



Model 685A07

Mechanical 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.

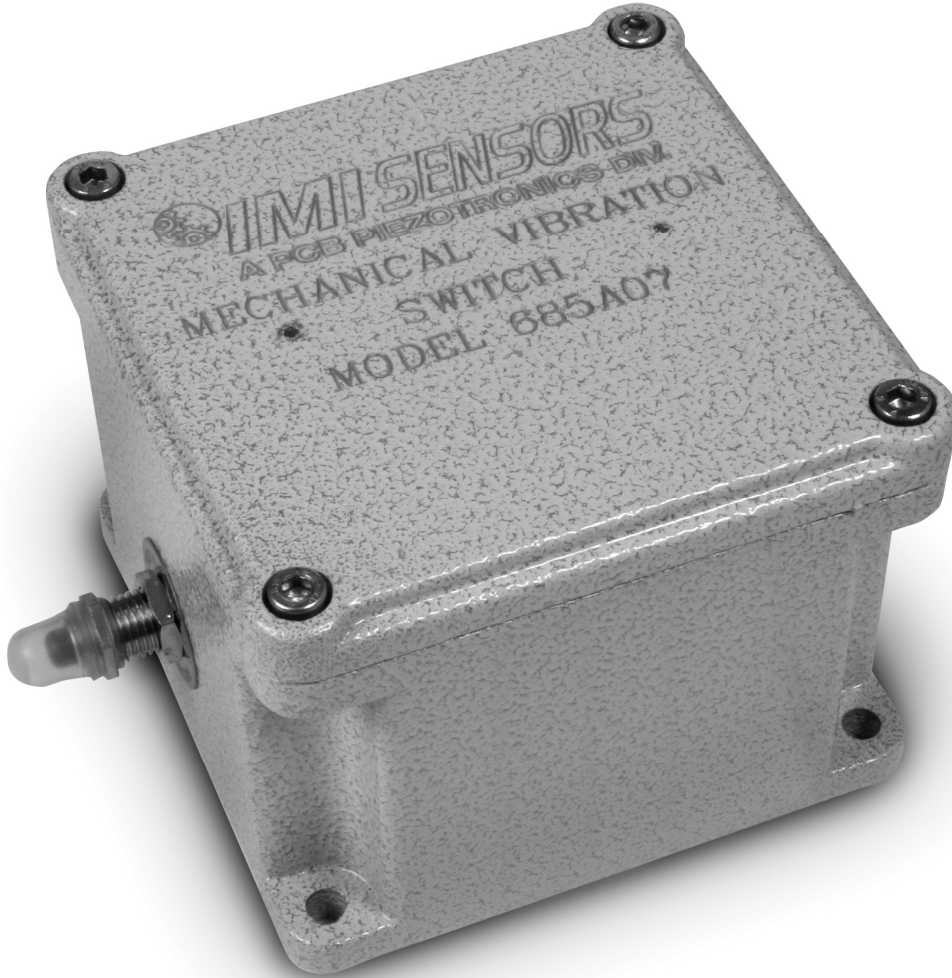
Warranty – All equipment and repair services provided by PCB Piezotronics, Inc. are covered by a limited warranty against defective material and workmanship for a period of one year from date of original purchase. Contact

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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Model 685A07 Mechanical Vibration Switch



