



Model EX686B71
Smart 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



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

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3425 Walden Ave.
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Toll-free: (800) 828-8840
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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 | 0 | 0 | 0 | 0 | 0 | 0 |
| PCB板 | X | 0 | 0 | 0 | 0 | 0 |
| 电气连接器 | 0 | 0 | 0 | 0 | 0 | 0 |
| 压电晶体 | X | 0 | 0 | 0 | 0 | 0 |
| 环氧 | 0 | 0 | 0 | 0 | 0 | 0 |
| 铁氟龙 | 0 | 0 | 0 | 0 | 0 | 0 |
| 电子 | 0 | 0 | 0 | 0 | 0 | 0 |
| 厚膜基板 | 0 | 0 | X | 0 | 0 | 0 |
| 电线 | 0 | 0 | 0 | 0 | 0 | 0 |
| 电缆 | X | 0 | 0 | 0 | 0 | 0 |
| 塑料 | 0 | 0 | 0 | 0 | 0 | 0 |
| 焊接 | X | 0 | 0 | 0 | 0 | 0 |
| 铜合金/黄铜 | X | 0 | 0 | 0 | 0 | 0 |
| 本表格依据 SJ/T 11364 的规定编制。 | | | | | | |
| 0：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.



Operating Guide with Enclosed Warranty Information

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Introduction

The 686-Series Smart Vibration Switch is a low-cost electronic vibration switch designed to monitor vibration levels on rotating machinery (ie. fans and cooling towers) and trip an alarm or shut down machinery when a specified vibration limit is exceeded. An onboard accelerometer with precision, microprocessor-controlled electronics ensures reliable operation and accuracy. The switch contains a two-pin MIL connector for easy drop-in replacement of mechanical vibration switches and a reliable solid state relay. Multiple units can be installed in a loop configuration for economical installation and expanded protection of critical machinery. This versatile switch can be used to replace more expensive electronic vibration switches where separate vibration output is not required and to replace troublesome mechanical vibration switches.

Every Smart Switch is factory-programmed. See Page 28 for more information.

General Features

- Fully USB-programmable from any PC (with optional USB Programmer Kit).
- Hermetically-sealed, stainless steel housing for use in corrosive environments.
- Imbedded piezoelectric accelerometer for improved accuracy and frequency response.
- Small footprint and single ¼-28 stud mounting.
- Solid state (AC/DC) relay.
- Universal AC or DC power.
- Magnetically Adjustable Vibration Threshold (MAVT™).
- Connects with industry standard MIL-C-5015 connector or integral cable.
- Programmable features
 - Alarm threshold level
 - Normally Open (NO) or Normally Closed (NC) relay
 - Latching or non-latching relay
 - Delays
 - Power on
 - Startup
 - Operational
 - Residual vibration level
- Intrinsically-safe versions available (EX prefix)
 - CSA

Operating Principles

The Smart Switch operates over just two wires. It installs in series with any load (ie. annunciator, PLC or relay coil). To energize itself, the vibration switch scavenges power from the load's power source. When the alarm threshold is exceeded, the switch is activated and the load's power circuit is completed to facilitate the desired alarm or shutdown.

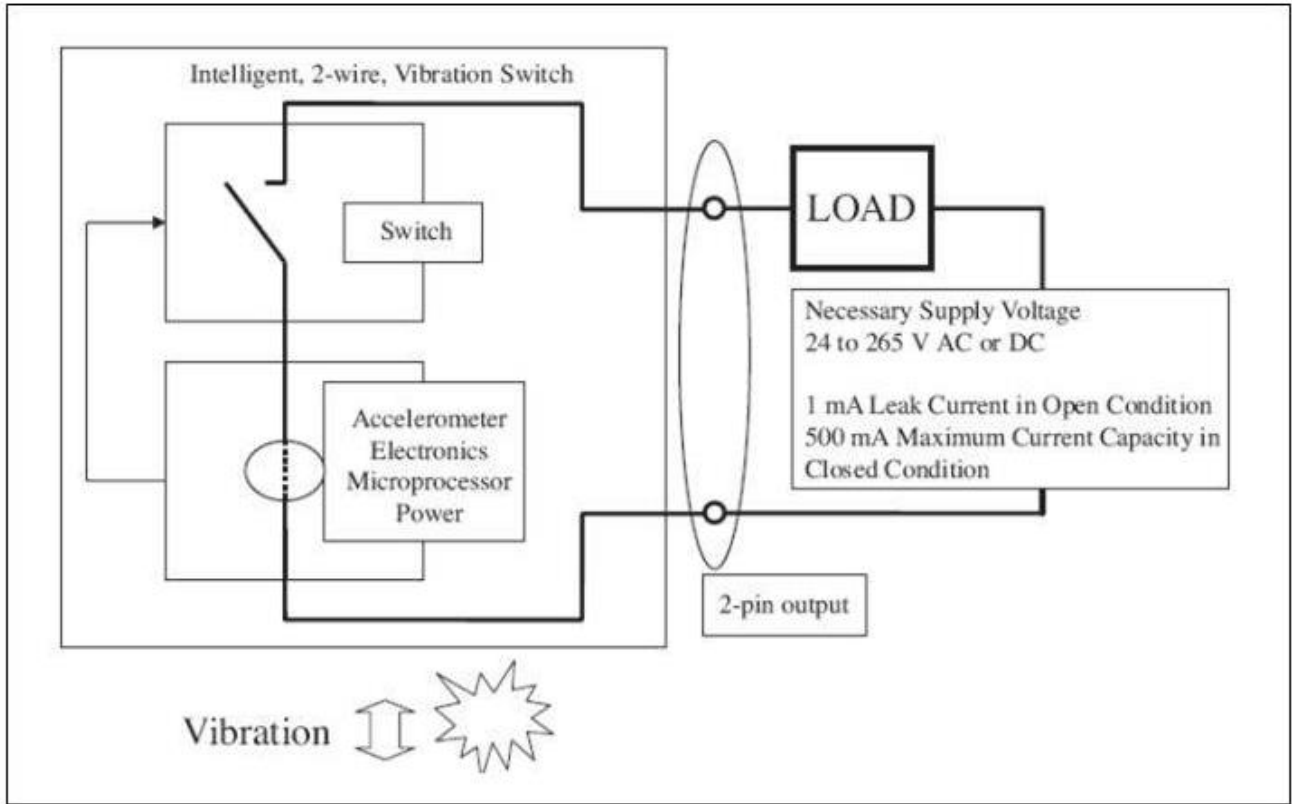


Figure 1 – Block Diagram

Benefits of Solid State Relays

A solid state relay is an electronic component that functions in the same way as an electromechanical relay, but without any moving parts. A solid state relay offers the most reliable switch action, especially for vibration applications where moving relay components run a greater risk of malfunction. They are purely electronic devices composed of a low current control side and a high current load side for switching action.

Installation

When choosing a mounting method, consider closely the advantages and disadvantages of each technique. Typical mounting types are stud, direct adhesive, adhesive mounting base and magnetic mounting base.

Note: For a complete list of product specifications, see the “Specification Sheet” and “Outline Drawing” at the end of this Manual.

Direct Adhesive Mount Procedure

For restrictions of space or for convenience, most sensors (with the exception of integral stud models) can be adhesive-mounted directly to the machine surface.

- Step 1: Prepare a smooth, flat mounting surface. A minimum surface finish of 63 μin (0.0016 mm) generally works best.
- Step 2: Place a small portion of adhesive on the underside of the sensor. Firmly press down on the top of the assembly to displace any adhesive. Be aware that excessive amounts of adhesive can make sensor removal difficult.

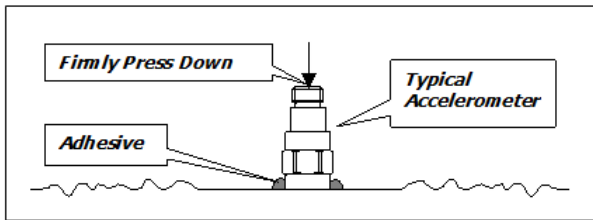


Figure 2 – Direct Adhesive Mounting

Standard Stud Mount Procedure

This mounting technique requires smooth, flat contact surfaces for proper operation and is recommended for permanent and/or secure installations. Stud mounting is also recommended when testing at high frequencies.

Note: Do not attempt mounting on curved, rough or uneven surfaces, as the potential for misalignment and limited contact surface may significantly reduce the sensor's upper operating frequency range.

| | ¼-28 Stud | ¼-28 Captive Screw |
|----------------|-----------|--------------------|
| A (in) | 0.250 | 0.250 |
| B (in) | 0.350 | 0.350 |
| Torque (ft-lb) | 2 to 5 | 2 to 5 |

- Step 1: First, prepare a smooth, flat mounting surface and then drill and tap a mounting hole in the center of this area. A precision-machined mounting surface with a minimum finish of 63 µin (0.0016 mm) is recommended. (If it is not possible to properly prepare the machine surface, consider using an adhesive mounting pad as a possible alternative.) Inspect the area, checking that there are no burrs or other foreign particles interfering with the contact surface.
- Step 2: Wipe clean the mounting surface and spread on a light film of grease, oil or similar coupling fluid prior to installation. Adding a coupling fluid improves vibration transmissibility by filling small voids in the mounting surface and increasing the mounting stiffness. For semi-permanent mounting, substitute epoxy or another type of adhesive.
- Step 3: Hand-tighten the sensor/mounting stud to the machine, and then secure the sensor with a torque wrench to the mounting surface by applying the recommended mounting torque (see enclosed specification data sheet for proper mounting torque). It is important to use a torque wrench during this step. Under-torquing the sensor may not adequately couple the device; over-torquing may result in stud failure and possibly permanent damage.

