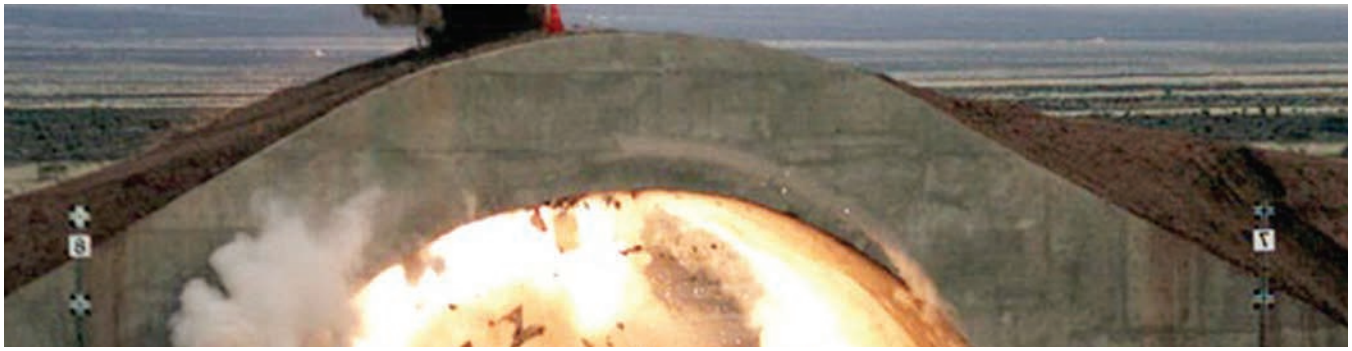
PCB PIEZOTRONICS
AN MTS COMPANY



SERIES **3991**

MEMS HIGH-G SHOCK ACCELEROMETERS

- Titanium housing and OEM configuration available
- Slight damping reduces resonance amplification
- Mechanical over-range stops improve survivability
- Wide band frequency response
- Low power consumption
- Low warm-up drift

TYPICAL APPLICATIONS

- Safe and Arm
- Smart Fuzes
- Weapons Data Recorders
- Explosive Environments (pyroshock)
- Metal-to-metal Impact
- Blast Loading of Structures / Blast Survivability

STATE-OF-THE-ART MEMS DESIGN AND FABRICATION

Series 3991 MEMS high-amplitude shock accelerometers from PCB Piezotronics (PCB®), represent state-of-the-art industry technology for miniature, high amplitude, DC response acceleration sensors. Tis series is capable of measuring long duration transient motion, as well as, responding to and surviving extremely fast rise times, typical of a high-G shock event. Both a packaged and an OEM configuration are offered, to fulfill a variety of installation requirements.

The air-damped acceleration sensing element, is micromachined from silicon, is manufactured with the latest advances in etching techniques and equipment. This tiny element measures just 2.5 x 1.7 x 0.9 mm (L x W x H), and incorporates a seismic mass, protective over-range stops and a full-active, piezoresistive Wheatstone bridge.

Series 3991 is intended to fulfill the most demanding aerospace and defense application requirements. Their design concepts were born from more than 20 years of PCB® expertise in very high-G shock (≥ 20000 G) measurement applications and sensor development. Our design team has the most experience in the world for these applications. Our process engineers utilized the latest and most sophisticated techniques and equipment to achieve the desired performance levels that previously have not been attainable.

As with all PCB® instrumentation, these sensors are complemented with toll-free applications assistance, 24-hour customer service and are backed by our Total Customer Satisfaction no risk policy.

MEMS HIGH-AMPLITUDE SHOCK ACCELEROMETERS		
Model Number	**3991B1120KG**	**3991B1160KG**
Environmental		
Sensitivity (10VDC excitation)	0.010 mv/g	0.003 mV/g
Sensitivity	0.001 mV/V/g	0.0003 mV/V/g
Measurement Range	± 0 to 20000 g	± 0 to 60000 g
Frequency Range (± 1 db)	10 kHz	20 kHz
Resonant Frequency	> 60k Hz	> 120k Hz
Overload Limit (Shock)	± 60000 g pk	± 100000 g pk
Overload Limit (Mechanical Stops)	≥ 30 kg	≥ 80 kg
Temperature Range (Operating)	-65 to +250 °F -54 to +121 °C	-65 to +250 °F -54 to +121 °C
Excitation Voltage (Typical)	10 VDC	10 VDC
Excitation Voltage	3.3 to 15 VDC	3.3 to 15 VDC
Bridge Resistance (± 2k ohms)	6k ohms	6k ohms
Physical		
Size (Height x Length x Width)	0.11 x 0.56 x 0.28 in (2.79 x 14.22 x 7.11 mm)	0.11 x 0.56 x 0.28 in (2.79 x 14.22 x 7.11 mm)
Weight	0.045 oz (1.28 gm)	0.045 oz (1.28 gm)
Mounting	(2) Through-holes / Screws	(2) Through-holes / Screws
Housing	Titanium	Titanium
Cable Length	10 ft (3 m)	10 ft (3 m)
Electrical Connection	034 FEP, Integral Cable	034 FEP, Integral Cable
Cable Termination	Pigtails	Pigtails
Supplied Accessories		
Mounting Screw	(2) Model 081A110 (4-40 x 1/4" SHCS)	(2) Model 081A110 (4-40 x 1/4" SHCS)
Calibration Certificate	ACS-62 Shock Calibration	ACS-62 Shock Calibration