Operating Guide

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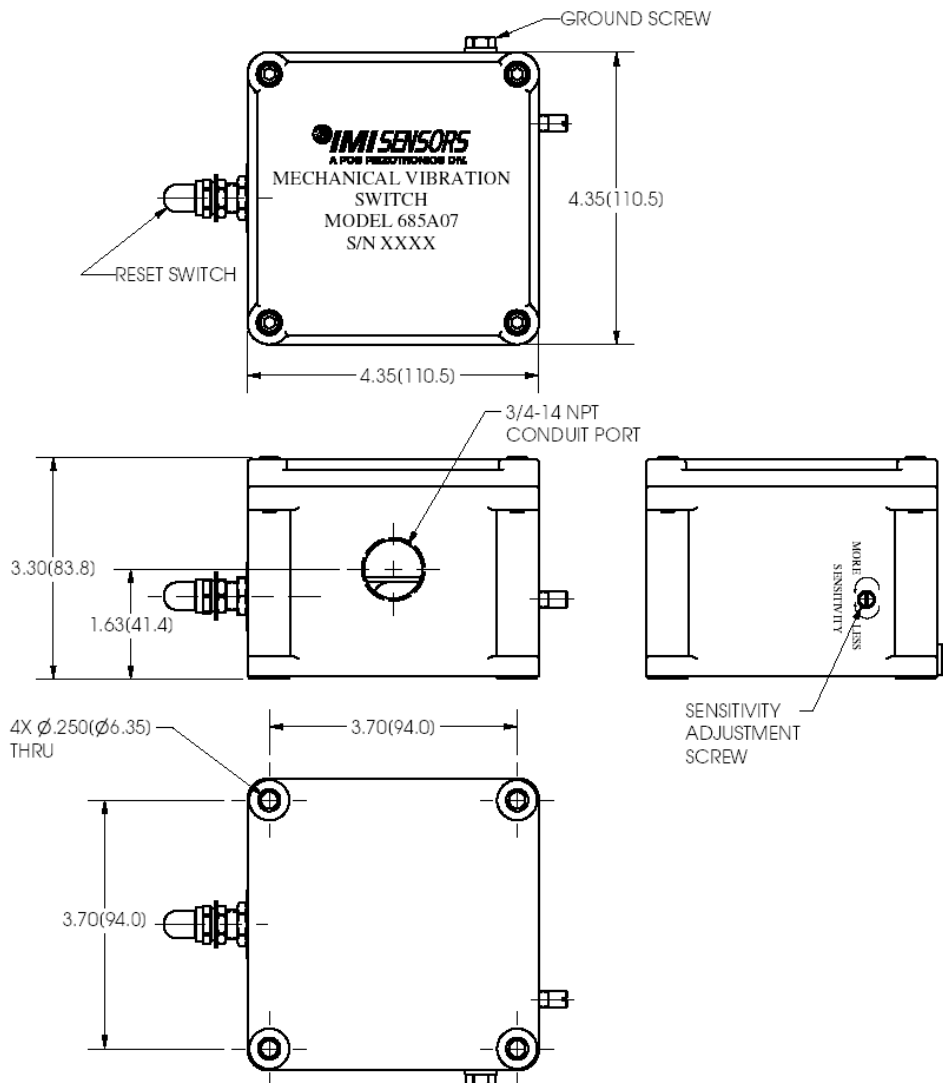
Introduction

The Model 685A07 Mechanical Vibration Switch is a shock sensitive mechanism for shutdown of engine or electric motor powered equipment. This switch uses a magnetic latch to ensure reliable operation. Pushing the reset button moves the tripping latch into a magnetically held position. A shock/vibration will move the magnet beyond this holding position, thus freeing the spring loaded tripping latch to transfer the contacts and shutdown the machinery.

General Features

- Designed to Detect Shock/Vibration in 3-Planes of Motion
- Fully Adjustable
- Includes Magnetic Latching Feature
- Accommodates normally open (NO) and normally closed (NC) wiring schemes.
- Manual Reset Button
- Designed for use in non-hazardous locations. (For hazardous Class I Div I locations, see 685AX8 series)
- Top cover is secured with socket head cap screws for easy access to wiring terminals.

The Model 685A07 is designed to be mounted directly on the equipment to be monitored via integral mounting holes.



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.

Installation

WARNING!!!

BEFORE BEGINNING INSTALLATION OF THIS IMI PRODUCT:

- ✓ Stop the machine.
- ✓ Disconnect all electrical power to the machine.
- ✓ Make sure the machine cannot operate during installation.
- ✓ Follow all safety warnings of the machine manufacturer.
- ✓ Read and follow all installation instructions.

The 685A07 vibration switch is sensitive to shock and vibration in all three planes of motion - up/down, front/back and side/side. Side/side (in the same plane as the reset pushbutton) is the most sensitive. For maximum sensitivity mount the unit so that the side with the reset button is in-line with the direction of rotation of the machine. (See Dimensions on page 5 for sensitivity adjustment location).