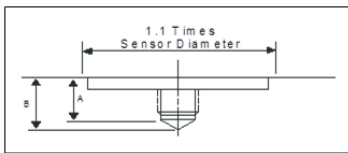


Figure 3 – Mounting Surface Preparation

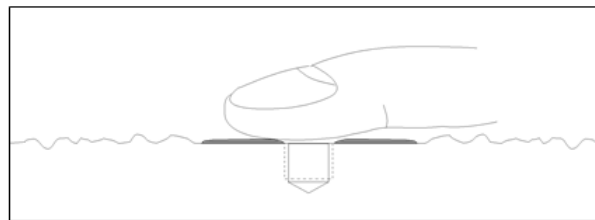


Figure 4 – Mounting Surface Lubrication

Adhesive Stud Mount Procedure

Adhesive mounting is often used for temporary installation or when the machine surface cannot be adequately prepared for stud mounting. Adhesives like hot glue or wax work well for temporary mounts; two-part epoxies and quick-bonding gels provide a more permanent mount.

Note: Adhesively mounted sensors often exhibit a reduction in high-frequency range. Generally, smooth surfaces and stiff adhesives provide the best frequency response. Contact the factory for recommended epoxies.

This method involves attaching a base to the machine surface, then securing the sensor to the base. This allows for easy removal of the accelerometer.

- Step 1: Prepare a smooth, flat mounting surface. A minimum surface finish of 63 μin (0.0016 mm) generally works best.
- Step 2: Stud-mount the sensor to the appropriate adhesive mounting base according to the guidelines set forth in Steps 2 and 3 of the Standard Stud Mount Procedure.
- Step 3: Place a small portion of adhesive on the underside of the mounting base. Firmly press down on the assembly to displace any extra adhesive remaining under the base.

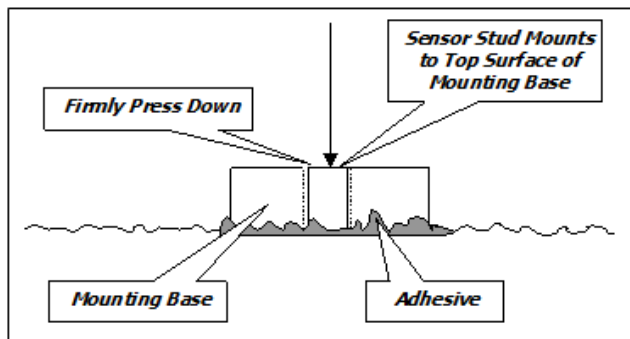


Figure 5 – Adhesive Installation of Mounting Base

Magnetic Mount Procedure

Magnetic mounting provides a convenient means for making portable measurements and is commonly used for machinery monitoring and other portable or trending applications.

Note: The correct magnet choice and an adequately prepared mounting surface are critical for obtaining reliable measurements, especially at high frequencies. Poor installations can cause as much as a 50% drop in the sensor frequency range.

Not every magnet is suitable for all applications. For example, rare earth magnets are commonly used because of their high strength. Flat magnets work well on smooth, flat surfaces, while dual-rail magnets are required for curved surfaces. In the case of non-magnetic or rough surfaces, it is recommended that the user first weld, epoxy or otherwise adhere a steel mounting pad to the test surface. This provides a smooth and repeatable location for mounting.

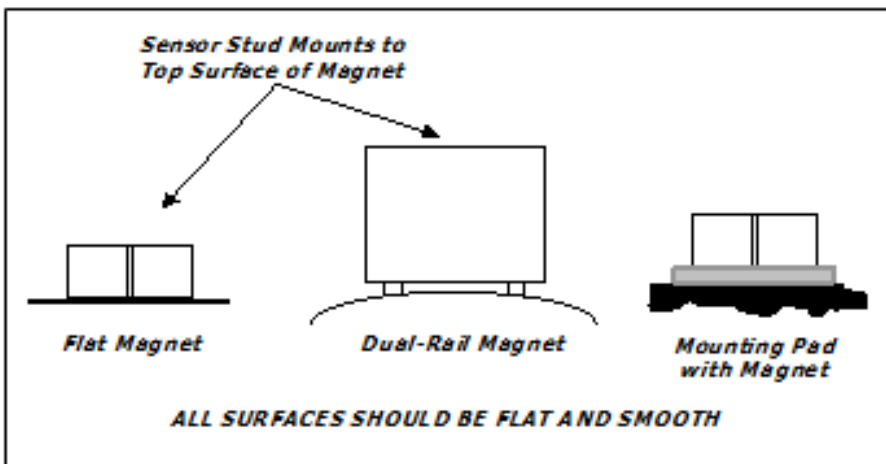


Figure 6 – Magnet Types

- Step 1: After choosing the correct magnet, inspect the unit to verify that the mounting surfaces are flat and smooth.
- Step 2: Stud-mount the accelerometer to the appropriate magnet according to the guidelines set forth in Steps 2 and 3 of the Standard Stud Mount Procedure.
- Step 3: Prepare a smooth, flat mounting surface. A minimum surface finish of 63 μin [0.0016 mm] generally works best. After cleaning the surface and checking for burrs, wipe on a light film of silicone grease, machine oil or similar-type coupling fluid.
- Step 4: Mount the magnet/sensor assembly to the prepared test surface by gently “rocking” or “sliding” it into place.

Note: Magnetically mounting accelerometers carelessly has the potential to generate very high (and very damaging) g levels. To prevent damage, install the assembly gently. If unsure, please contact the factory for assistance.

Wiring

On the following pages are eleven different wiring scenarios for the Smart Switch. The wiring legend below is applicable to all wiring diagrams.

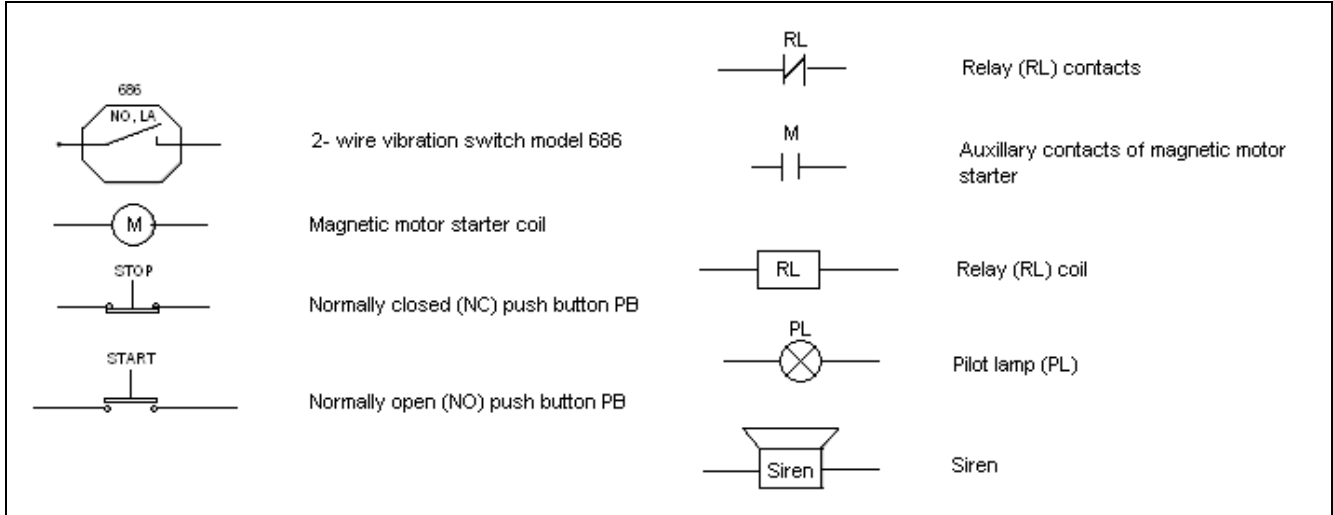
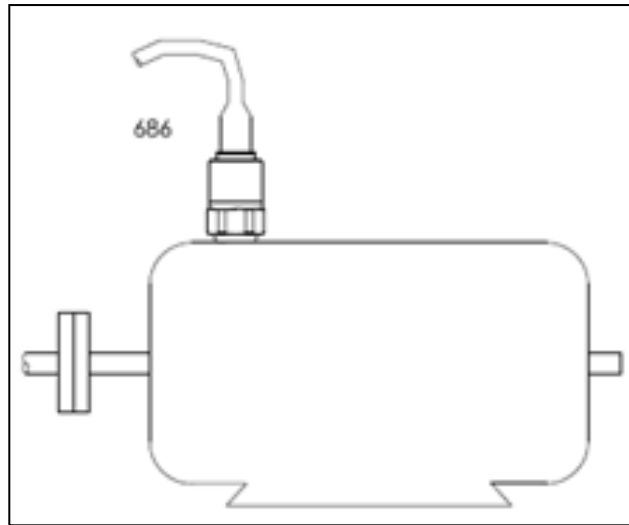
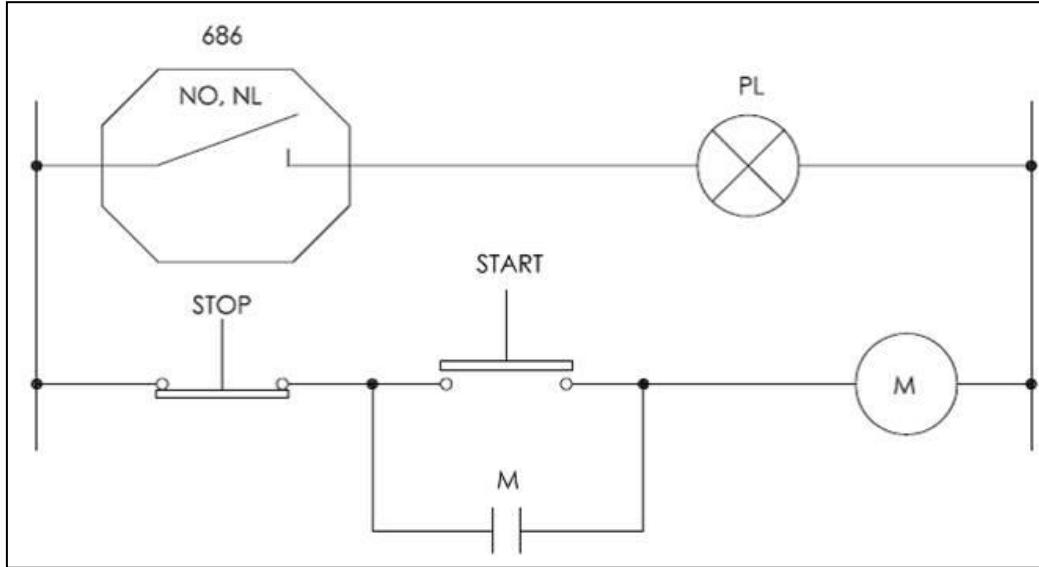