Model 080A213

Triaxial mounting block for Model 3991B11XXKG (Screw 080A110)

LN Mini 8-Pin DIN Connector

Bridge input mating connector

MODEL NUMBERING SYSTEM FOR SERIES 3991 HIGH-AMPLITUDE SHOCK ACCELEROMETERS

1) Single Axis Series 3991					
3991B	Single axis, MEMS DC response shock accelerometer (revision A)				
	2) Configurations				
	11	Titanium housing, 10 ft (3m) integral cable, 4 conductor FEP cable, terminating in pigtails, two through-bolt mounting holes			
		3) Measurement Range			
		20KG 60KG	±20000 G ±60000 G		
			4) Integral Cable Length (add only if selecting integral cable and other than standard length shown above)		
			/ XXX	Specify XXX as desired in feet	
				5) Cable Termination (add only if selecting integral cable with other than pigtail connection	
				LN	Mini 8-pin DIN connector
				AY	4-pin plug
Examples					
3991B	11	60KG	/020	LN	Single axis, titanium housing, integral 4 conductor FEP cable, 60000 G range with 20 ft (6.1m) cable terminating with Mini 8-Pin DIN connector

Typical Rear Panel

MEMS SENSOR SIGNAL CONDITIONER	
Model Number	**482C27**
Channels	4
Sensor Input Types	Differential/Single-ended MEMS/Bridge, ICP®/Voltage
Compatible Sensor Series	350X, 360X, 371X, 374X, 3991, load cells
Gain	x0.1 to x2000; x0.1 to x200 [1]
Gain Increment	0.1
Output Range	±10 V
Frequency Response	DC to 100k Hz (-3dB)
Temperature Range (Operating)	+32 to +122 °F 0 to +50 °C
Excitation Voltage	0 to 12 VDC unipolar or bipolar [2]
Computer Controller	Ethernet/RS-232
Power Required	9 to 18 VDC [3]
Input Connectors	(4) 8-socket mini DIN, (4) BNC Jacks
Output Connectors	BNC Jacks
Size (Height x Width x Depth)	3.2 in x 8.0 in x 5.9 in 8.1 cm x 20 cm x 15 cm
Weight	2.25 lb (1.021 kg)
Supplied Accessories	
(1) 017AXX Power Cord; (1) 488A14 Universal Power Adaptor; (1) MCSC Control Software	
Additional Accessories	
Auto Lighter Adaptor	488A13t
Input Mating Connector(s)	8-pin mini DIN, AC
Additional Versions	
8-channel 19" rack mount version, computer control only	483C28
Notes	
[1] Maximum gain for bridge/MEMS input is x2000 and for ICP®/voltage input is x200. [2] In bipolar mode, +Vexc and -Vexc track each other. They are equal and opposite. [3] Supplied with 85 to 264 VAC, 47 to 400 Hz Universal Power Adaptor.	

The Model 482C27 four-channel, benchtop signal conditioner is fullfeatured and cost effective. It offers low noise operation and simplicity of use. Each channel is selectable between two input types: Bridge/MEMS or ICP®/Voltage.

For the bridge inputs, this model offers 0 to 12 VDC unipolar or bipolar excitation voltage for use with single-ended or differential MEMS and bridge sensors, like load cells and reaction torque sensors. This model features incremental gain of x0.1 to x2000, auto zero, auto balance, AC/ DC coupling, normalization, and shunt calibration. The bridge inputs are compatible with full bridge sensors as well as 1/2 and 1/4 bridge sensors, with internal switchable bridge completion resistors.

For the ICP® inputs, the model offers 0 to 20 mA of constant current excitation, to power ICP® sensors or in-line ICP® charge converters. This model features incremental gain of x.1 to x200, normalization and AC/DC coupling.

The base unit of this model is powered from 9 to 18 VDC, however, it is supplied with a universal voltage, AC power adaptor. Optional auto lighter adaptor, Model 488A13, is also available.

Model 483C28

8-channel version, computer control only

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PCB Piezotronics, Inc. is a designer and manufacturer of microphones, vibration, pressure, force, torque, load, and strain sensors, as well as the pioneer of ICP® technology used by design engineers and predictive maintenance professionals worldwide for test, measurement, monitoring, and control requirements in automotive, aerospace, industrial, R&D, military, educational, commercial, OEM applications, and more. With a worldwide customer support team, 24-hour SensorLine℠, and a global distribution network, PCB® is committed to Total Customer Satisfaction. Visit www.pcb.com for more information. PCB Piezotronics, Inc. is a wholly owned subsidiary of MTS Systems Corporation. Additional information on MTS can be found at www.mts.com.

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MTS SENSORS

MTS Sensors, a division of MTS Systems Corporation (NASDAQ: MTSC), vastly expanded its range of products and solutions after MTS acquired PCB Piezotronics, Inc. in July, 2016. PCB Piezotronics, Inc. is a wholly owned subsidiary of MTS Systems Corp.; IMI Sensors and Larson Davis are divisions of PCB Piezotronics, Inc.; Accumetrics, Inc. and The Modal Shop, Inc. are subsidiaries of PCB Piezotronics, Inc.