



Model 685A11
Electronic Vibration Switch
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



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

Total Customer Satisfaction – PCB Piezotronics guarantees Total Customer Satisfaction. If, at any time, for any reason, you are not completely satisfied with any PCB product, PCB will repair, replace, or exchange it at no charge. You may also choose to have your purchase price refunded in lieu of the repair, replacement, or exchange of the product.

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 insure 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 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 insure 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

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.

Warranty – All equipment and repair services provided by PCB Piezotronics, Inc. are covered by a limited warranty against defective material and workmanship for a period of one year from date of original purchase. Contact

PCB for a complete statement of our warranty. Expendable items, such as batteries and mounting hardware, are not covered by warranty. Mechanical damage to equipment due to improper use is not covered by warranty. Electronic circuitry failure caused by the introduction of unregulated or improper excitation power or electrostatic discharge is not covered by warranty.

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:

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3425 Walden Ave.
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Model 685AX1 Electronic Vibration Switch



Operating Guide with Enclosed Warranty Information

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***MANUAL NUMBER: 25109
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Introduction

The Model 685AX1 is an Electronic Vibration Switch designed to monitor vibration levels and trip an alarm when a specified limit is exceeded. An onboard accelerometer with precision electronics insures reliability and accuracy. The device comes standard in an Explosion Proof Enclosure.

General Features

- Imbedded Piezoelectric Accelerometer for improved accuracy and frequency response.
- Vibration range can be in Acceleration or Velocity.
- Provides a 5amp, Form C (SPDT), relay output.
- Adjustable trip limit via a single turn potentiometer.
- Accommodates normally open (NO) and normally closed (NC) wiring schemes.
- Continuous or latching relay action.
- Local reset button and remote reset capability.
- LED indicators for Power and Alarm.
- Removable Terminal Blocks for easy wiring.
- Comes standard in an Explosion Proof Enclosure.
- Mounts directly to the equipment being monitored via a supplied mounting bracket.
- Top cover is secured with a socket head cap screw.
- Flexible design allows for various custom requirements.