Figure 7 – Wiring Diagrams Legend

For those wiring scenarios that suggest the use of an external electromechanical relay, IMI suggests Omron general purpose relays as listed below. Visit www.omron.com for more information.

| Attribute | Omron Model Number | | | | |
|---|---|-------------|---|------------|-------------|
| | MJN2C-AC120 | MJN2C-AC240 | MJN2C-DC12 | MJN2C-DC24 | MJN2C-DC110 |
| Contact Form | 2 Form C (DPDT) | | | | |
| Relay Rated Resistive Load | 10 A @ 240 VAC/28 VDC | | | | |
| Service Life- Electrical (Min @Rated Loads) | 100,000 operations "average" | | | | |
| Relay Max Resistive Switching Capacity | 2400 VA, 280 W | 240 VAC | 12 VDC | 24 VDC | 110 VDC |
| Coil Nominal Voltage | 120 VAC | | 1.2 W | | |
| Coil Power Consumption | 1.7 VA | | | | |
| Coil Type | Non-Latching | | | | |
| Seal Type | Unsealed | | | | |
| Termination Style | Socket Mount | | | | |
| Operating Temperature Range | -45 to +60 C with no icing or condensation | | -45 to +70 C with no icing or condensation | | |
| Dielectric Strength (AC for 1 min) | 2500 VAC | | | | |
| Approved Standards | UL, CSA | | | | |

Indicating a High Level of Vibration in a Motor

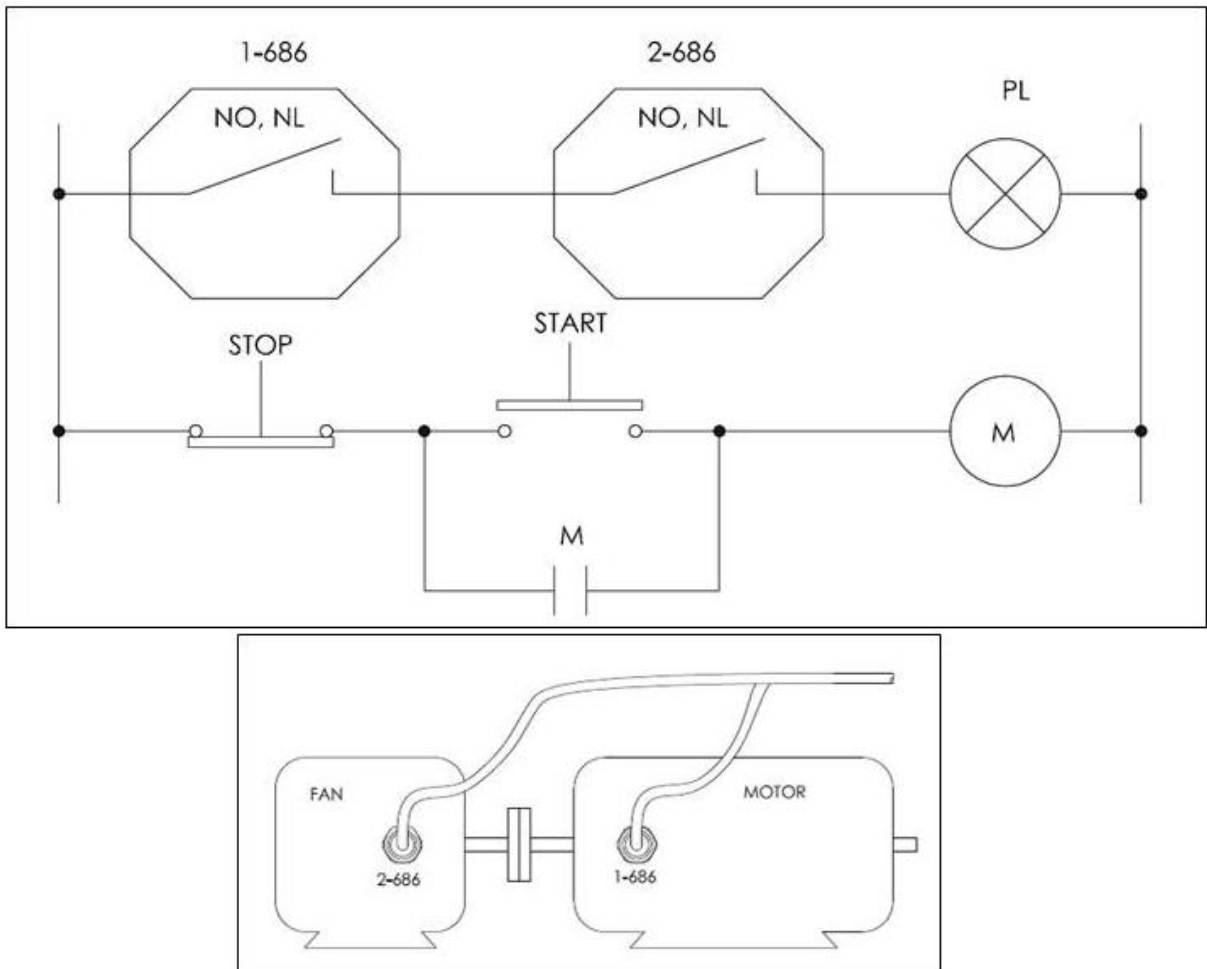


Figures 8 and 9 – Indicating a High Level of Vibration in a Motor

Pushing the Start pushbutton closes the M contacts and starts the motor. If the start-up delay option for the switch is enabled, the Smart Switch will not trip regardless of the vibration level during the specified delay time. After this delay, the vibration switch will be activated. If the vibration level exceeds the alarm threshold for a time period greater than the specified operational delay time, the relay will trip. This action will close the contact to the pilot lamp.

Since the NL (non-latching) option is specified, the pilot lamp will illuminate only while alarm threshold is exceeded. Should the vibration level drop below the alarm threshold value (based also on the specified hysteresis), the pilot lamp will turn off.

Indicating High Levels of Vibration Simultaneously in Series (Such as Fan & Motor)



Figures 10 and 11 – Indicating High Levels of Vibration Simultaneously in Series (Such as Fan & Motor)

The Smart Switches are hooked up in series and installed on the two most loaded bearings across the coupling in the horizontal direction. Pushing the Start pushbutton closes the M contacts and starts the motor and fan. If the start-up delay option for the switches is enabled, the Smart Switches will not trip during the specified startup delay time, regardless of the vibration level. After this delay, the switch relays will be activated if the vibration level on both machines exceeds the alarm threshold for a period greater than the specified operation delay time. This action will close the contact to the pilot lamp.

Since the NL (non-latching) option is specified, the pilot lamp will illuminate only while set threshold on both machines is exceeded. Should the vibration level for one or both of the machines drop below the threshold value (based also on the specified hysteresis), the pilot lamp will turn off.

