PCB PIEZOTRONICS INC.

Service, Repair, and Return Policies and Instructions

The information contained in this document supersedes all similar information that may be found elsewhere in this manual.

Service – Due to the sophisticated nature of the sensors and associated instrumentation provided by PCB Piezotronics, user servicing or repair is not recommended and, if attempted, may void the factory warranty. Routine maintenance, such as the cleaning of electrical connectors, housings, and mounting surfaces with solutions and techniques that will not harm the physical material of construction, is acceptable. Caution should be observed to ensure that liquids are not permitted to migrate into devices that are not hermetically sealed. Such devices should only be wiped with a dampened cloth and never submerged or have liquids poured upon them.

Repair – In the event that equipment becomes damaged or ceases to operate, arrangements should be made to return the equipment to PCB Piezotronics for repair. User servicing or repair is not recommended and, if attempted, may void the factory warranty.

Calibration – Routine calibration of sensors and associated instrumentation is recommended as this helps build confidence in measurement accuracy and acquired data. Equipment calibration cycles are typically established by the users own quality regimen. When in doubt about a calibration cycle, a good "rule of thumb" is to recalibrate on an annual basis. It is also good practice to recalibrate after exposure to any severe temperature extreme, shock, load, or other environmental influence, or prior to any critical test.

PCB Piezotronics maintains an ISO-9001 certified metrology laboratory and offers calibration services, which are accredited by A2LA to ISO/IEC 17025, with full traceability to SI through N.I.S.T. In addition to the normally supplied calibration, special testing is also available, such as: sensitivity at elevated or cryogenic temperatures, phase response, extended high or low frequency response, extended range, leak testing, hydrostatic pressure testing, and others. For information on standard recalibration services or special testing, contact your local PCB Piezotronics distributor, sales representative, or factory customer service representative.

Returning Equipment – *Following these procedures will ensure that your returned materials are handled in the most expedient manner*. Before returning any equipment to PCB Piezotronics, contact your local distributor, sales representative, or factory customer service representative to obtain a Return **Warranty, Service, Repair, and Return Policies and Instructions** Materials Authorization (RMA) Number. This RMA number should be clearly marked on the outside of all package(s) and on the packing

list(s) accompanying the shipment. A detailed account of the nature of the problem(s) being experienced with the equipment should also be included inside the package(s) containing any returned materials.

A Purchase Order, included with the returned materials, will expedite the turn-around of serviced equipment. It is recommended to include authorization on the Purchase Order for PCB to proceed with any repairs, as long as they do not exceed 50% of the replacement cost of the returned item(s). PCB will provide a price quotation or replacement recommendation for any item whose repair costs would exceed 50% of replacement cost, or any item that is not economically feasible to repair. For routine calibration services, the Purchase Order should include authorization to proceed and return at current pricing, which can be obtained from a factory customer service representative.

Contact Information – International customers should direct all inquiries to their local distributor or sales office. A complete list of distributors and offices can be found at www.pcb.com. Customers within the United States may contact their local sales representative or a factory customer service representative. A complete list of sales representatives can be found at www.pcb.com. Toll-free telephone numbers for a factory customer service representative, in the division responsible for this product, can be found on the title page at the front of this manual. Our ship to address and general contact numbers are:

PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY14043 USA
Toll-free: (800) 828-8840
24-hour SensorLine^{SM}: (716) 684-0001
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PCB工业监视和测量设备 - 中国RoHS2公布表

PCB Industrial Monitoring and Measuring Equipment - China RoHS 2 Disclosure Table

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
住房	O	O	O	O	O	O
PCB板	X	O	O	O	O	O
电气连接器	O	O	O	O	O	O
压电晶体	X	O	O	O	O	O
环氧	O	O	O	O	O	O
铁氟龙	O	O	O	O	O	O
电子	O	O	O	O	O	O
厚膜基板	O	O	X	O	O	O
电线	O	O	O	O	O	O
电缆	X	O	O	O	O	O
塑料	O	O	O	O	O	O
焊接	X	O	O	O	O	O
铜合金/黄铜	X	O	O	O	O	O
本表格依据 SJ/T 11364 的规定编制。						
O： 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。						
X： 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。 铅是欧洲RoHS指令2011/65/ EU附件三和附件四目前由于允许的豁免。						

