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K-Beam® Accelerometer

Type 8315A...

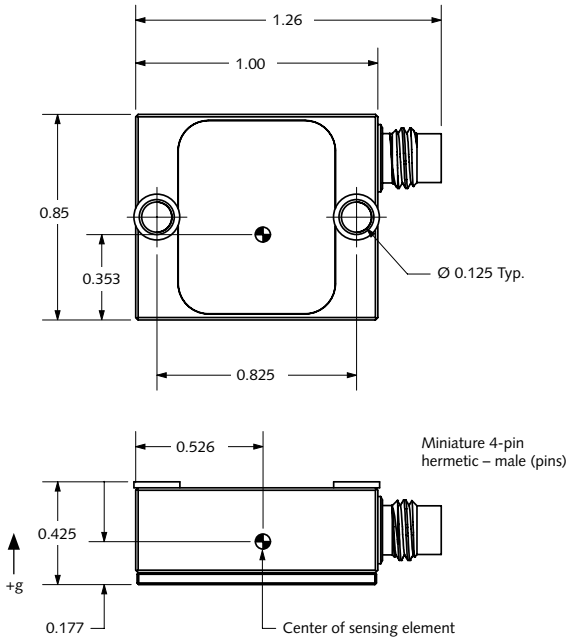
Capacitive MEMS, Single-Axis Accelerometer

Type 8315A… is a high-sensitivity, low-noise, single-axis accelerometer family which measures acceleration and low frequency vibration in the primary sensing axis. 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, single-ended 2.5 V ±2 V and ±4 V or ±8 V differential accelerometer output options
- Operating temperature: –65 … 260°F
- Low-noise
- Excellent thermal stability
- 1.00 x 0.85 inch footprint
- Wide supply voltage range, 5 … 50 VDC
- 6,000 g_{pk} shock rated
- Conforming to CE

8315A ... TA

Dimensions



Description

The Type 8315A… 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 voltage and is proportional to the applied acceleration.

There are three housing/electrical interface options (AC, TA, TB), which determine the available output signal formats. The accelerometer is powered by a single regulated supply between 6 and 50 VDC (+5 VDC supply options are available upon request).

The AC option is a hard anodized aluminum housing with an epoxy seal and an integral PVC cable. The maximum temperature range is 185°F. The available output signal formats are bipolar 0±4 V, single-ended 2.5±2 V, and differential 0±4 V or 0±8 V. The sensing element and electronics are contained in this lightweight housing with an environmental seal and integral ground isolation.

The TA and TB options offer a welded titanium housing with either an industry standard 4-pin, ¼"—28 connector or an integral PTFE jacketed cable. The maximum temperature range is 260°F and the available output signal formats are bipolar 0±4 V (with temperature output), single-ended 2.5 ±2 V (with temperature output), and differential 0±4 V or 0±8 V. 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 for a fully hermetic design with integral ground isolation. For adhesive mounting, the hard anodized plate at the bottom of the sensor provides ground isolation. For screw mounting, the sensors are supplied with integral isolation inserts in the screw holes to ensure a ground isolated mount in combination with the hard anodized plate on the bottom of the sensor.

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Application

The 8315A… is an instrument-grade, single-axis accelerometer. It is well-suited for a wide variety of R&D and OEM applications requiring precision measurements and packaging designed for demanding application and handling needs.

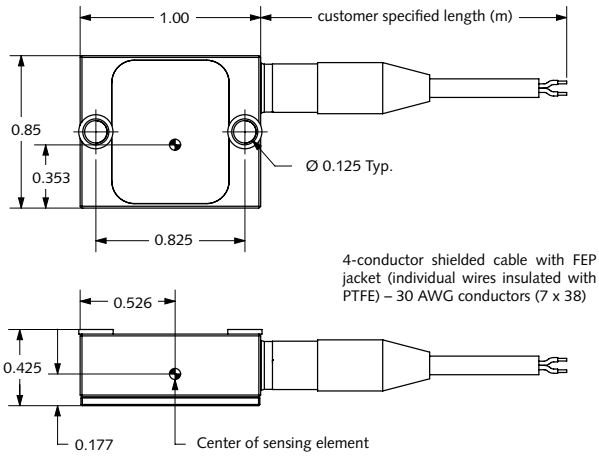
In particular, the sensor design is optimized for low frequency applications common to Aviation/Aerospace, Automotive, Civil Engineering Structures, Seismic and other R&D studies. In particular, Aviation/Aerospace ground and flight testing often evaluates dynamics and structural vibration to assess performance parameters, reliability and integrity. Automotive laboratory and road testing evaluates system parameters such as vehicle ride, dynamics and structural analysis to assess performance parameters, reliability and durability. Civil engineering structures such as bridges are often evaluated for structural response to assess the integrity of the bridge to ensure safety. Seismic ground and structural testing are performed to measure the effects of earthquakes and other natural phenomena. The differential output versions are being used for railway comfort or conditional maintenance monitoring applications where halogen-free cables are requested as well. Other examples of R&D studies include human motion, robotics and platform motion control systems.