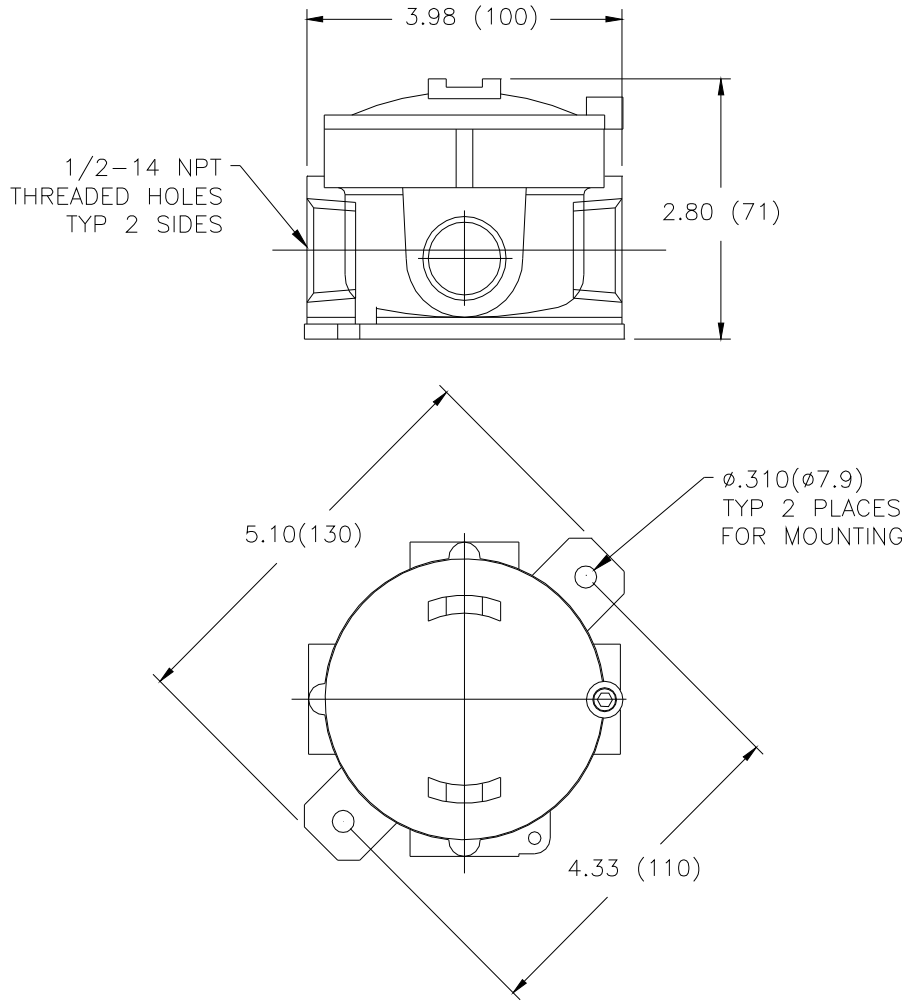
Specifications

- **Power Supply Voltage:** 10-30Vdc
- **Power Supply Current:** 100mA max.
- **Sensor Type:** Piezoelectric Sensing Element
- **Vibration Range:** 0-10g-peak (0-1ips Optional)
- **-3dB Frequency Response:** 3Hz to 1Khz (180 – 60,000cpm)
- **Alarm Level Adjust:** 0-10g-peak
- **Turn on Time Delay:** 3 seconds (factory set)
- **Alarm Time Delay:** 5 seconds (factory set)
- **Alarm function Select:** Latch or Continuous
- **Alarm Relay:** 5A Form C 230Vac/30Vdc
- **Operating Temperature Range:** -13 to 158°F (-25 to 70°C)
- **Storage Temperature Range:** -40 to 257°F (-40 to 125°C)
- **Relative Humidity:** Nema 4X Rating
- **Case Dimension W x H x D:** 5.1 x 3.0 x 4.0in. (130 x 76.2 x 102mm)
- **Weight:** 1.40lbs. (635grams)
- **Case Material:** Aluminum Alloy
- **Input/Output Electrical Connectors:** Removable Screw Terminals
- **Screw Terminal Wire Size:** 24-14 AWG (0.2-2.5 mm²)
- **Enclosure Rating:** EEx-dIIC T6
- **Conduit Hubs (2):** ½" Threaded NPT Female
- **Mounting Hex Screw:** 5/16-18 x 5/8"
- **Mounting Screw Torque:** 2-5ft. lbs. (3-7Nm)
- **LED Indicators:**
 - Power: - Green
 - Alarm: - Red
- **Alarm Setpoint:** Single Turn Potentiometer (0-100% Full Scale Range)
- **Reset Function:** Momentary Pushbutton Switch and/or Remote to Common.

Installation and Wiring

Installation

The Model 685AX1 is designed to be mounted directly on the equipment to be monitored via a supplied mounting bracket. Use grease between all surfaces to insure specified frequency response, otherwise performance will be degraded.



Dimension Drawing
Inch (mm)



WARNING

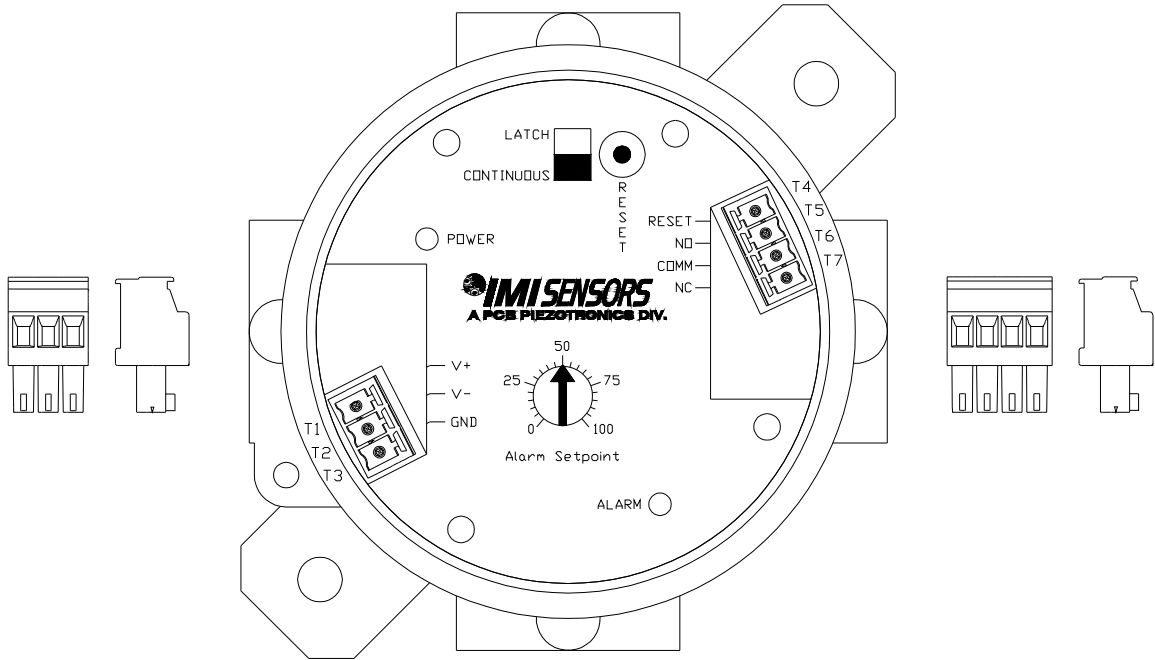
AC and DC input signals and power supply voltages could be hazardous. DO NOT connect live wires to screw terminal plugs, and DO NOT insert, remove, or handle screw terminal plugs with live wires connected.