CHINA RoHS COMPLIANCE

Component Name	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Chromium VI Compounds (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	O	O	O	O	O	O
PCB Board	X	O	O	O	O	O
Electrical Connectors	O	O	O	O	O	O
Piezoelectric Crystals	X	O	O	O	O	O
Epoxy	O	O	O	O	O	O
Teflon	O	O	O	O	O	O
Electronics	O	O	O	O	O	O
Thick Film Substrate	O	O	X	O	O	O
Wires	O	O	O	O	O	O
Cables	X	O	O	O	O	O
Plastic	O	O	O	O	O	O
Solder	X	O	O	O	O	O
Copper Alloy/Brass	X	O	O	O	O	O

This table is prepared in accordance with the provisions of SJ/T 11364.

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

X: Indicates that said hazardous substance contained in at least one of the homogeneous materials for this part is above the limit requirement of GB/T 26572.
Lead is present due to allowed exemption in Annex III or Annex IV of the European RoHS Directive 2011/65/EU.

DOCUMENT NUMBER: 21354
*DOCUMENT REVISION: **D***
ECN: 46162

Model Number	HIGH AMPLITUDE MEMS SHOCK ACCELEROMETER	Revision: C
3991B1160KG		ECN #: 47477

Performance	**ENGLISH**	**SI**	
Sensitivity(± 50 %)(at 10 VDC excitation)	0.003 mV/g	0.0003 mV/(m/s²)	[2]
Sensitivity	0.0003 mV/V/g	0.00003 mV/V/(m/s²)	[7]
Measurement Range	± 0 to 60,000 g	± 0 to 588,400 m/s² pk	
Frequency Range(± 1 dB)	0 to 20,000 Hz	0 to 20,000 Hz	
Resonant Frequency	>120 kHz	>120 kHz	
Damping Ratio	2 % Critical	2 % Critical	[1]
Non-Linearity(per 10,000 g (98,100 m/s²))	≤ 1 %	≤ 1 %	
Transverse Sensitivity	≤ 3 %	≤ 3 %	
Environmental			
Overload Limit(Shock)	± 100,000 g pk	± 980,665 m/s² pk	[5]
Overload Limit(Mechanical Stops)	≥ 80 kg	≥ 782,534 m/s² pk	
Temperature Range(Operating)	-65 to 250 °F	-54 to 121 °C	
Temperature Coefficient of Sensitivity	-0.11 %/°F	-0.20 %/°C	[1]
Zero g Offset Temperature Shift	± 10 mV	± 10 mV	[6]
Base Strain Sensitivity	.3 g/με	2.94 (m/s²)/με	[1]
Electrical			
Excitation Voltage(Maximum)	15.0 VDC	15.0 VDC	
Current Consumption	<3 mA	<3 mA	
Input Resistance(± 2000 Ohm)	6000 Ohm	6000 Ohm	[1][2]
Output Resistance(± 2000 Ohm)	6000 Ohm	6000 Ohm	[1][2]
Offset Voltage	± 40 mVDC	± 40 mVDC	[2]
Settling Time	0.01 sec	0.01 sec	[3]
Electrical Isolation(Case)	≥ 10^7 Ohm	≥ 10^7 Ohm	[4]
Physical			
Sensing Element	Piezoresistive MEMS	Piezoresistive MEMS	
Sensing Geometry	Full Active	Full Active	
Housing Material	Titanium	Titanium	
Sealing	Epoxy	Epoxy	
Size (Height x Length x Width)	0.120 in x 0.56 in x 0.28 in	3.05 mm x 14.22 mm x 7.11 mm	
Weight(without cable)	0.045 oz	1.28 gm	[1]
Electrical Connector	Integral Cable	Integral Cable	
Electrical Connection Position	Side	Side	
Cable Type	096 4-cond silicone jacket	096 4-cond silicone jacket	
Cable Termination	Pigtail Ends	Pigtail Ends	
Cable Length	10 ft	3.05 m	
Mounting	Through Holes (2)	Through Holes (2)	

CE[8]

All specifications are at room temperature unless otherwise specified.