Mounting

The mounting surface must remain clean and flat in order to retain reliable and accurate measurements. The accelerometer can be directly attached to the test structure with the supplied screws or adhesive for a ground isolated mount. Several optional accessories are offered to mount Type 8315A… Type 8464K01 is an adhesive mounting base with 2, 4-40 threaded holes to mount the sensor with the supplied screws. Type 8464K02 is similar to Type 8464K01 and has a threaded 10-32 hole to provide a ground isolated stud mount. Type 8464K03 is also similar to Type 8464K01 and provides a magnetic mounting for the sensor. Type 8522 is a triaxial mounting cube which is used to provide a biaxial or triaxial solution for Type 8315A family of sensors. The instruction manual for Type 8315A… provides detailed information regarding mounting surface preparation.

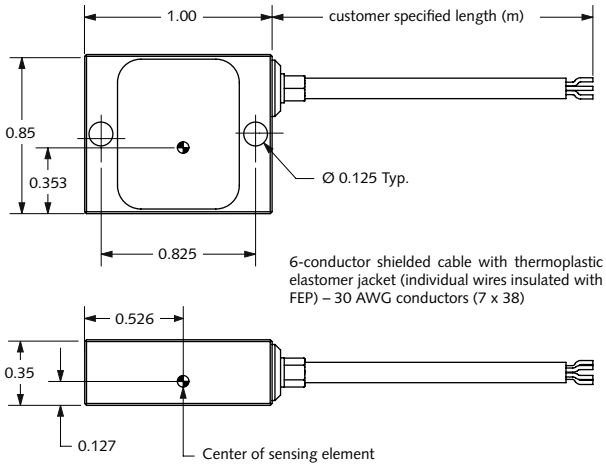
8315A … TB

Dimensions



8315A … AC

Dimensions



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Technical Data

Type	Unit	8315A2D0	8315A010	8315A030	8315A050	8315A100	8315A200
Acceleration range	g	±2	±10	±30	±50	±100	±200
Frequency response, ±5 %	Hz	0 … 250	0 … 1,000				
Sensitivity, ±5 % (ref 100 Hz),							
Output Type A, 0 ±4 V FSO output	mV/g	2,000	400	133.3	80	40	20
Output Type B, 2.5 ±2 V FSO output	mV/g	1,000	200	66.6	40	20	10
Output Type C, 0 ±4 V FSO differential	mV/g	2,000	400	133.3	80	40	20
Output Type D, 0 ±8 V FSO differential	mV/g	4,000	800	266.6	160	80	40
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					
Phase shift (max.) @ 0 Hz	degrees	0					
@ 10 Hz	degrees	2					
@ 100 Hz	degrees	20	10				
Noise density, 0 ... 100 Hz, typ. (max) 0.025	mgrms/√ Hz	0.025 (0.030)	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, output Type (A; B; C; D)	mV	0 ±60 (A) ; 2,500 (B) ±60 (C) ; 0 ±120 (D)					
Capacitive load, max.	µF	0.5					
Load resistance, min.	kΩ	30					
Output impedance, typ.	Ω	300					
Supply current, nom.	mA	1.6					
Supply voltage, temperature	VDC	6 … 50 (≤ 210 °F); 6 … 35 (≤ 230 °F); 6 … 20 (≤ 250 °F); 6 … 12.5 (260 °F)					
Reverse polarity protection		Yes					
Environmental							
Shock, (half sine, 200 µs)	g	6,000					
Random, (20 - 2,000 Hz)	grms	20					
Storage temperature range	°F	–65 … 260 (TA or TB housing); –65 … 185 (AC housing)					
Operating temperature range	°F	–65 … 260 (TA or TB housing); –65 … 185 (AC housing)					
Temp. coeff. sensitivity, typ. (max)	ppm/°F	±55 (±165)					
Temp. coeff. sensitivity, typ. (max)	%/°F	±0.006 (±0.017)					
Temp. coeff. bias, typ. (max)	mg/°F	±0.06 (±0.4)	±0.3 (±2.2)	±0.8 (±6.6)	±2.5 (±11)	±2.8 (±22)	±5.5 (±44)
Temperature sensor							
Output @ 68 °F	V	1.632					
Sensitivity	mV/°F	–6.47					
Accuracy	°F	±9					
Physical							
Case		Titanium or Anodized Aluminum					
Mounting		4-40 / M3					
Sealing		Environmental (AC housing); Hermetic (TA or TB housing)					
Ground isolation		Yes					
Weight (excluding cable)	grams	15 (TA or TB housing)/ 12 (AC housing)					
Cable length tolerance	m	±0.1					

Operation of the sensor with supply voltage exceeding stated values at indicated temperatures will cause permanent damage to the sensor.

