Model 608M50

Industrial 3-Wire Accelerometer

Installation and Operating Manual

**For assistance with the operation of this product,
contact PCB Piezotronics, Inc.**

Toll-free: 800-959-4464
24-hour SensorLine: 716-684-0001
Fax: 716-684-3823
E-mail: imi@pcb.com
Web: www.imi-sensors.com

Repair and Maintenance

PCB guarantees Total Customer Satisfaction through its "Lifetime Warranty Plus" on all Platinum Stock Products sold by PCB and through its limited warranties on all other PCB Stock, Standard and Special products. Due to the sophisticated nature of our sensors and associated instrumentation, **field servicing and repair is not recommended and, if attempted, will void the factory warranty**.

Beyond routine calibration and battery replacements where applicable, our products require no user maintenance. Clean electrical connectors, housings, and mounting surfaces with solutions and techniques that will not harm the material of construction. Observe caution when using liquids near devices that are not hermetically sealed. Such devices should only be wiped with a dampened cloth—never saturated or submerged.

In the event that equipment becomes damaged or ceases to operate, our Application Engineers are here to support your troubleshooting efforts 24 hours a day, 7 days a week. Call or email with model and serial number as well as a brief description of the problem.

Calibration

Routine calibration of sensors and associated instrumentation is necessary to maintain measurement accuracy. We recommend calibrating on an annual basis, after exposure to any extreme environmental influence, or prior to any critical test.

PCB Piezotronics is an ISO-9001 certified company whose calibration services are accredited by A2LA to ISO/IEC 17025, with full traceability to SI through N.I.S.T. In addition to our standard calibration services, we also offer specialized tests, including: sensitivity at elevated or cryogenic temperatures, phase response, extended high or low frequency response, extended range, leak testing, hydrostatic pressure testing, and others. For more information, contact your local PCB Piezotronics distributor, sales representative, or factory customer service representative.

Returning Equipment

If factory repair is required, our representatives will provide you with a Return Material Authorization (RMA) number, which we use to reference any information you have already provided and expedite the repair process. This number should be clearly marked on the outside of all returned package(s) and on any packing list(s) accompanying the shipment.

Contact Information

PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY14043 USA
Toll-free: (800) 828-8840
24-hour SensorLine: (716) 684-0001
General inquiries: info@pcb.com
Repair inquiries: rma@pcb.com

For a complete list of distributors, global offices and sales representatives, visit our website, www.pcb.com.

Safety Considerations

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the precautions required to avoid injury. While our equipment is designed with user safety in mind, the protection provided by the equipment may be impaired if equipment is used in a manner not specified by this manual.

Discontinue use and contact our 24-Hour Sensorline if:

- Assistance is needed to safely operate equipment
- Damage is visible or suspected
- Equipment fails or malfunctions

For complete equipment ratings, refer to the enclosed specification sheet for your product.

Definition of Terms and Symbols

The following symbols may be used in this manual:

DANGER
Indicates an immediate hazardous situation, which, if not avoided, may result in death or serious injury.

CAUTION
Refers to hazards that could damage the instrument.

NOTE
Indicates tips, recommendations and important information. The notes simplify processes and contain additional information on particular operating steps.

The following symbols may be found on the equipment described in this manual:

This symbol on the unit indicates that high voltage may be present. Use standard safety precautions to avoid personal contact with this voltage.

This symbol on the unit indicates that the user should refer to the operating instructions located in the manual.

This symbol indicates safety, earth ground.

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.

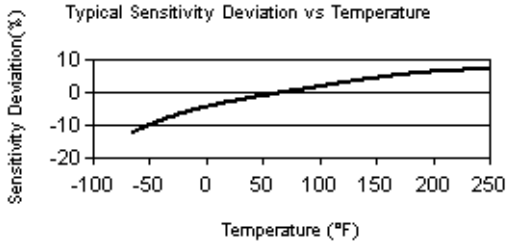
O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

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.