Connector and Pinout Diagram

The 685AX1 uses plug-in type screw terminal connectors for all input and output connections.

Strip off 0.3" (8mm) of insulation from the connection wire ends. Remove the terminal block from the enclosure, feed the wire through the access ports, and terminate the wire in the correct location. Do not exceed a torque of .05 Nm (0.04 lbft). Re-install the terminal block. Use caution when feeding the wire into the device since the circuit board is exposed at the access ports. R

This assembly connection method allows devices to be exchanged easily and the electrical connection to be visibly isolated.



Pin Location Diagram

Pin Descriptions:

DC Power – Pins 1 to 3:

- T1 +Power
- T2 -Power/Common
- T3 Earth Ground – must be wired to this terminal.

Remote Reset – Pin 4:

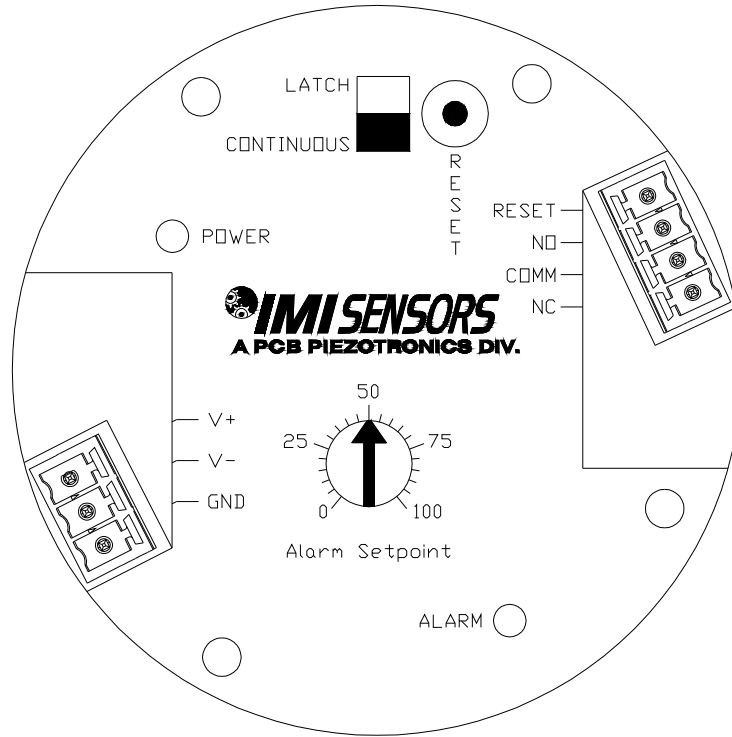
- T4 Activated by connection to -Power/Common

Relay Output – Pins 5 to 7:

- T5 Normally Open
- T6 Common
- T7 Normally Closed

Configuring the 685AX1

Internal Diagram



The internal diagram displays the location of the control features for the 685AX1. The alarm setpoint is adjusted via a single turn potentiometer. Relay operation is selected for either latch or continuous. And the device can be locally reset after an alarm condition has been corrected.

The control features of the vibration switch are accessible by removing the socket head cap screw and turning the top cover counterclockwise.

Warning

Only make adjustments to the Alarm Setpoint Potentiometer. The additional potentiometer (when equipped) is used for factory calibration and adjusting them will require return of the 685AX1 to the factory for recalibration.

Warning 1 – ESD sensitivity

The power supply/signal conditioner should not be opened by anyone other than qualified service personnel. This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid injury.