Constant Siren Alarming in the Event of High Vibration Levels

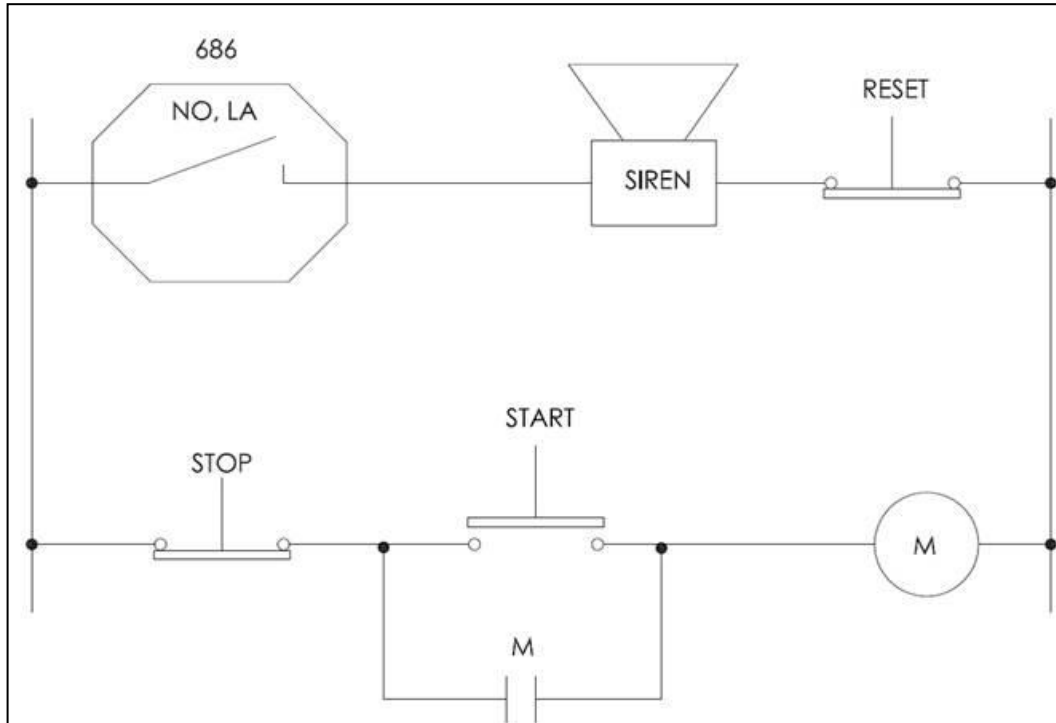
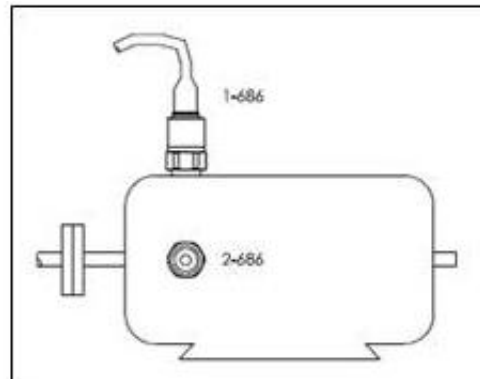
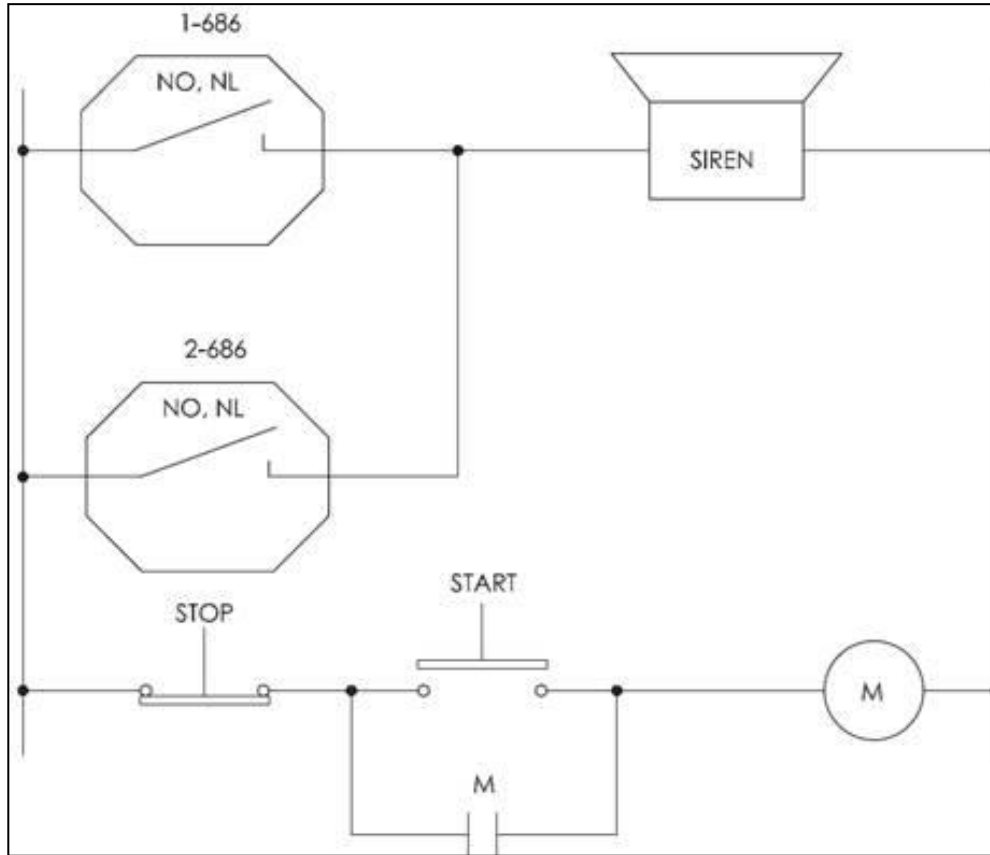


Figure 12 – Constant Siren Alarming in the Event of High Vibration Levels

The Smart Switch is hooked up for automatic constant siren alarming when the alarm threshold level is exceeded. Pushing the Start pushbutton closes the M contact and starts the motor. If the start-up delay option for the switches is enabled, the Smart Switches will not trip during the specified startup delay time, regardless of the vibration level. After this delay, the switch relay will be activated if the vibration level exceeds the alarm threshold for a period greater than the specified operational delay time. This action will close the contact to the alarm siren and activate it.

Since the LA (latching) option is specified, the alarm siren will be constantly energized after this high vibration event, even if the vibration level should drop below the alarm threshold. The Reset pushbutton should be engaged to de-energize the alarm siren and return the system to its original monitoring condition.

Using Two Switches in Parallel to Monitor Two Axes Simultaneously on Same Motor



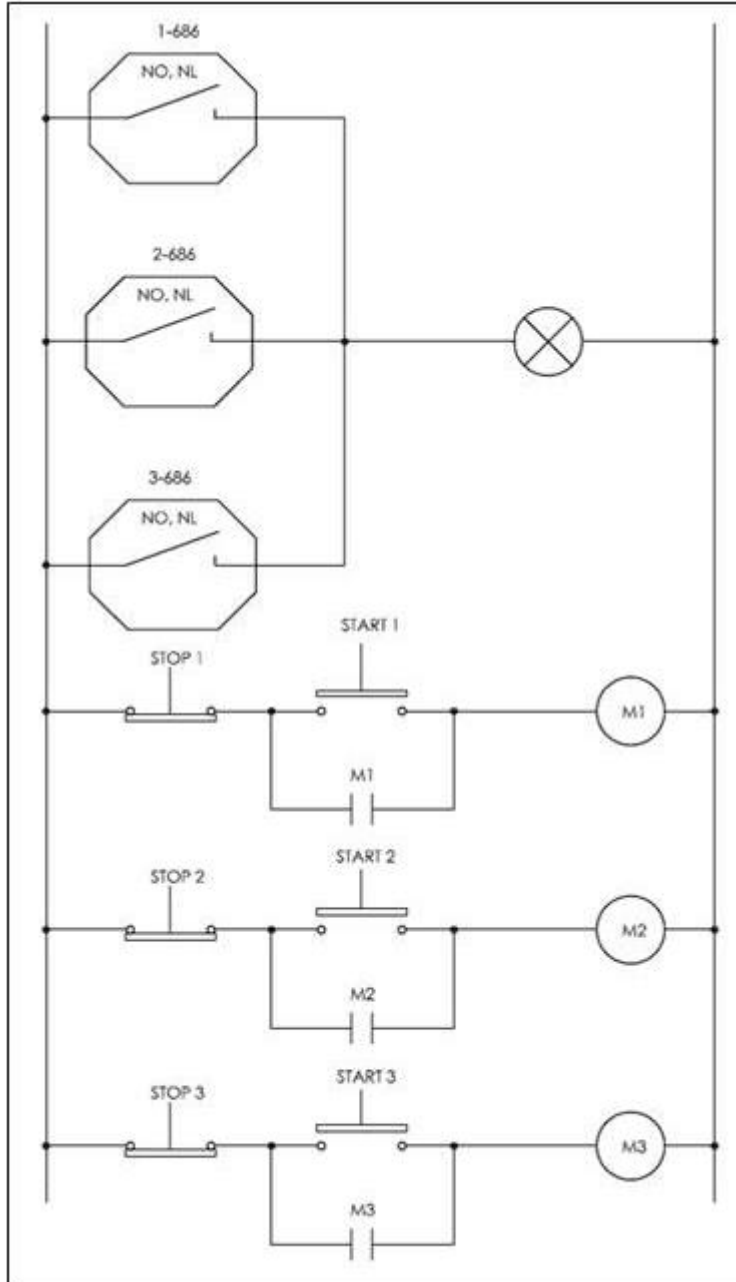
Figures 13 and 14 – Using Two Switches in Parallel to Monitor Two Axes Simultaneously on Same Motor

The Smart Switches are hooked up in parallel and installed on the motor in horizontal and vertical directions. Pushing the Start pushbutton closes the M contact and starts the motor. If the start-up delay option for the switches is enabled, then during the specified startup delay time, the switches will not trip regardless of the vibration level. After this delay, the alarm siren will be activated if either of the switches experiences a vibration level over the alarm threshold lasting greater than the specified operation delay time.



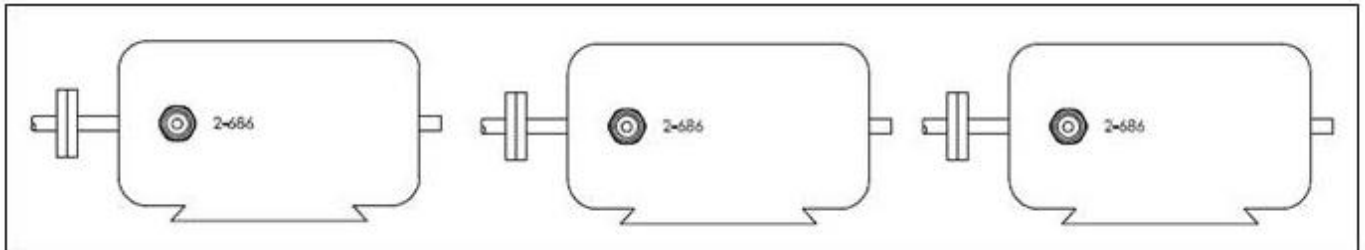
Since the NL (non-latching) option is specified, the alarm siren will sound while alarm threshold on one or both switches is exceeded. Should the vibration level for both switches drop below the alarm threshold value (based also on the specified hysteresis), the alarm siren will turn off.