[1] Contact Kistler for ±5 VDC supply voltage versions.

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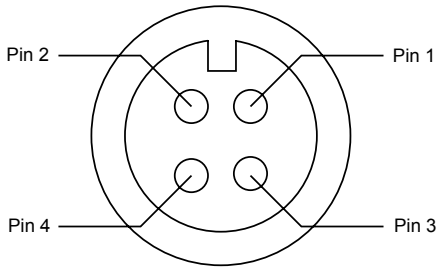
Included Accessories: Aluminum Housing	Type/Art. No.
• Mounting screw, M3 x 12 mm long	431-0492-003
• Mounting screw, 4-40 UNC-2A x 1/2" long	431-0375-005
• Fiber washer	434-0318-001
• Mounting wax	8432

Included Accessories: Titanium Housing	Type/Art. No.
• Mounting screw, M3 x 14mm long	431-0492-004
• Mounting screw, 4-40 UNC-2A x 9/16" long	431-0491-002
• Mounting wax	8432

Optional Accessories	Type
• Adhesive mounting base (off-ground) with two 4-40 female threaded holes on sensor side	8464K01
• Mounting base (off-ground) with two 4-40 female threaded holes on sensor side, one 10-32 threaded female thruhole, with 10-32 stud	8464K02
• Magnetic mounting base	8464K03
• Triaxial mounting cube, with 10-32 UNF-2A x 1/2" screw and #10 washer, two 4-40 UNC-2A x 7/16"screws with washers	8522
• Baseplate conversion for backward compatibility to Type 8305/8310/8312 mounting pattern with 10-32 stud	8464K04
• Flexible shielded breakout cable, silicone jacket (mates with Type 8315 with integral connector option) pigtail wires on opposite end (lengths 2, 5, 10 and sp meters)	1534AxxK00
• Extension cable, 4-pin ¼"—28 neg. to 4-pin ¼"—28 neg. PTFE jacket	1592A...
• Output cable, 4-pin neg., 1/4"—28 neg. to pigtails PTFE jacket	1592M1...
• Halogen-free output cable, 4-pin neg., ¼" neg. to pigtail	1592M2...

Electrical Interface			Function-Output		
A (pin)	B (Wire Color)	C (Wire Color)	Type A0, B0	Type AT, BT	Type C0, D0
1	Red	Red	Power	Power	Power
2	Black	Black	Return	Return	Return
3	Yellow	Green	N/C	Temperature	Output-
4	White	White	Output+	Output+	Output+
-	-	Orange	N/C	N/C	N/C
-	-	Blue	N/C	N/C	N/C
-	Shield	Shield	Case	Case	Case



1/4"—28, 4-pin connector sensor view

Ordering Key

Type 8315A □ □ □ □

Measuring Range

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

Output Type

0±4 V FSO, no temperature output	**A0**
0±4 V FSO, with temperature output	**AT**
2.5±2 V FSO, no temperature output	**B0**
2.5±2 V FSO with temperature output	**BT**
0±4 V FSO, differential, no temp. output	**C0**
0±8 V FSO differential, no temp. output	**D0**

Housing/Electrical Interface

Anodized aluminum housing with integral cable (max. temperature to 185 °F (output types A0, B0 C0 and D0 only)	**AC**
Titanium housing with 4-pin connector (output types AT, BT, C0 and D0 only)	**TA**
Titanium housing with integral cable (PTFE) (output types AT, BT, C0 and D0 only)	**TB**

Cable Length

none	**00**
sp = length in meters (for AC and TB housing/electrical interface only)	**sp**

*Please contact Kistler for +5 VDC supply options

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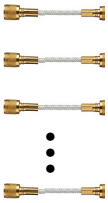
Measuring Chain

Measure	Connect	Amplify	Output	Analyze
 Type 8315A ... AC Type 8315A ... TB Integral cable	Integral pigtail	customer supplied		 Read-out
 Type 8315A ... TA 4-pin pos.	 Type 1592M1/1534A... 4-pin neg. pigtails	customer supplied		 Read-out
 Type 8315A ... TA 4-pin pos.*	 Type 1592A ... 4-pin neg. 4-pin neg.	 Type 5210 Power supply	 Type 1511 BNC pos. BNC pos.	 Read-out
 Type 8315A up to 15	 Type 1592A... 4-pin neg. 4-pin neg.	 5146A15 15-Channels Power supply	 Type 1511 BNC pos. BNC pos.  customer supplied	 Read-out

* excludes C0 and D0 (differential) output Types

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