Warning 2 – ESD sensitivity

This equipment is designed with user safety in mind; however, the protection provided by the equipment may be impaired if the equipment is used in a manner not specified by PCB Piezotronics, Inc.

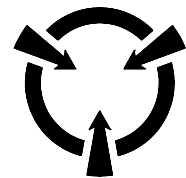
Caution 1 – ESD sensitivity

Cables can kill your equipment. High voltage electrostatic discharge (ESD) can damage electrical devices. Similar to a capacitor, a cable can hold a charge caused by triboelectric transfer, such as that which occurs in the following:

- *Laying on and moving across a rug,*
- *Any movement through air,*
- *The action of rolling out a cable, and/or*
- *Contact with a non-grounded person.*

The PCB solution for product safety:

- *Connect the cables only with the AC power off.*
- *Temporarily “short” the end of the cable before attaching it to any signal input or output.*



CAUTION
ELECTROSTATIC
DISCHARGE SENSITIVE

Caution 2 – ESD sensitivity

ESD considerations should be made prior to performing any internal adjustments on the equipment. Any piece of electronic equipment is vulnerable to ESD when opened for adjustments. Internal adjustments should therefore be done ONLY at an ESD-safe work area. Many products have ESD protection, but the level of protection may be exceeded by extremely high voltage.

Ordering Information

IMI Part Number: **685A X 1**

Vibration Range and Relay Characteristics*

0	0-10g (98.1m/s ²) peak – standard model with 5Amp Form C Relay (1)
1	0-1ips (25.4mm/s) peak with 5Amp Form C Relay (1)
2	0-10g (98.1m/s ²) peak, alarm under limit operation, with 5Amp Form C Relay (1)
3	0-1ips (25.4mm/s) peak, alarm under limit operation, with 5Amp Form C Relay (1)
4	0-10g (98.1m/s ²) peak, with 1Amp Form C Relay (2)
5	0-1ips (25.4mm/s) peak, with 1Amp Form C Relay (2)
6	0-10g (98.1m/s ²) peak, alarm under limit operation, with 1Amp Form C Relay (2)
7	0-1ips (25.4mm/s) peak, alarm under limit operation, with 1Amp Form C Relay (2)

Ordering Example: 685A31

This is a 685A Series Vibration Switch configured as follows:

- Vibration Range 0-1ips
- 5A Form C Relay
- Alarm will activate when vibration goes below set limit.

****Additional Options Available – Please Inquire***

Notes:

- (1)** 5A Form C 230Vac/30Vdc, Vibration Range is 10g for N/O contact, 5g for N/C contact.
- (2)** 1A Form C 230Vac/30Vdc, Vibration Range is 20g for both NO and NC contacts.



Warranty

IMI instrumentation is warranted against defective material and workmanship for 1 year unless otherwise expressly specified. Damage to instruments caused by incorrect power or misapplication, is not covered by warranty. *If there are any questions regarding power, intended application, or general usage, please consult with your local sales contact or distributor.* Batteries and other expendable hardware items are not covered by warranty.

Service

Because of the sophisticated nature of IMI instrumentation, field repair is typically **NOT** recommended and may void any warranty. If factory service is required, return the instrumentation according to the "Return Procedure" stated below. *A repair and/or replacement quotation will be provided prior to servicing at no charge.* Before returning the unit, please consult a factory IMI applications engineer concerning the situation as certain problems can often be corrected with simple on-site procedures.

Return procedure

To expedite returned instrumentation, contact a factory IMI applications engineer for a RETURN MATERIAL AUTHORIZATION (RMA) NUMBER. Please have information available such as model and serial number. Also, to insure efficient service, *provide a written description of the symptoms and problems with the equipment to a local sales representative or distributor, or contact IMI if none are located in your area.*

Customers outside the U.S. should consult their local IMI distributor for information on returning equipment. For exceptions, please contact the International Sales department at IMI to request shipping instructions and an RMA. For assistance, please call (716) 684-0003, or fax us at (716) 684-3823. You may also receive assistance via e-mail at imi@pcb.com or visit our web site at www.pcb.com.



Customer Service

IMI, a division of PCB Piezotronics, guarantees **Total Customer Satisfaction**. If, at any time, for any reason, you are not completely satisfied with any IMI product, IMI will repair, replace, or exchange it at no charge. You may also choose to have your purchase price refunded.