Using Three Switches in Parallel to Monitor Three Motors Simultaneously



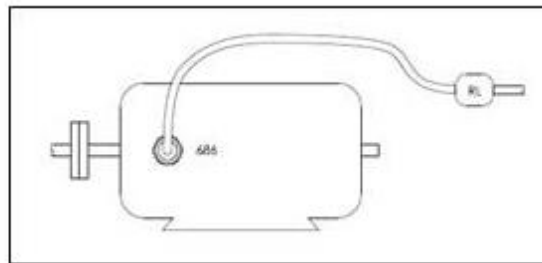
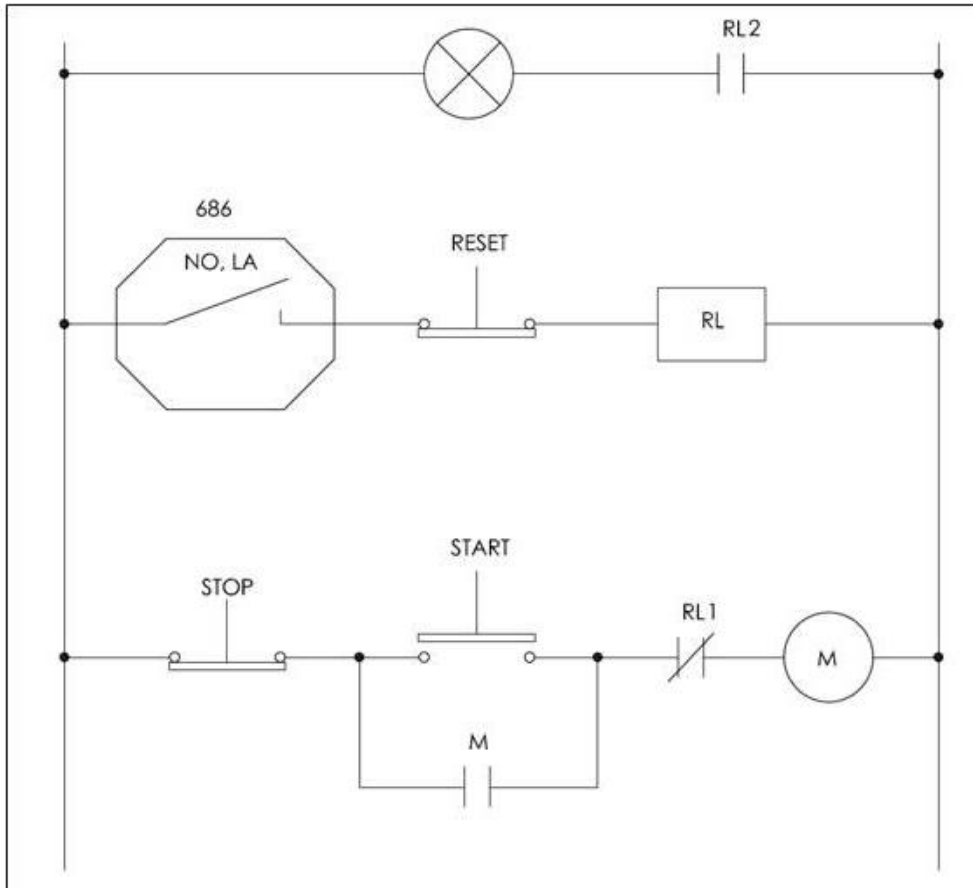
The three Smart Switches are hooked up in parallel and installed on each motor in the horizontal direction. This provides an economical solution for monitoring a group of machinery while only having to run one cable. Pushing any Start pushbutton will close the corresponding M contact and start the motor. If the start-up delay option for the switches is enabled, then during the specified startup delay time, the switches will not trip; regardless of the vibration level. After this delay, the pilot lamp will be illuminated if any of the switches experience a vibration level over the alarm threshold value lasting greater than the specified operational delay time.

Since the NL (non-latching) option is specified, the pilot lamp will illuminate while alarm threshold on any of the switches is exceeded. When the vibration level for all switches drops below their alarm threshold value (based also on the specified hysteresis), the pilot lamp will turn off.



Figures 15 and 16 – Using Three Switches in Parallel to Monitor Three Motors Simultaneously

Automatic Machinery Shutdown Using an External Electromechanical Relay

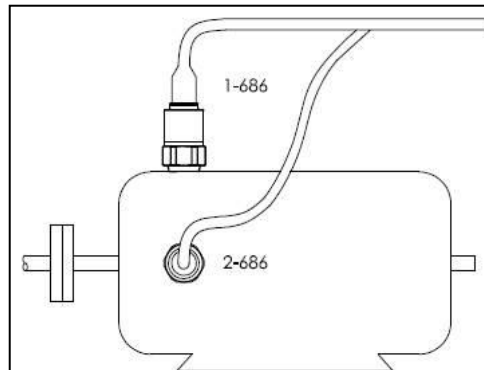
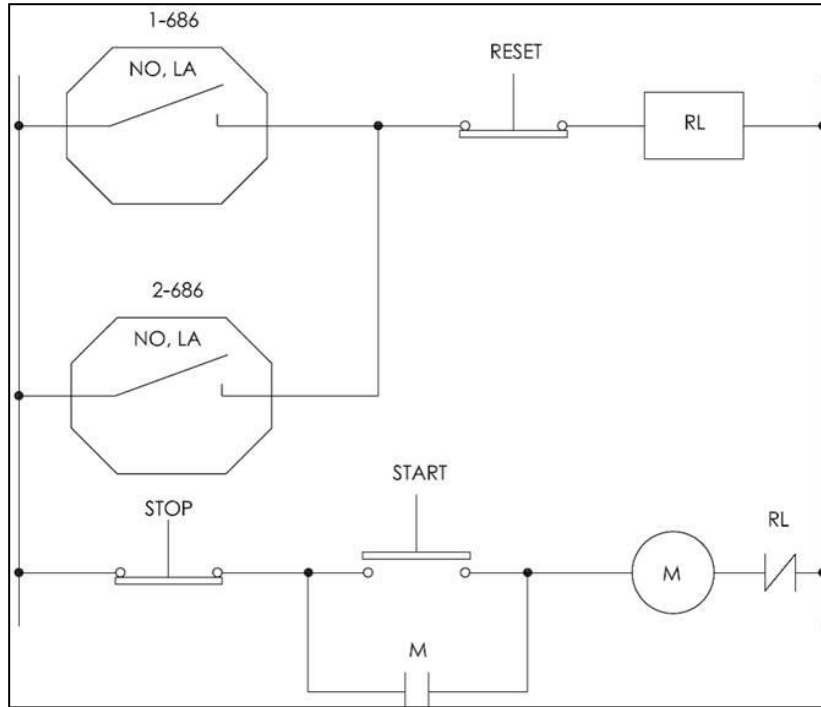


Figures 17 and 18 – Automatic Machinery Shutdown Using an External Electromechanical Relay

The Smart Switch is hooked up for automatic motor shutdown when the alarm threshold level is exceeded. The switch should be mounted in the horizontal direction on the bearing carrying the most load. Pushing the Start pushbutton closes the M contact and starts the motor. If the start-up delay option for the switches is enabled, the Smart Switches will not trip during the specified startup delay time, regardless of the vibration level. After this delay, the switch relay will be activated if the vibration level exceeds the alarm threshold for a period greater than the specified operational delay time. This action will close the contact and send a voltage to the RL relay coil. This will open the RL1 and close the RL2 contacts, shut down the motor, and light the pilot lamp.

Since the LA (latching) option is enabled, the RL coil will be constantly energized after this event; even if the vibration level drops below the alarm threshold value after shutdown. The Reset pushbutton should be pushed to reset the switch and close the RL1 and RL2 contacts before restarting the motor.

Automatic Machinery Shutdown Using an External Electromechanical Relay While Monitoring 2 Axes



Figures 19 and 20 – Automatic Machinery Shutdown Using an External Electromechanical Relay While Monitoring 2 Axes

The Smart Switches are hooked up in parallel for automatic motor shutdown when the alarm threshold level is exceeded on either switch. The switches should be mounted in the horizontal and vertical direction at the bearing carrying the most load. Pushing the Start pushbutton closes the M contact and starts the motor. If the start-up delay option for the switches is enabled, the Smart Switches will not trip during the specified startup delay time, regardless of the vibration level. After this delay, the switch relay will be activated if the vibration level of either switch exceeds the alarm threshold for a period greater than the specified operational delay time. This action will close the contact and send a voltage to the RL relay coil. This will open the RL contacts and shut down the motor.

Since the LA (latching) option is specified, the RL coil will be constantly energized after this event; even if the vibration level drops below the alarm threshold value after shutdown. The Reset pushbutton should be pushed to reset the switch and close the RL contacts before restarting the motor.