The 685A07 must be firmly attached/mounted to the machine so that all mounting surfaces are in rigid contact with the mounting surface of the machine. For best results, mount the instrument in-line with the direction of rotating shafts and/or near bearings. In other words, the reset push button should be mounted pointing into the direction of shaft rotation (see page 7). It may be necessary to provide a mounting plate or bracket to attach the 685A07 to the machine. The mounting bracket should be thick enough to prevent induced acceleration/vibration upon the 685A07. Typically 1/2 in. (13mm) thick plate is sufficient. See illustrations on page 7 for typical mounting locations.

CAUTION: A dust boot is provided on the reset pushbutton for all series to prevent moisture or dust intrusion. The sensitivity adjustment for model 685A07 is not sealed; therefore, mounting orientation should be on a horizontal plane or with the sensitivity adjustment pointing down.

WARNING: STOP THE MACHINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING INSTALLATION.

- 1) Firmly secure the unit to the equipment using the base foot mount.
For oil well pump jacks, attach the 685A07 to the Sampson post or walking beam. See Typical Mounting Locations page 7.
- 2) Make the necessary electrical connections to the vibration switch. See Internal Switches, page 8 for electrical terminal locations and page 9 for typical wiring diagrams. **DO NOT EXCEED VOLTAGE OR CURRENT RATINGS OF THE CONTACTS.** Follow appropriate electrical codes/methods when making electrical connections. Be sure that the run of electrical cable is secured to the machine and is well insulated from electrical shorting. Use of conduit is recommended.

NOTE: *If the electrical cable crosses a pivot point such as at the pivot of the walking beam, be sure to allow enough slack in the cable so that no stress is placed on the cable when the beam moves.*

If conduit is not used for the entire length of wiring, conduit should be used from the electrical supply box to a height above ground level that prevents damage to the exposed cable from the elements, rodents, etc. or as otherwise required by applicable electrical codes. If conduit is not attached directly to the 685A07 switch, use a strain relief bushing and a weatherproof cap on the exposed end of the conduit. A "drip loop" should be provided in the cable to prevent moisture from draining down the cable into the conduit should the weatherproof cap fail.

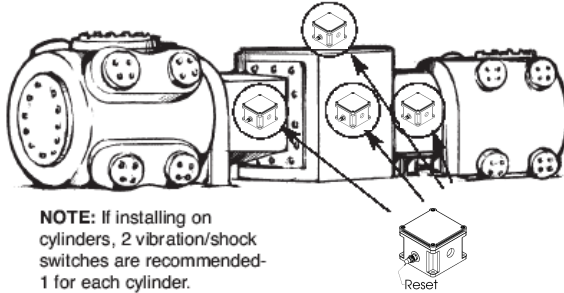


IMI SENSORS

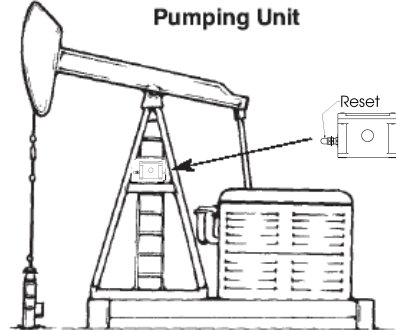
A PCB PIEZOTRONICS DIV.