IMI offers to all customers, at no charge, 24-hour phone support. This service makes product or application support available to our customers, day or night, seven days a week. When unforeseen problems or emergency situations arise, call the **IMI Hot Line at (716) 684-0003**, and an application specialist will assist you.



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*ICP[®] is a registered trademark of PCB Group, Incorporated,
which uniquely identifies PCB sensors that incorporate built-in microelectronics.*

ELECTRONIC VIBRATION SWITCH SPECIFICATIONS

DYNAMIC PERFORMANCE

	ENGLISH	SI	
Vibration Range	0 to 10g peak	0 to 98.1 m/s ² peak	7
Frequency Response (±3dB)	180-60,000cpm	3-1000Hz	4,8,9
Alarm Level Adjust	0 to 10g peak	0 to 98.1 m/s ² peak	
Turn on Time Delay	3 seconds	3 seconds	2
Alarm Time Delay Fixed	5 seconds	5 seconds	2
Alarm Function Select	Latch or Continuous	Latch or Continuous	
Alarm Relay (SPDT)	5A Form C 230VAC/30VDC	5A Form C 230VAC/30VDC	5

ELECTRICAL

Power Supply Voltage	10-30Vdc	10-30Vdc	
Power Supply Current	<100mA	<100mA	6
Sensor Type	Piezoelectric Sensing Element	Piezoelectric Sensing Element	

ENVIRONMENTAL

Operating Temperature Range	-13 to 158°F	-25 to 70°C	
Storage Temperature Range	-40 to 257°F	-40 to 125°C	
Relative Humidity	NEMA 4X	NEMA 4X	

MECHANICAL

Case Dimension W x H x D:	5.1" x 3.0" x 4.0"	130mm x 76.2mm x 102mm	
Weight	1.4lbs	635 grams	
Material	Aluminum Alloy	Aluminum Alloy	
Input/Output Electrical Connectors	Removable Screw Terminals	Removable Screw Terminals	
Screw Terminal Wire Size	24 – 14 AWG	0.2 – 2.5 mm ²	
Rating	Explosion Proof	Flame Proof	3
Conduit Hubs	½" threaded NPT Female	N/A	
Mouting Hex Screw	5/16-18 x 5/8"	N/A	
Mounting Screw Torque	2-5 ft. lbs.	3-7 Nm	

INDICATOR/CONTROLS

Power LED	Green	Green	
Alarm LED	Red	Red	
Alarm Setpoint	Single Turn Potentiometer	Single Turn Potentiometer	
Reset Function	Momentary Pushbutton Switch	Momentary Pushbutton Switch	1

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.

685AX1

- 0 0-10g (98.1m/s²) peak – standard model.
- 1 0-1ips (25.4mm/s) peak
- 2 0-10g (98.1m/s²) peak, under limit operation.
- 3 0-1ips (25.4mm/s) peak, under limit operation.
- 4 0-10g (98.1m/s²) peak , 1A Relay (8)
- 5 0-1ips (25.4mm/s) peak, 1A Relay (8)
- 6 0-10g (98.1m/s²) peak, under limit operation, 1A Relay (8)
- 7 0-1ips (25.4mm/s) peak, under limit operation, 1A Relay (8)

NOTES:

- 1) Reset can also be engaged via external connection to common.
- 2) Factory Set.
- 3) EEx-dIIC T6
- 4) To obtain 1000Hz frequency response, grease must be applied to all mechanical couplings. Otherwise, frequency response is limited to approximately 500Hz.
- 5) Alarm function is set for over limit operation.
- 6) During Alarm activation, a current pulse occurs <150mA for 2sec.
- 7) Vibration Range is 10g for N/O contact, 5g for N/C contact.
- 8) 1A Form C 230VAC/30VDC, Vibration Range is 20g for NO and NC.
- 9) For velocity range, frequency response is 10Hz – 1kHz (60-60000CPM)

All specifications are at room temperature unless otherwise specified.

ICP® is a registered trademark of PCB Group, Inc.

