bipolar at 0 ±4 V and the accelerometer is powered by a single regulated supply between 6 and 50 VDC. Temperature output is provided if external compensation of the output signal is desired. The sensing element and electronics are contained in a lightweight, welded titanium housing and also uses a specially designed miniature circular 9-pin connector for a fully hermetic design. Ground isolation is obtained by mounting the sensor using one of the off-ground accessories or by adhesively mounting the sensor to the test object using the side of the sensor with the integral hard anodized plate.

Application

Type 8395A… is an instrument grade triaxial accelerometer. As such, Type 8395A… is well suited for a wide variety of R&D and OEM applications requiring precision measurements and packaging for demanding application and handling needs.
In particular, the sensor design is optimized for low frequency applications common to Aviation/Aerospace, Automotive, Civil Engineering Structures, Seismic and other R&D studies. In particular, Aviation/Aerospace ground and flight testing often evaluates dynamics and structural vibration to assess performance parameters, reliability and integrity. Automotive laboratory and road testing often evaluates system parameters such as vehicle ride, dynamics and structural analysis to assess performance parameters, reliability and durability. Civil engineering structures, such as bridges, often are evaluated for structural response to assess the integrity of the bridge to ensure safety. Seismic ground and structural testing is often performed to measure the effect of earthquakes and other natural phenomena. Other R&D studies include human motion, robotics and platform motion control systems for example.

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Type	Unit	8395A2D0	8395A010	8395A030	8395A050	8395A100	8395A200
Acceleration range	g	±2	±10	±30	±50	±100	±200
Frequency response, ±5 %	Hz	0 … 250	0 … 1 000				
Damping ratio, typical		0,7	0,7	0,7	0,7	0,7	0,7
Sensitivity, ±5 % (ref 100 Hz)	mV/g	2 000	400	133,3	80	40	20
Resonant frequency, nom.	kHz	1,3	2	4	5,1	7,2	11
Transverse sensitivity, typ. (max.)	%	1,0 (3,0)					
Sensitive axis misalignment, typ. (max.)	mrad	10 (30)					
Amplitude linearity, max.	% FSO	±1,0					
Phase shift (max.)							
@ 0 Hz	Degrees	0					
@ 10 Hz	Degrees	2					
@ 100 Hz	Degrees	20	10				
Noise density, 0 - 100 Hz, typ. (max)	mgrms/√ Hz	0,025 (0,03)	0,125 (0,15)	0,375 (0,45)	0,625 (0,75)	1,25 (1,5)	2,5 (3)
Noise 0 - 100 Hz, typ.	mgrms	0,25	1,25	3,75	6,25	12,5	25
Resolution (threshold), typ.	mgrms	0,35	1,75	3,85	8,75	17,5	35
Electrical							
0 g output	mV	0 ± 60					
Capacitive load, max.	µF	0,5					
Load resistance, min.	kΩ	30					
Output impedance, typ.	Ω	300					
Supply current, nom.	mA	4,2					
Supply voltage, temperature	VDC	6 … 50 (≤ 100 °C) ; 6 … 35 (= 110 °C) ; 6 … 20 (= 120 °C) ; 6 … 12,5 (= 125 °C)					
Reverse polarity protection		Yes					
Environmental							
Shock, (half sine, 200 µsec)	g	6 000					
Random (20 - 2 000 Hz)	grms	20					
Storage temperature range	°C	–55 … 125					
Operating temperature range	°C	–55 … 125					
Temp. coeff. sensitivity, typ. (max)	ppm/°C	±100 (±300)					
Temp. coeff. sensitivity, typ. (max)	%/°C	±0,01 (±0,030)					
Temp. coeff. bias, typ. (max)	mg/°C	±0,1 (±0,8)	±0,5 (±4)	±1,5 (±12)	±2,5 (±20)	±5 (±40)	±10 (±80)
Temperature Sensor							
Output @ 20 °C	V	1,632					
Sensitivity	mV/°C	–11,77					
Accuracy	°C	±5					
Physical							
Case	Material	Titanium					
Dimensions	mm	21,6 x 21,6 x 22,1					
Connector	Type	Miniature 9-pin hermetic – male (pins)					
Mounting		10-32 stud / adhesive					
Degree of protection (EN 60529)		IP68					
Ground isolation		Yes					
Weight	grams	30					