TYPICAL MOUNTING LOCATIONS

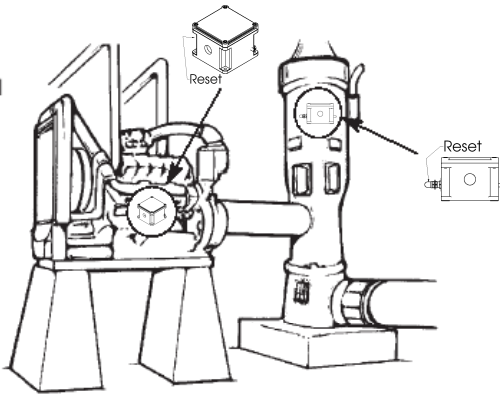
2-Throw Balance-Opposed Compressor



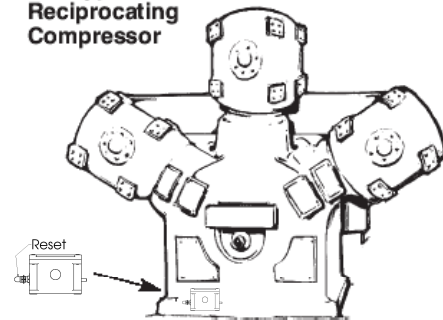
Pumping Unit



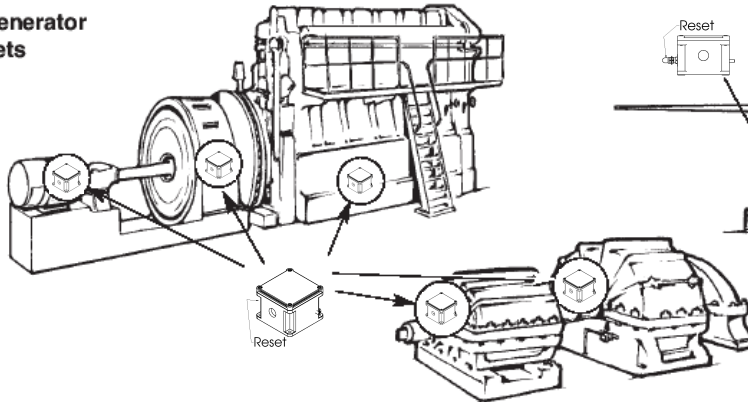
Engine and Vertical Shaft Pump



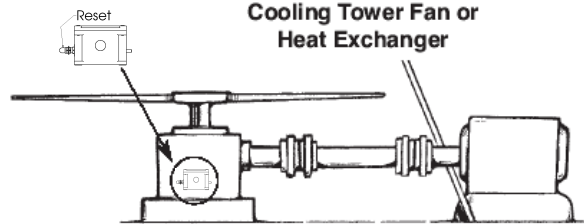
"Y" Type Reciprocating Compressor



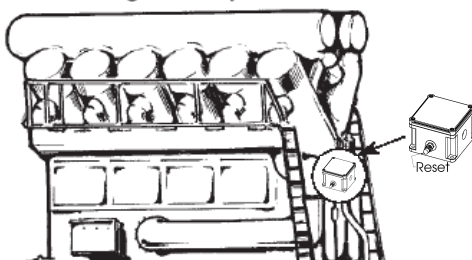
Generator Sets



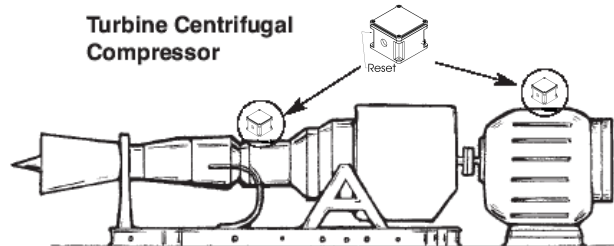
Cooling Tower Fan or Heat Exchanger



Engine Compressor

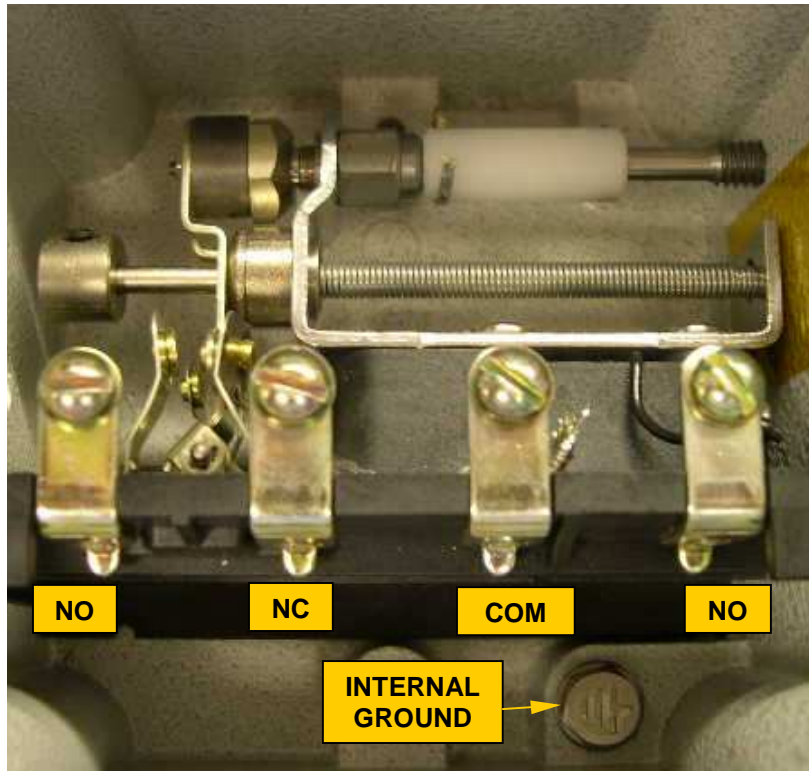


Turbine Centrifugal Compressor



Internal Switches

The 685A07 uses SPDT switch terminals with removable screws for all connections.