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

Form DD030 Rev.F 2/23/99

Drawn: <i>JJP</i>	Engineer: <i>UJ</i>	Sales: <i>JJP</i>	Approved: <i>MS</i>	Spec Number:
Date: <i>10/30/06</i>	Date: <i>10/30/06</i>	Date: <i>10/30/06</i>	Date: <i>10/30/06</i>	25108



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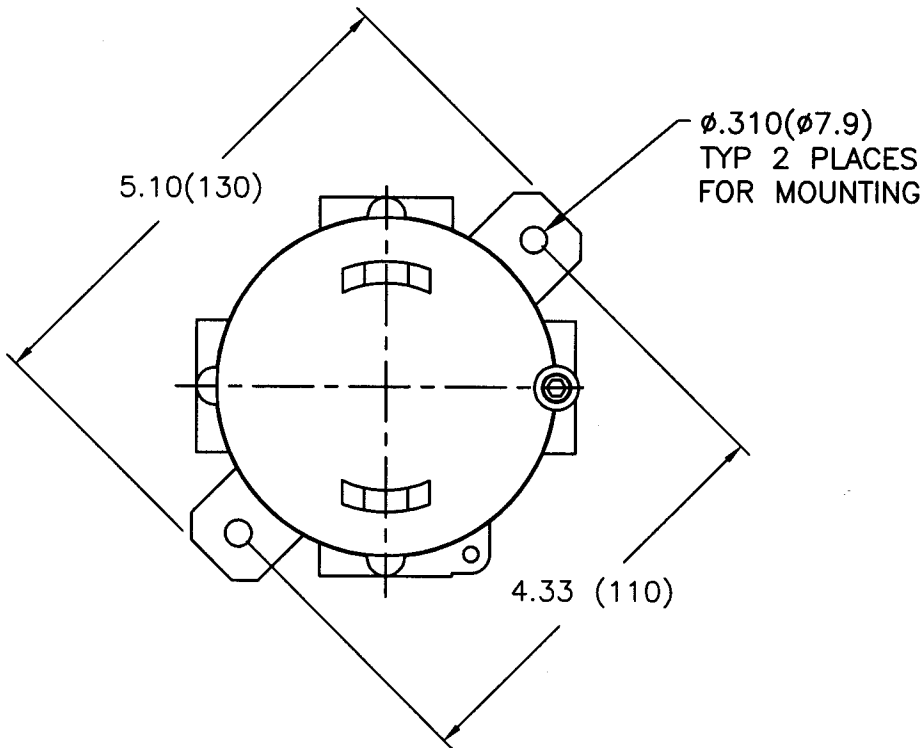
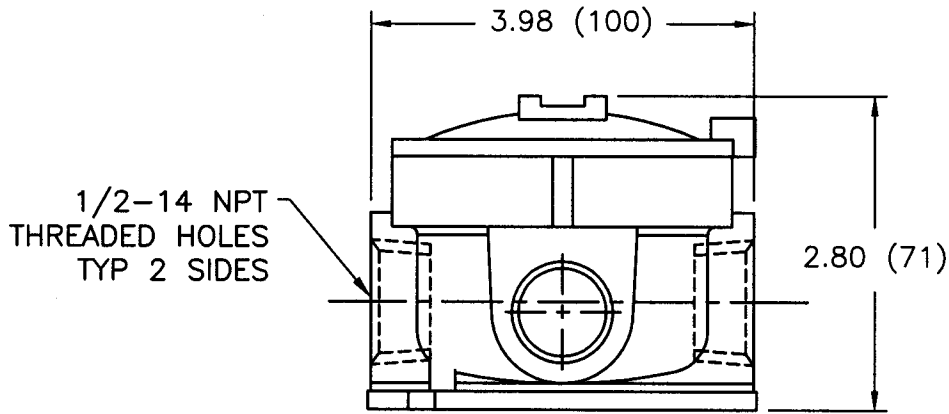
E-Mail: imisales@pcb.com

24808

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APPLICATION		
NEXT ASS'Y	USED ON	VAR

REVISIONS				
REV	DESCRIPTION	ECN	DATE	APP'D
NR	RELEASED TO DRAFTING		1/15/04	DM/04



UNLESS SPECIFIED TOLERANCES		DRAWN					PCB PIEZOTRONICS™
DIMENSIONS IN INCHES	DIMENSIONS IN MILLIMETERS [IN BRACKETS]	CHK'D	DATE	MFG	ENGR	SALES	
DECIMALS XX ±.01 XXX ±.005	DECIMALS X ±0.3 XX ±0.13	APP'D					
ANGLES ±2 DEGREES	ANGLES ±2 DEGREES	TITLE	OUTLINE DRAWING MODEL 685A01 VIBE SWITCH				CODE IDENT. NO. 52681
FILLETS AND RADII .003 - .005	FILLETS AND RADII [0.07 - 0.13]						DWG. NO. 24808
DD011 REV. C 01/21/03							SCALE: 1 : 2 SHEET 1 OF 1