Using the Switch and External Latching for Automatic Machinery Shutdown

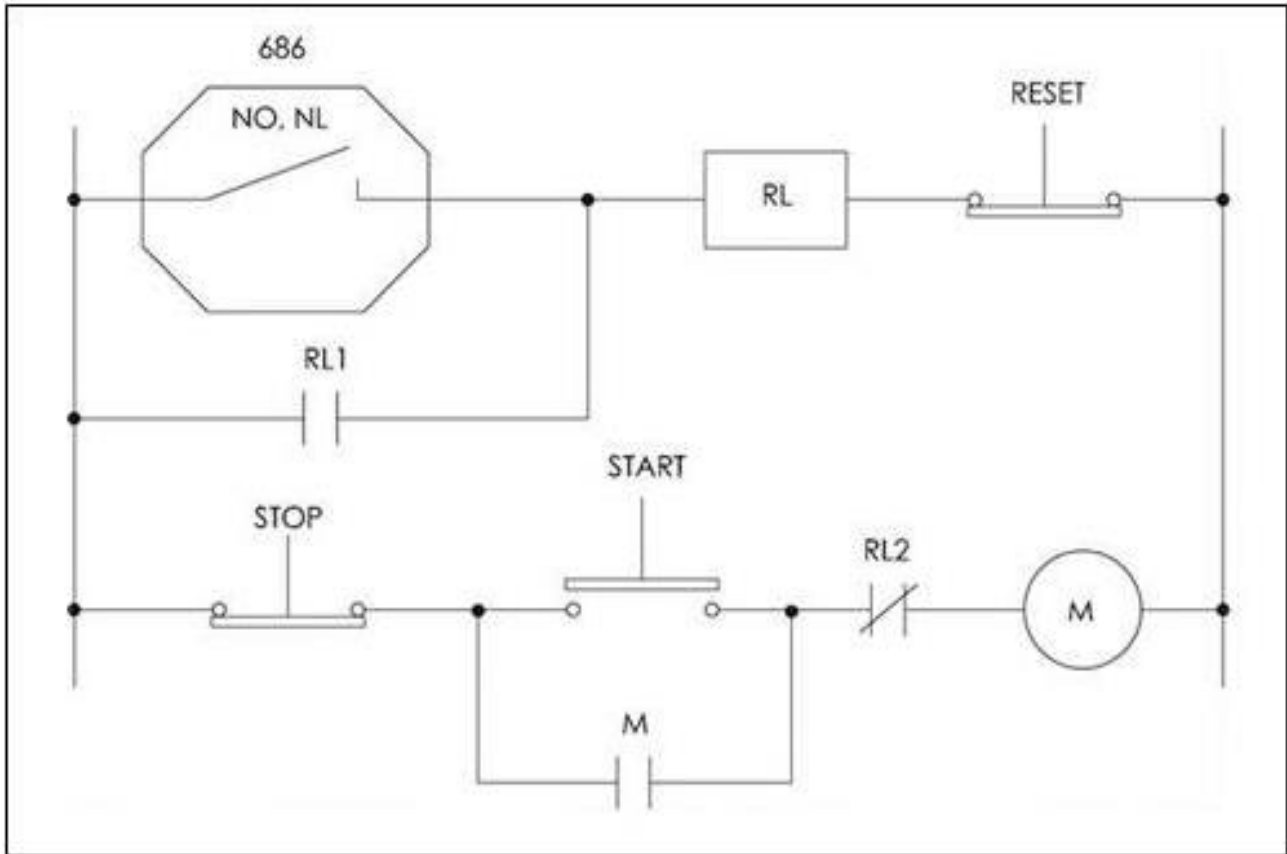


Figure 21 – Using the Switch and External Latching for Automatic Machinery Shutdown

The Smart Switches are hooked up for automatic motor shutdown in case of high vibration levels on critical machinery. Since RL2 contacts are normally closed, pushing the Start pushbutton closes the M contact and starts the motor. If the start-up delay option for the switches is enabled, the Smart Switches will not trip during the specified startup delay time, regardless of the vibration level. After this delay, the switch relay will be activated if the vibration level of either switch exceeds the alarm threshold for a period greater than the specified operational delay time. This action will close the contacts and send a voltage to the RL relay coil. This will open the RL2 contacts and shut down the motor.

Since the LA (latching) option is specified, the RL1 contacts are used for external latching. Closing of RL1 provides constant coil energizing after the shutdown event. Therefore, when the vibration level drops below the alarm threshold level after shutdown, the closed RL1 contacts still energize the RL coil and keep RL2 in the open position. The Reset pushbutton should be pushed to reset the 2-wire switch, close the RL2 contacts and open the RL1 contacts before restarting the motor.

Both Alarm Siren and Automatic Machinery Shutdown Using Two Switches

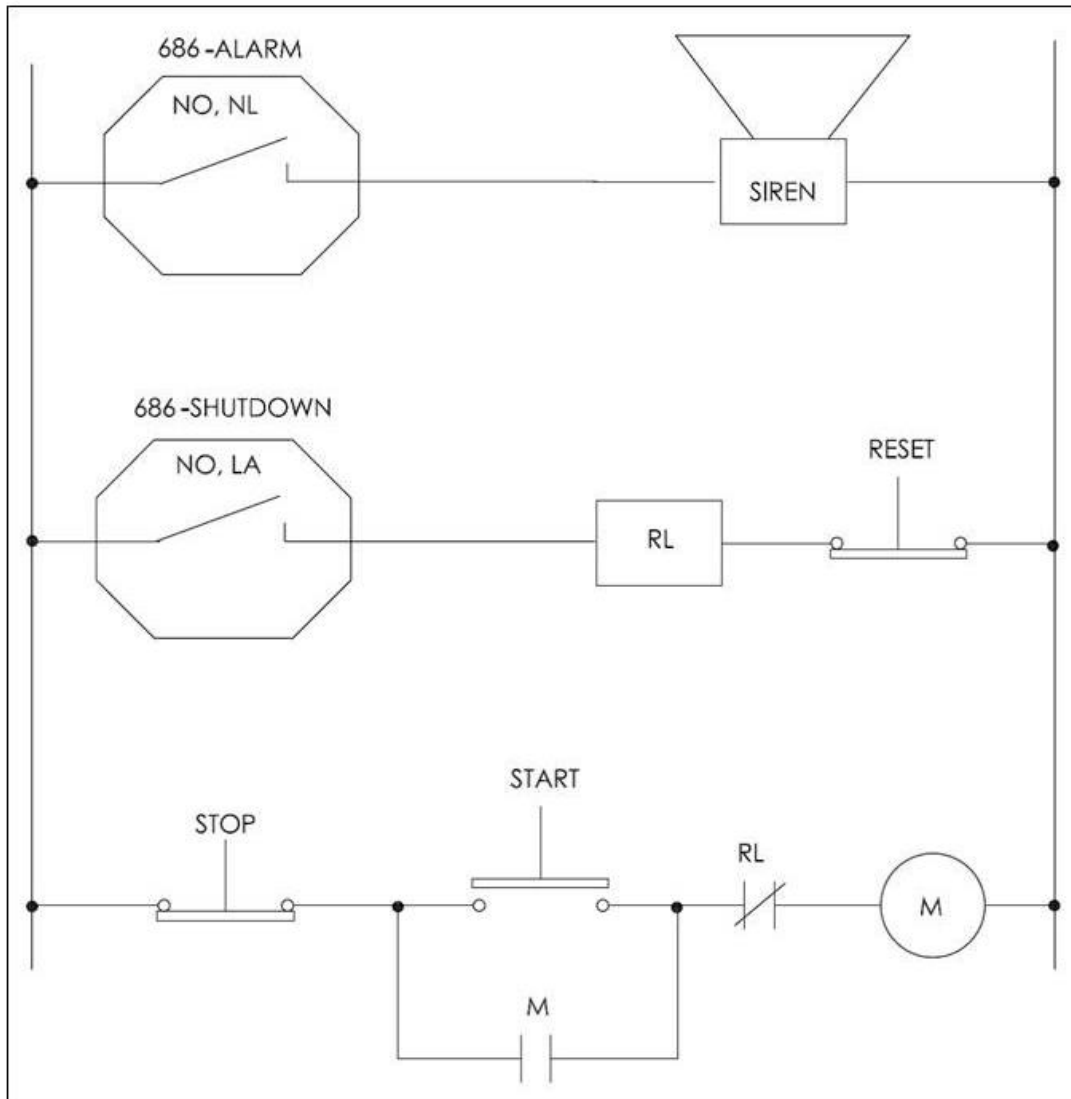


Figure 22 – Both Alarm Siren and Automatic Machinery Shutdown Using Two Switches

The Smart Switches are hooked up for providing alarm siren and automatic motor shutdown when the alarm threshold levels are exceeded. To accomplish this, the two switches have two different threshold values; one for alarm and one for shutdown. Pushing the Start pushbutton closes the M contact, and since RL2 contacts are normally closed, starts the motor. If the start-up delay option for the switch is enabled, the switch will not trip regardless of the vibration level during the specified delay time. After this delay, if the vibration level exceeds the alarm threshold for the alarm switch, it will be activated and apply a voltage to the alarm siren. Since the NL (non-latching) option is specified for this switch, the alarm siren will be energized until the vibration level falls below the alarm threshold value (based also on the specified hysteresis). If the vibration level exceeds the shutdown alarm threshold, the second vibration switch will be activated and apply a voltage to the RL relay coil. This will open the RL contacts and shut down the motor. Since the LA (latching) option is specified, the RL coil will be constantly energized after this event; even though the vibration level will drop below the alarm threshold value after shutdown. The Reset pushbutton should be pushed to reset the switch and close the RL contacts before restarting the motor.