This product is a controlled item under the International Traffic in Arms Regulations (ITAR) administered by the Directorate of Defense Trade Controls. Any export of this product from the United States, including any item in which this product may be incorporated, requires appropriate authorization from the U.S. Department of State. Diversion contrary to U.S. law is prohibited.

In the interest of constant product improvement, we reserve the right to change specifications without notice.

OPTIONAL VERSIONS

Optional versions have identical specifications and accessories as listed for the standard model except where noted below. More than one option may be used.

NOTES:

[1] Typical.
[2] Verified with test data provided on supplied calibration certificate.
[3] Settling Time is the maximum time after power-up for the Offset Voltage to be within +/-2% of Measurement Range output of the final offset value. Mounting surface must be at thermal equilibrium.
[4] Individually tested to ensure compliance with specified value.
[5] Half-sine pulse duration, ≥ 20 µsec.
[6] -65 to +250 °F, ref. 75 °F (-54 to +121 °C, ref. 24 °C)
[7] Sensitivity is proportional to excitation voltage, and at other excitation values, sensitivity can be predicted from the 10VDC calibrated value with a small (<~.5%) increase in uncertainty.
[8] See PCB Declaration of Conformance PS165 for details.

SUPPLIED ACCESSORIES:

Model 081A110 Mounting Screw (4-40 x 1/4" SHCS) (2)
Model ACS-62 Shock Pulse Calibration of single axis piezoresistive shock accelerometer to maximum amplitude of 5k g, 10.0 VDC excitation

Entered: LK	Engineer: JS	Sales: RWM	Approved: JJB	Spec Number:
Date: 11/28/2017	Date: 11/28/2017	Date: 11/28/2017	Date: 11/28/2017	**65882**

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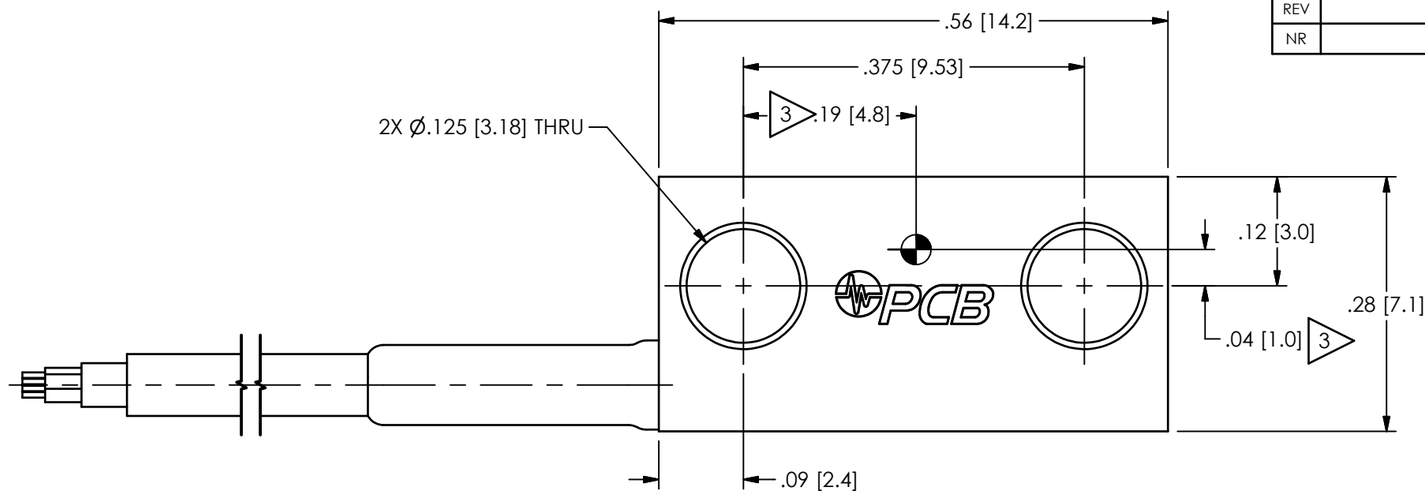
ITAR CONTROLLED PRODUCT