Model Number 608M50	INDUSTRIAL 3-WIRE ACCELEROMETER	Revision: C ECN #: 52557

Performance	ENGLISH	SI	
Sensitivity(± 20 %)	100 mV/g	10.2 mV/(m/s²)	[1]
Measurement Range(12 VDC)	± 50 g	± 490 m/s²	[2]
Measurement Range(5 VDC)	± 15 g	± 147 m/s²	[2]
Frequency Range(± 3 dB)	90 to 600,000 cpm	1.5 to 10,000 Hz	
Resonant Frequency	1,320 kcpm	22 kHz	[2]
Broadband Resolution(1 to 10,000 Hz)	2 mg	19.6 mm/s²	[2]
Non-Linearity	± 1 %	± 1 %	[3]
Transverse Sensitivity	≤ 7 %	≤ 7 %	
Environmental			
Overload Limit(Shock)	5,000 g pk	49,050 m/s² pk	
Temperature Range	-65 to +250 °F	-54 to +121 °C	
Temperature Response	See Graph	See Graph	[2]
Enclosure Rating	IP68	IP68	
Electrical			
Settling Time(within 1% of bias)	≤ 5.0 sec	≤ 5.0 sec	
Discharge Time Constant	≥ 0.1 sec	≥ 0.1 sec	
Excitation Voltage	5 to 12 VDC	5 to 12 VDC	
Output Impedance	< 100 Ohm	< 100 Ohm	
Current Draw	0.5 mA	0.5 mA	
Output Bias Voltage	2.5 to 6 VDC	2.5 to 6 VDC	
Spectral Noise(10 Hz)	18 µg/√Hz	176.6 (µm/sec²)/√Hz	[2]
Spectral Noise(100 Hz)	4 µg/√Hz	39.2 (µm/sec²)/√Hz	[2]
Spectral Noise(1 kHz)	2 µg/√Hz	19.6 (µm/sec²)/√Hz	[2]
Electrical Isolation(Case)	> 10^8 Ohm	> 10^8 Ohm	
Physical			
Size (Hex x Height)	9/16 in x 2.5 in	14 mm x 64 mm	
Weight(with cable)	3.5 oz	99.3 gm	
Mounting	Stud	Stud	
Mounting Thread	1/4-28 Female	1/4-28 Female	[4]
Mounting Torque	2 to 5 ft-lb	2.7 to 6.8 Nm	
Sensing Element	Ceramic	Ceramic	
Sensing Geometry	Shear	Shear	
Housing Material	Stainless Steel	Stainless Steel	
Sealing	Molded	Molded	
Electrical Connector	Molded Integral Cable	Molded Integral Cable	
Electrical Connection Position	Top	Top	
Cable Termination	Blunt cut	Blunt cut	
Electrical Connections(Red)	Pos (+) Power	Pos (+) Power	
Electrical Connections(Black)	Ground	Ground	
Electrical Connections(White)	Acceleration Output	Acceleration Output	
Cable Length	10 ft	3 m	
Cable Type	062 3-cond shielded with polyurethane jacket	062 3-cond shielded with polyurethane jacket	

CE [5]



All specifications are at room temperature unless otherwise specified.
In the interest of constant product improvement, we reserve the right to change specifications without notice.
ICP® is a registered trademark of PCB Piezotronics, Inc.

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.

M - Metric Mount
Supplied Accessory: Model M081A61 Mounting Stud 1/4-28 to M6 X 1 (1)

NOTES:

[1]Conversion Factor 1g = 9.81 m/s².
[2]Typical.
[3]Zero-based, least-squares, straight line method.
[4]1/4-28 has no equivalent in S.I. units.
[5]See PCB Declaration of Conformance PS107 for details.

SUPPLIED ACCESSORIES:

Model 081A40 Mounting Stud (1)
Model ICS-2 NIST-traceable single-point amplitude response calibration at 6000 cpm (100 Hz) for each axis (1)