Automatic Machinery Shutdown Based on Normally Open Solid-State Relay

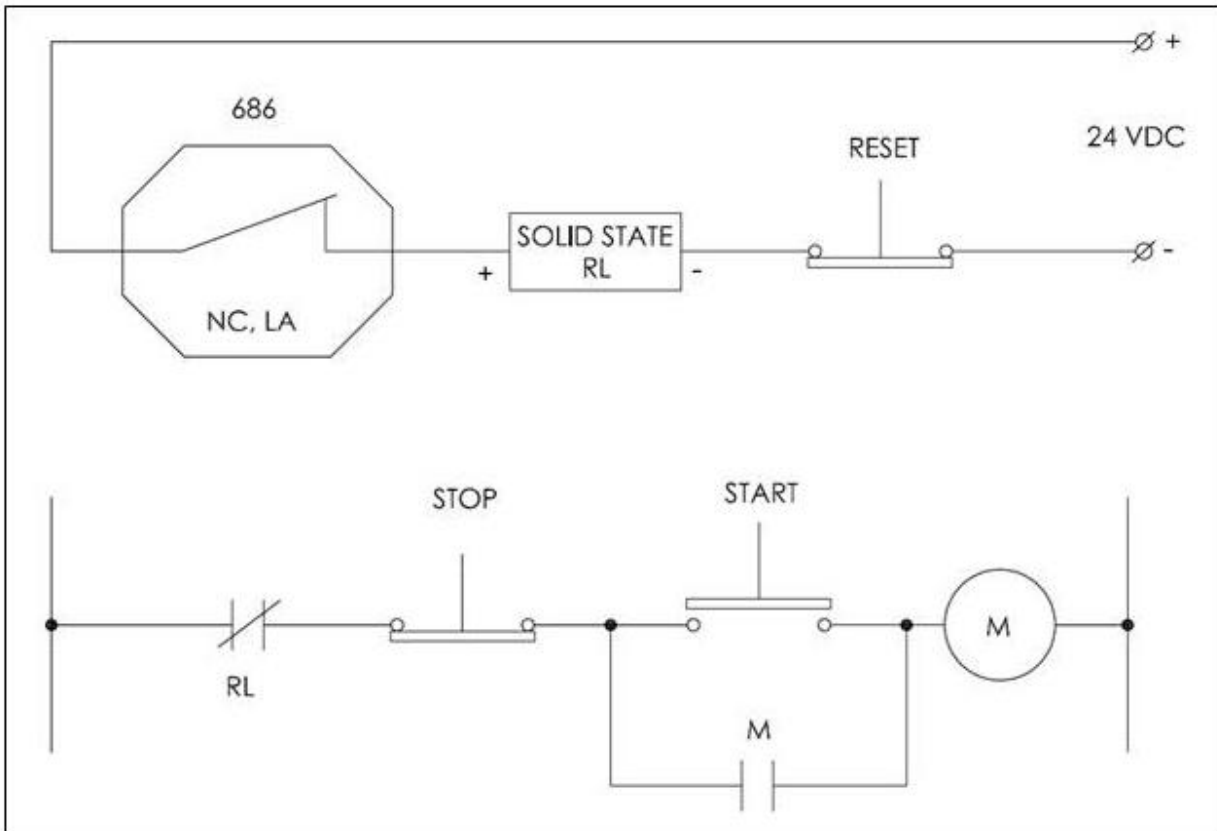


Figure 23 – Automatic Machinery Shutdown Based on Normally Open Solid-State Relay

The Smart Switch is hooked up to provide automatic motor shutdown when the alarm threshold level is exceeded. Pushing the Start pushbutton closes the M contact, and since the switch is Normally Closed, the solid state relay will be energized and the RL contacts will be closed. This will start the motor. If the start-up delay option is enabled, the switch will not trip regardless of the vibration level during the specified delay time. After this delay, if the vibration level exceeds the alarm threshold, it will be activated, thereby opening its contacts and de-energizing the solid state relay input. This will open the RL contacts and shut down the motor. Since the LA (latching) option is specified, the solid state relay input will be constantly de-energized after this event even if the vibration level drops below the alarm threshold value after shutdown. The Reset pushbutton should be pushed to reset the switch and close the RL contacts before restarting the motor.

Automatic Machinery Shutdown of Three-Phase Electrical Motor Based on a N.O. Solid State Relay

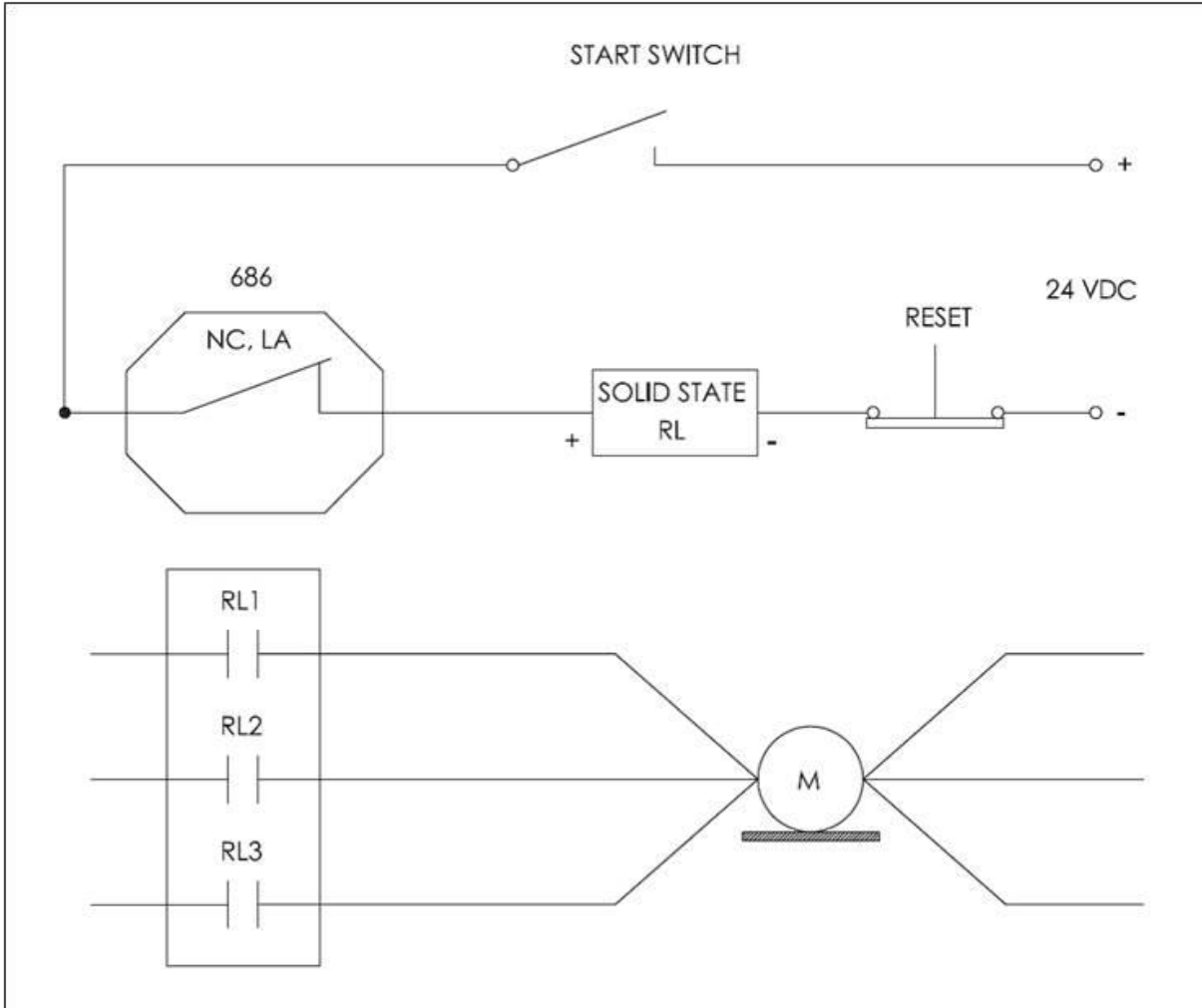


Figure 24 – Automatic Machinery Shutdown of 3-Phase Electrical Motor Based on a N.O. Solid State Relay

The Smart Switch is hooked up to provide automatic motor shutdown when the alarm threshold level is exceeded using a normally open three channel solid state relay. Since the Smart Switch is normally closed, closing the Start Switch will energize the solid state relay. This will cause the RL1, RL2, and RL3 contacts to close and start the motor. If the start-up delay option for the switch is enabled, the switch will not trip regardless of the vibration level during the specified delay time. After this delay, if the vibration level exceeds the alarm threshold, it will be activated, thereby opening its contacts and de-energizing the solid state relay input. This will open the RL1, RL2, & RL3 contacts and shut down the motor. Since the LA (latching) option is specified, the solid state relay input will be constantly de-energized after this event; even if the vibration level drops below the alarm threshold value after shutdown. The Reset pushbutton should be pushed to reset the switch and close the RL1, RL2, & RL3 contacts before restarting the motor. This will start the motor immediately without using the Start pushbutton.

Programming Software

The Smart Switch can be user-programmed with the optional Model 600A29 Programming Kit. The kit includes USB programmer cable/dongle (Model 070A100), software (Model EE225), terminal block/integral cable adapter (Model 042M17) and magnet clip (Model 080A214). The software can also be downloaded from IMI's website, www.pcb.com. This software must be installed prior to connecting the Smart Switch to the computer using the USB programmer cable. The software includes both the drivers and user interface needed for programming the Smart Switch. During initial installation, you may need administrative rights for the computer in order to install the drivers. Once installed, administrative rights are not required for use.