THIS PRODUCT IS A CONTROLLED ITEM UNDER THE INTERNATIONAL TRAFFIC IN ARMS REGULATIONS (ITAR) ADMINISTERED BY THE DIRECTORATE OF DEFENSE TRADE CONTROLS. ANY EXPORT OF THIS PRODUCT FROM THE UNITED STATES, INCLUDING ANY ITEM IN WHICH THIS PRODUCT MAY BE INCORPORATED, REQUIRES APPROPRIATE AUTHORIZATION FROM THE U.S. DEPARTMENT OF STATE. DIVERSION CONTRARY TO U.S. LAW IS PROHIBITED.

65879

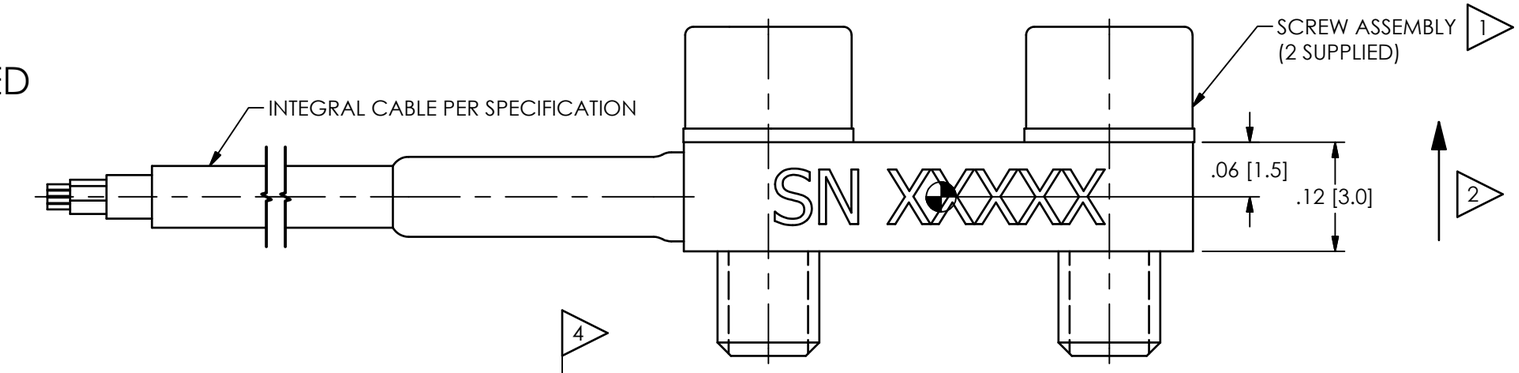
REVISIONS		
REV	DESCRIPTION	DIN
NR	RELEASED TO DRAFTING	46108

ESD SENSITIVE
CLASS 2 HANDLING REQUIRED



ELECTRICAL CONNECTIONS

GREEN	+ SIGNAL
WHITE	- SIGNAL
RED	+ EXCITATION
BLACK	- EXCITATION



MOUNTING HOLE PREPARATION:

Ø.089 [2.26] ↧.230 [5.84]
4-40 UNC-2B ↧.187 [4.75]

4 RECOMMENDED MOUNTING SURFACE SHOULD BE FLAT TO WITHIN .0003 [.008] TIR OVER Ø.650 [16.51] WITH A 32 [0.08] FINISH FOR BEST RESULTS