Screw Connections

Screw Connections:

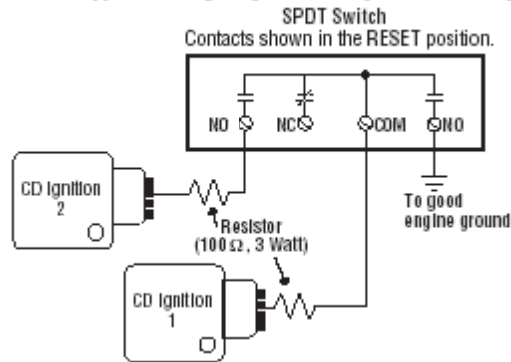
NO Normally Open
COM Common
NC Normally Closed
Internal and external ground screws

ELECTRICAL

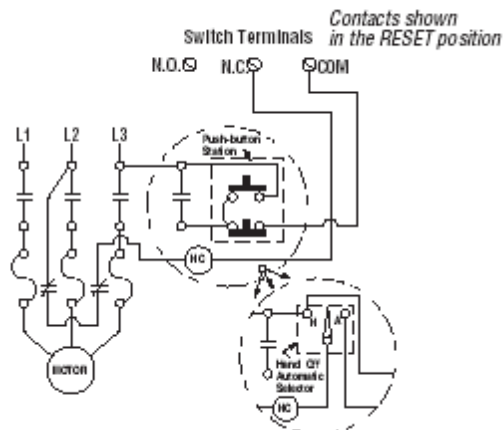


WARNING: REMOVE POWER BEFORE OPENING THE UNIT (ACCESS DOOR). STOP THE MACHINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING THE WIRING OPERATION. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON INSTALL AND WIRE THE UNIT, AND MAKE SURE IT CONFORMS WITH NEC AND APPLICABLE CODES.

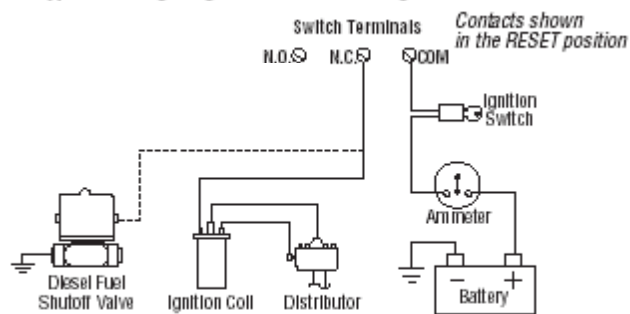
Typical Wiring Diagram for Single or Dual CD Ignition



Typical Wiring Diagram for Electric Motors



Typical Wiring Diagram for Distributor Ignition or Diesel



Sensitivity Adjustment

WARNING: REMOVE ALL POWER BEFORE OPENING THE ENCLOSURE. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON PERFORM ADJUSTMENTS AND MAKE SURE IT CONFORMS TO NEC AND LOCAL CODES. DO NOT ADJUST SENSITIVITY WHILE THE MACHINE IS RUNNING. STAND CLEAR OF THE MACHINE AT ALL TIMES WHEN IT IS OPERATING.

The 685A07 covers a wide range of sensitivity and needs to be adjusted to the specific piece of machinery on which it is installed. After the switch has been installed in a satisfactory location (see page 6) the sensitivity adjustment will be increased or decreased so that the switch does not trip during start-up or under normal operating conditions.

This is typically done as follows:

- 1) **REPLACE ALL COVERS, LIDS, AND ELECTRICAL ENCLOSURES.**
- 2) Press the reset push button (see **Figure 1**) to engage the magnetic latch. Be sure that the reset button remains depressed. If it does not remain depressed, turn sensitivity adjustment screw (see **Figure 2**) clockwise until it stops, turn it ¼ turn counterclockwise, and press the reset button again.