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Mounting

Reliable and accurate measurements require that the mounting surface be clean and flat. The accelerometer can be directly attached to the test structure with the supplied stud. Alternately, a ground isolated adhesive mount is obtained by mounting the hard anodized aluminum side of the sensor to the test object. Several optional accessories are offered to mount Type 8395A… Type 8466K01 has an integral 10-32 stud and screws into threaded hole on the sensor to provide a ground isolated adhesive mount. Type 8466K02 is similar to Type 8466K01 except it has a threaded 10-32 hole to provide a ground isolated stud mount. Type 8466K03 has an integral 10-32 stud and screws into threaded hole on the sensor and provides a magnetic mount for the sensor. The instruction manual for Type 8395A… provides detailed information regarding mounting surface preparation.

Optional Accessories	Type
• Adhesive mounting base (off-ground) with 10-32 male sensor side.	8466K01
• Mounting base (off-ground) with 10-32 male sensor side to 10-32 female mounting side	8466K02
• Magnetic mounting base	8466K03
• Interface plate for compatibility with legacy Type 8393 mounting hole pattern	8466K04
• Cable - mini 9-pin circular connector female, silicone jacket to pigtail (lengths 2, 5, 10, and sp meters)	1792AxxK00
• Cable - mini 9-pin circular connector female, silicone jacket to 9-pin D-sub (lengths 2, 5, 10 and sp meters)	1792AxxK01
• 9-pin neg. D-sub (3) BNC pos. | (2) Banana jacks	1794…

Included Accessories	Type
• 10-32 mounting stud	8402
• Mounting wax	8432

Measure	Connect	Connect	Analyze
 Type 8395A… MEMS	 Type 1792A…K01 9-pin neg. circular 9-pin pos. D-sub	 Type 1794 9-pin neg. D-sub (3) BNC pos. | (2) Banana jacks	 not supplied
 Type 8395A… MEMS	 Type 1792A…K00 9-pin neg. circular pigtail	customer supplied	 not supplied

Fig. 1: Measuring chain

Ordering Key

Example: 8395A010ATTA00 **Type 8395A** □□

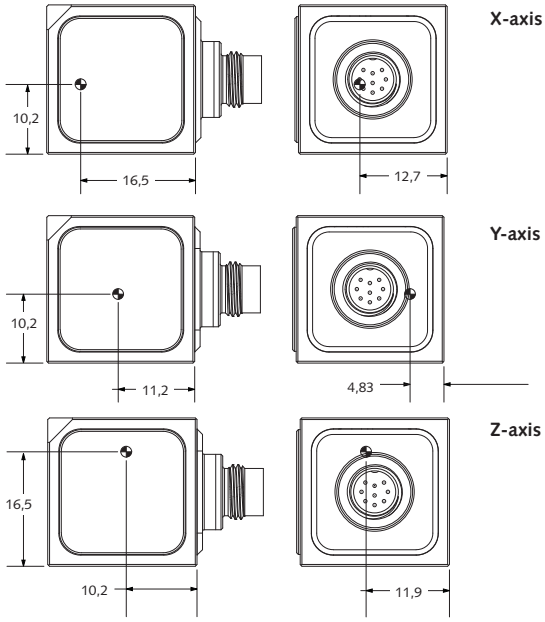
Measuring Range

±2 g	**2D0**
±10 g	**010**
±30 g	**030**
±50 g	**050**
±100 g	**100**
±200 g	**200**

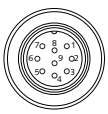
Electrical/Housing/Connector-cable length

AT = 0±4 V FSO TA = Hermetic titanium housing 00 = (cable length) 9-pin hermetic connector	**ATTA00**

Center of Sensing Element



Mini 9-pin (female)	Function	Type 1792A…K00 pigtail (color)	Type 1792A…K01 9-pin D-Sub
1	Power	Red	1
2	Ground	Black	2
3	X DC Output	White	3
4	Y DC Output	Yellow	4
5	Z DC Output	Blue	5
6	Temperature Output	Orange	9
7	N/C	Brown	-
8	N/C	Green	-
9	N/C	Violet	-



9-pin circular male connector sensor view