3 CENTER OF SEISMIC MASS

2 DIRECTION OF POSITIVE OUTPUT

1 RECOMMENDED MOUNTING TORQUE ON CAP SCREW, 6-8 IN LBS [68-90 N-CM]

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:		DRAWN		CHECKED		ENGINEER	
DIMENSIONS IN INCHES DECIMALS XX ±.01 XXX ±.005 ANGLES ± 2 DEGREES	DIMENSIONS IN MILLIMETERS [IN BRACKETS] DECIMALS X ± 0.3 XX ± 0.13 ANGLES ± 2 DEGREES	KRM	10/26/16	JDM	10/26/16	GCD	10/26/16
FILLETS AND RADII .003 - .005	FILLETS AND RADII 0.07 - 0.13	TITLE: INSTALLATION DRAWING MODEL 3991B11XXKG SERIES ACCELEROMETER					

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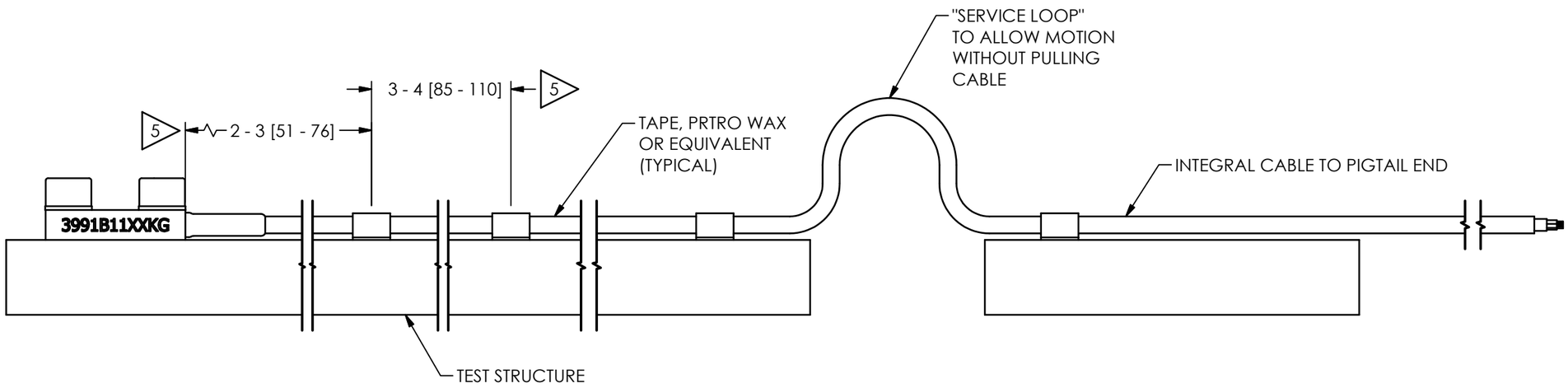
CODE IDENT. NO.	DWG. NO.	
52681	65879	
SCALE: 4X	SHEET 1 OF 2	

65879

REVISIONS		
REV	DESCRIPTION	DIN
	-SEE SHEET 1-	



5 FASTEN CABLE TO TEST STRUCTURE TYPICALLY WITHIN 2-3"[51-76] OF SENSOR. THEN FASTEN AGAIN WITHIN 3-4"[76-101] OF PREVIOUS ATTACHMENT. BETWEEN THE TEST STRUCTURE AND A FIXED STRUCTURE, ALLOW A SERVICE LOOP LARGE ENOUGH TO PREVENT PULLING OF THE CABLE WHEN SHAKING. MORE ATTACHMENT POINTS WILL PROVIDE LESS NOISE IN THE RESULTING DATA. LOOSE CABLES OR PARTS ELSEWHERE ON THE TEST STRUCTURE CAN ALSO GENERATE "NOISE" ON THE SIGNAL RECEIVED FROM THE MODEL 3991 SERIES.

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:		DRAWN		CHECKED		ENGINEER	
DIMENSIONS IN INCHES DECIMALS XX ±.01 XXX ±.005 ANGLES ± 2 DEGREES	DIMENSIONS IN MILLIMETERS [IN BRACKETS] DECIMALS X ± 0.3 XX ± 0.13 ANGLES ± 2 DEGREES	KRM	10/26/16	JDM	10/26/16	GCD	10/26/16
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CODE IDENT. NO. 52681	DWG. NO. 65879
SCALE: 4X	SHEET 2 OF 2