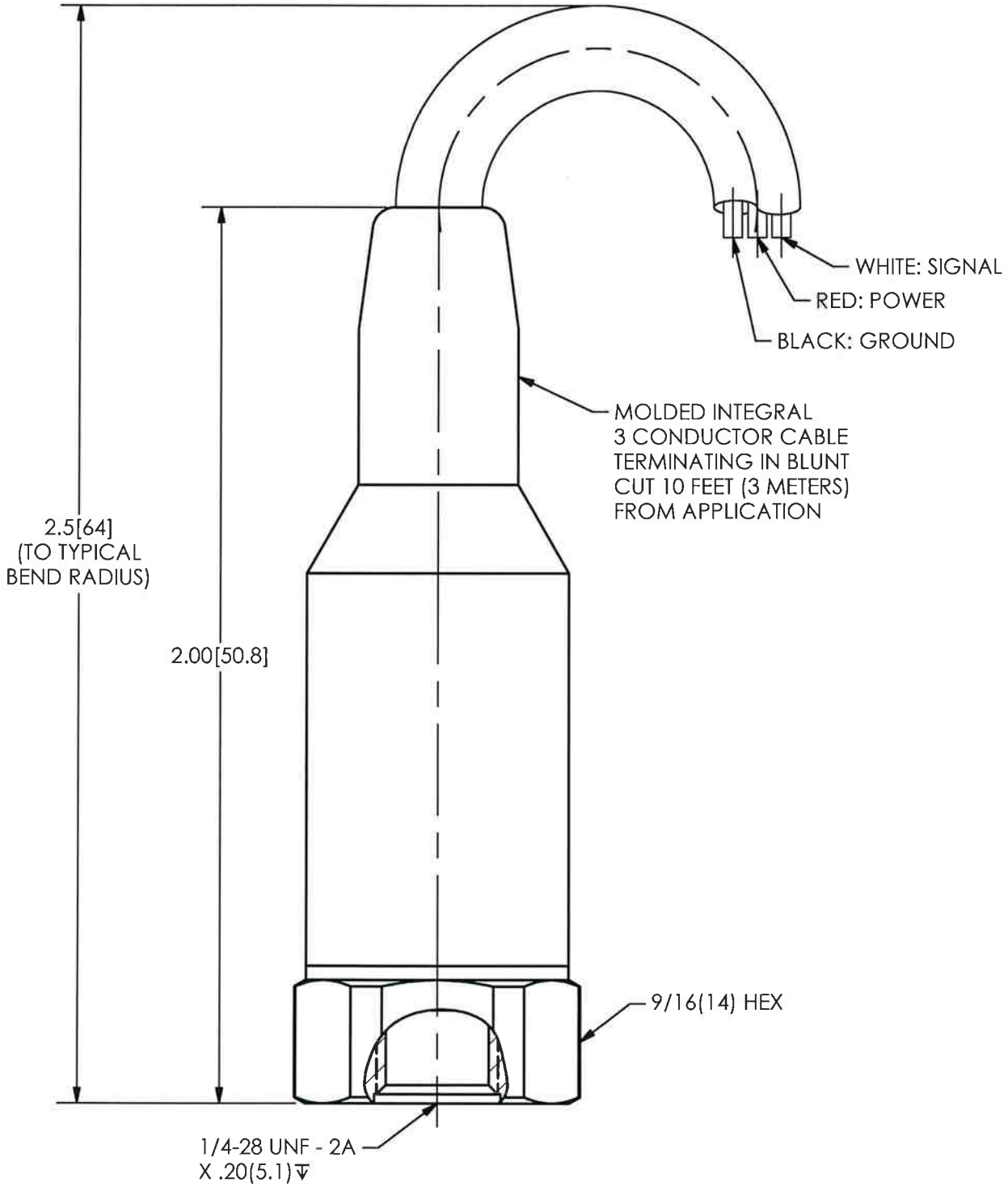
Entered: ND	Engineer: GD	Sales: JL	Approved: BAM	Spec Number:
Date: 03/29/2022	Date: 03/29/2022	Date: 03/29/2022	Date: 03/29/2022	37588

IMI SENSORS
A PCB PIEZOTRONICS DIV.
3425 Walden Avenue, Depew, NY 14043

Phone: 800-959-4464
Fax: 716-684-3823
E-Mail: imi@pcb.com

37589

REVISIONS			
REV	DESCRIPTION	ECN	APP'D
NR	RELEASED TO DRAFTING		ECB 5/30/07



UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:	
DIMENSIONS IN INCHES DECIMALS XX ± .03 XXX ± .010 ANGLES ± 2 DEGREES	DIMENSIONS IN MILLIMETERS [IN BRACKETS] DECIMALS X ± 0.8 XX ± 0.25 ANGLES ± 2 DEGREES
FILLETS AND RADII .003 - .005	FILLETS AND RADII [0.07 - 0.13]

DRAWN	JTG	5/30/07	MFG	JB	5/30/07
CHK'D	ECB	5/30/07	ENGR	JCB	5/30/07
APP'D	LF	5/30/07	SALES	JM	5/30/07

TITLE

OUTLINE DRAWING
MODEL 608M50
ACCELEROMETER

PCB PIEZOTRONICS INC
3425 WALDEN AVE. DEPEW, NY 14043
(716) 684-0001 E-MAIL: sales@pcb.com

CODE IDENT. NO.	DWG. NO.
52681	37589
SCALE: 3X	SHEET 1 OF 1

PCB PIEZOTRONICS
MTS SYSTEMS CORPORATION

SIL Declaration of Conformity

Functional safety according to IEC 61508

Manufacturer: PCB Piezotronics
3425 Walden Avenue
Depew, NY 14043 USA

PCB Piezotronics declares as manufacturer, that the vibration transmitters:

- 602 Series (XX)602yzzz/aaa
- 603 Series (XX)603yzzz/aaa
- 606 Series (XX)606yzzz/aaa
- 607 Series (XX)607yzzz/aaa
- 608 Series (XX)608yzzz/aaa

(XX) Options include one or more of the following:
EX – Approved for Hazardous Locations
M – Metric Mounting Hardware
TO – Dual Output (Vibration/Temperature)

Note: "yzzz" completes the model, "aaa" indicates cable length (if applicable)

Is hardware suitable for use in safety-instrumented systems according to IEC 61508, if the safety instructions and the following parameters are observed:

Parameter	60x Series*	EX60x Series*
SIL	2	2
Proof Test Interval (Annual)	8,760 h	8,760 h
Device Type	B	B
HFT	0	0
SFF	79.59%	79.59%
PFD_{AV}[1]	7.45×10^{-5}	7.45×10^{-5}
$\lambda_{du} \times 10^{-6}$	0.3348	0.3348
SIL Capability (Low Demand Mode)	2	2
SIL Capability (Continuous Demand Mode)	2	2
MTTF[2]	9.5 y	9.5 y

1. The values comply with SIL2 according to ISA S84.01
2. According to Siemens SN29500 and Proven In Use data

* With or without the M (metric) option

The PCB sensor hardware is suitable for inclusion in Safety Instrumented Systems (SIS) that are designed using IEC 61511 (for the process industry sector), IEC 62061 (safety of machinery), EN 50129 (railway applications), and ISO 26262 (automotive industry).

Note: The use of SIL Hardware in specific safety standard application may apply different number of sequences or definitions to those in IEC 61508.

July 2, 2019

PCB Piezotronics Authorized Representative:

Carrie Termin
Regulatory Affairs and Product Certification Specialist

PCB Piezotronics, Inc. Corporate SEAL 1996 New York

PCB PIEZOTRONICS, INC. — CORPORATE HEADQUARTERS
3425 Walden Avenue, Depew, New York 14043-2495 USA
Phone: 716-684-0001 Fax: 716-684-0987
E-mail: info@pcb.com
Web site: www.pcb.com
AS9100 and ISO9001 Certified
ISO17025 Accredited

intertek
Total Quality. Assured.

INTERTEK ASSURANCE SAFETY INTEGRITY LEVEL SUMMARY REPORT
60X PCB SIL SENSOR RATING

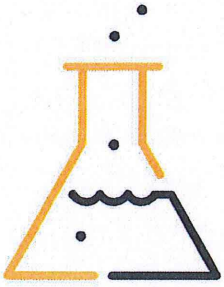
CLIENT NAME
PCB Piezotronics, Inc.
3425 Walden Ave
Depew, NY 14043-2417

REPORT NO
103685042CSLT-003

COMPILED BY
Ashton D. Hainge, CFSP, PMP

PROJECT NAME
G103685042

DATE
02 April 2019

PCB FUNCTIONAL SAFETY SIL SUMMARY AND RESULTS

Summary

This report details the results of the reliability analysis performed on the PCB Piezotronics ICP Sensor model 60X series. Design changes from this documentation package would need to be evaluated for the impact on the reliability characteristics. These results are based on the following PCB Piezotronics documentation:

1. Electrical schematic 23402-NR
2. 603C01 MTTF Calculation
3. 602C11 – 602D11 MTTF Calculation
4. 607-608 MTTF Calculation
5. Manual of 603C01

Results

The results from the FMEA are given below for the ICP Sensor model 60X Series:

Name	Result
Architecture	**1oo1**
Proof test interval (Annual)	**8,760 h**
PFD_{avg}	**$7.45x10^{-5}$**
SFF	**79.59%**
HFT	**0**
SIL Capability (Low Demand Mode)	**2**
SIL Capability (Continuous Demand Mode)	**2**
Architecture	**1oo1**

PCB Sensor Product Meets SIL 2 Capability

Name		Result
Safe Detected failure rate	$\lambda_{SD} \times 10^{-6}$	0.019
Safe Undetected failure rate	$\lambda_{SU} \times 10^{-6}$	0.013
Dangerous Detected failure rate	$\lambda_{DD} \times 10^{-6}$	0.033
Dangerous Undetected failure rate	$\lambda_{DU} \times 10^{-6}$	0.017
Average frequency of a dangerous failure on demand	PFH x 10^{-6}	0.796

Type B components: 60X Series

The safety relevant parameter PFD_{avg} is in compliance with the corresponding requirements for SIL 2 according to IEC 61508[1]. The safety relevant parameters HFT and SFF are in compliance with the corresponding requirements for SIL 1 according to IEC 61508. The user should consider, that the hardware fault tolerance of all inspected devices is zero and that a single fault can lead to a dangerous failure. Even though PFDavg has the range of SIL 4, the hardware fault tolerance limits the capability to SIL 2.

Senior Consultant,

Ashton Hainge, Intertek
CFSP, PMP

[1] The assessment results described in this report only refer to the safety-related parameters PFD avg, HFT, and SFF according to IEC 61508.

This report does not make any statements, that the manufacturer meets all other requirements of the above cited standards for hardware, software, documentation, management of functional safety, verification, and validation.

This report does not imply that the examined pressure sensors have been certified for functional safety by the assessor according to IEC 61508 or any other standards.

The sensors are only one part of a complete safety function. It is at the responsibility of the end-user to prepare and to apply an extensive reliability model, that brings out the complete safety function and that meets all requirements of the claimed SIL level according to IEC 61508.