Figure 1



Figure 2

- 3) Start the machine.
- 4) If the instrument trips on start-up, allow the machine to stop. Turn the sensitivity adjustment 1/4 turn clockwise. Depress the reset button and restart the machine. Repeat this process until the unit does not trip on start-up.
- 5) If the instrument does NOT trip on start-up, stop the machine. Turn the sensitivity adjustment screw 1/4 turn counter-clockwise. Repeat the start-up/stop process until the instrument trips on start-up. Turn the sensitivity adjustment screw 1/4 turn clockwise (less sensitive). Restart the machine to verify that the instrument will not trip on start-up.
- 6) Verify that the unit will trip when abnormal shock/vibration exists.

Model Number

685A07

MECHANICAL VIBRATION SWITCH SPECIFICATIONS

Revision: B
ECN #: 25022

PERFORMANCE

Vibration Range
Frequency Response

ELECTRICAL

Alarm Function
Alarm Relay (SPDT)

ENVIRONMENTAL

Operating Temperature Range
Ingress Protection

PHYSICAL

Size (Width x Height x Depth)
Conduit Hole
Weight
Mounting Thread
Mounting Holes (4)
Sensing Element
Sensing Geometry
Housing Material
Electrical Connector
Screw Terminal Wire Size

INDICATOR/CONTROLS

Alarm Setpoint
Reset Function

ENGLISH

0 to 7g peak
0-6000cpm

Latch

5A Form C 480VAC

-40 to +140°F
IP50

4.35 in x 3.30 in x 4.35 in
3/4-14 NPT

2.1 lbs
Thru Hole
0.25 in
Magnet

Inertial Element
Aluminum Alloy

Removable Screw Terminals
24 - 14 AWG

Control Screw
Pushbutton Switch

SI

0 to 68.7 m/s² peak
0-100Hz

Latch

5A Form C 480VAC

-40 to +60°C
IP50

110.5 mm x 83.8 mm x 110.5 mm
N/A

953 grams
Thru Hole
6.4 mm
Magnet

Inertial Element
Aluminum Alloy

Removable Screw Terminals
0.2 - 2.5 mm²

Control Screw
Pushbutton Switch

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.

-NONE-

NOTES:

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: *[Signature]*

Date: 9/20/06

Engineer: *[Signature]*

Date: 9/20/06

Sales: *[Signature]*

Date: 7/20/06

Approved: *[Signature]*

Date: 4/15/06

Spec Number:

33224



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2

1

APPLICATION

REVISIONS

NEXT ASSY

USED ON

VAR

REV

DESCRIPTION

ECN

APP'D

NR

RELEASED TO DRAFTING

DWM 2/06

GROUND SCREW

RESET SWITCH

IMI SENSORS
A PCB PIEZOTRONICS DIV.
MECHANICAL VIBRATION
SWITCH
MODEL 685A07
S/N XXXX

4.35 [110.5]

4.35 [110.5]

3/4-14 NPT
CONDUIT PORT

3.30 [83.8]

1.63 [41.4]

MORE
SENSITIVITY
LESSSENSITIVITY
ADJUSTMENT
SCREW4X Ø.250 [Ø6.35]
THRU

3.70 [94.0]

3.70 [94.0]

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:

DIMENSIONS IN INCHES

DIMENSIONS IN MILLIMETERS
[IN BRACKETS]

DECIMALS XX ± .03
XXX ± .010
ANGLES ± 2 DEGREES

DECIMALS X ± 0.8
XX ± 0.25
ANGLES ± 2 DEGREES

FILLETS AND RADII
.003 - .005

FILLETS AND RADII
[0.07 - 0.13]

DRAWN

RCE 2/15/06

MFG

P.D. 2/15/06

CHK'D

SM 2/16/06

ENGR

ZGR 2/15/06

APP'D

UR 4/16/06

SALES

JA 2-21-06

TITLE

OUTLINE DRAWING
MODEL 685A07
MECHANICAL VIBE SWITCH

PCB PIEZOTRONICS INC.

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

CODE
IDENT. NO.
52681

DWG. NO.

33223

SCALE:

.5X

SHEET

1 OF 1

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