Figure 25 – Model 600A29 USB Programmer Kit

Program Installation

Installing the Software and USB Driver: Insert the software CD provided into the CD drive. The software will start the installation automatically if your PC is set to auto-install applications. If not, browse the CD and click on Setup.exe to start the installation process. The default installation directory is C:\PCB\EE225. It is recommended to use the default setting.

The installer will first install the software and then the WinUSB device driver. This device driver is required for the programmer software to communicate with the 070A100 USB programmer cable included in the programmer kit.

The following screens will be displayed when the installer starts. Click the Next button to proceed from step to step.

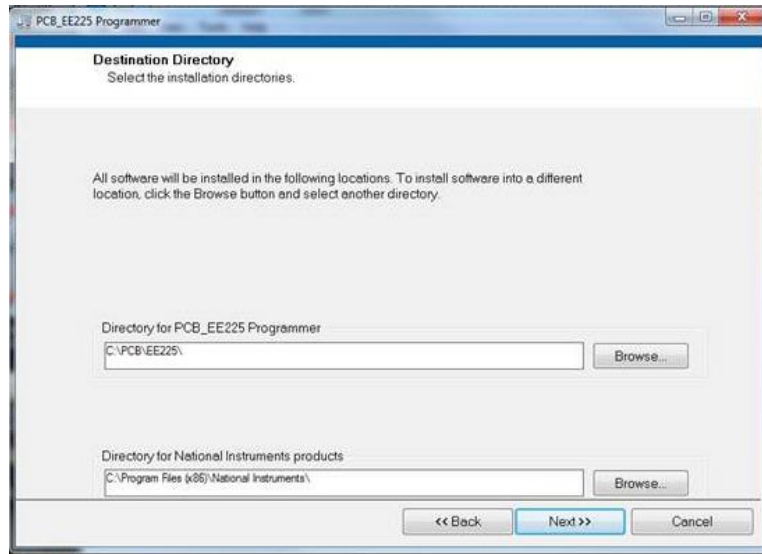


Figure 26 – Install Location Screen

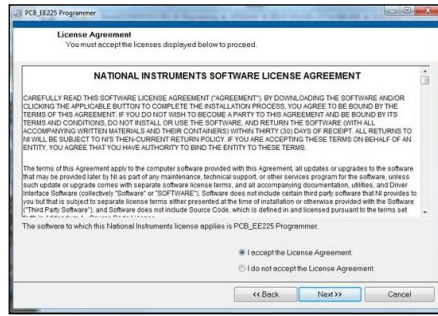


Figure 27 – National Instruments Software License Agreement

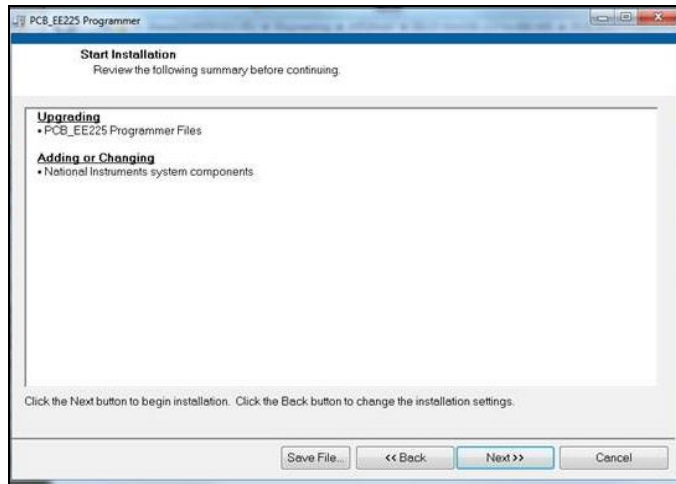


Figure 28 – Installation Verification Screen

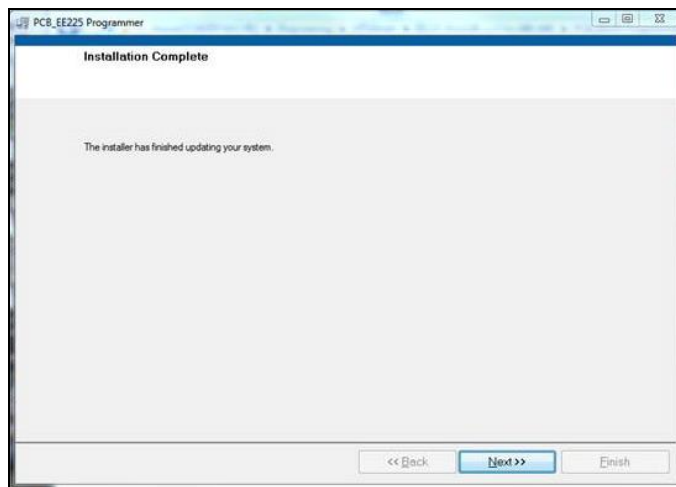


Figure 29 – Installation Complete Screen

After the software completes, the USB driver installer will start automatically. The initial USB installer will look similar to the one below.



Figure 30 – WinUSB Driver Installation Screen

The drivers will now be properly installed and you should get the following screen. Click “Finish”. The software is now ready to use.



Figure 31 – WinUSB Driver Installation Complete Screen

Running the Software

Connect the USB programmer cable to the Smart Switch. Hold a magnet to the indicated MAVT™ point on the Smart Switch. Wait about 2 seconds. While keeping the magnet against the Smart Switch, connect the USB programmer cable to a USB port on the PC. Run the software from the Start | All Programs | PCB EE225 Software menu item.

Initially the screen will appear as in **Error! Reference source not found.** with a yellow bar and status indicating ‘Initializing...’ followed by the message: “Connecting to USB Dongle...”.

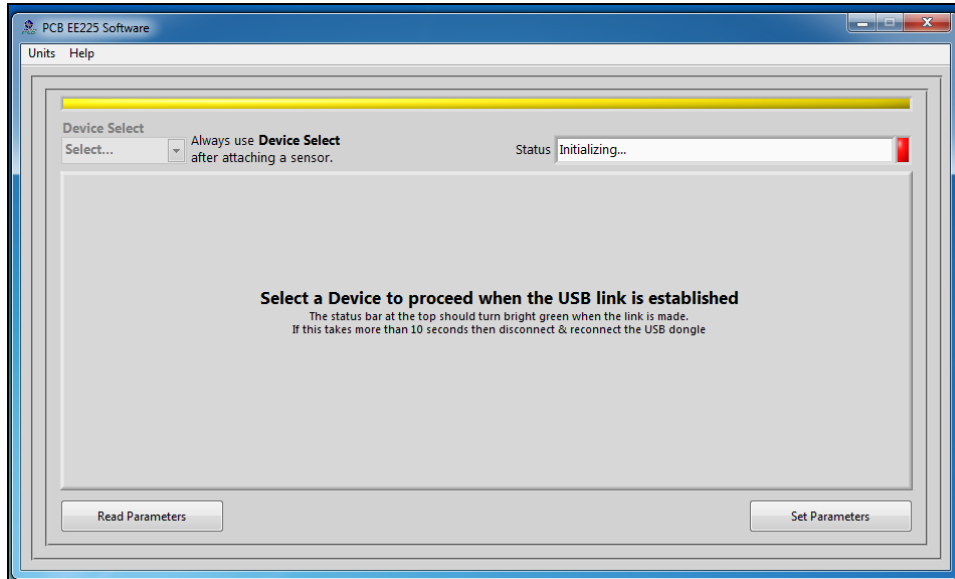


Figure 32 – Software While Connecting to USB Programmer Cable

Once the connection is made the bar at the top of the screen will turn green and the status will indicate “USB Connection Success - Select a device”. If the software and USB programmer cable fail to connect, remove and reinsert the USB programmer cable.

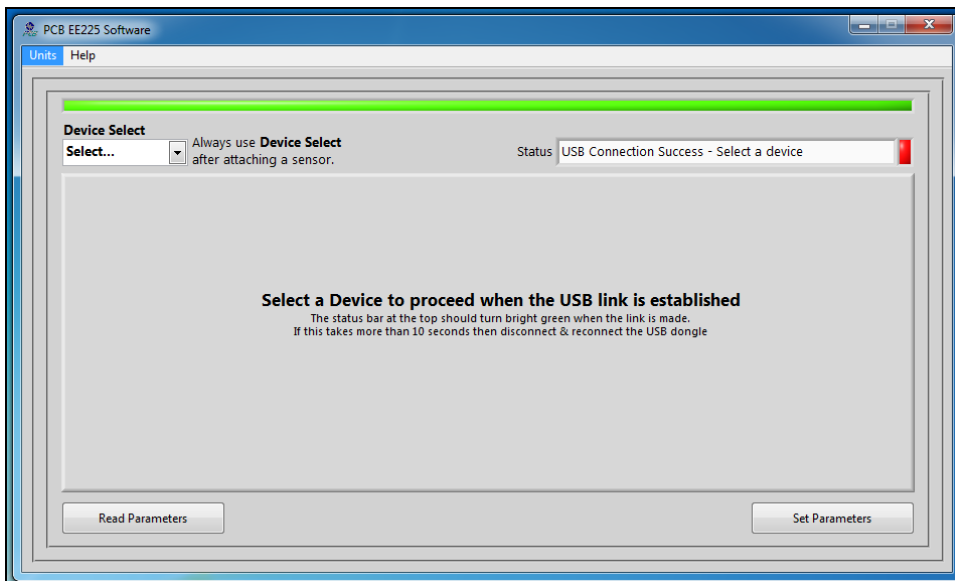


Figure 33 – Software After Connecting to USB Programmer Cable

To select a device, click on the Device Select pull down menu and select the device you'd like to program. In this case, select 686.

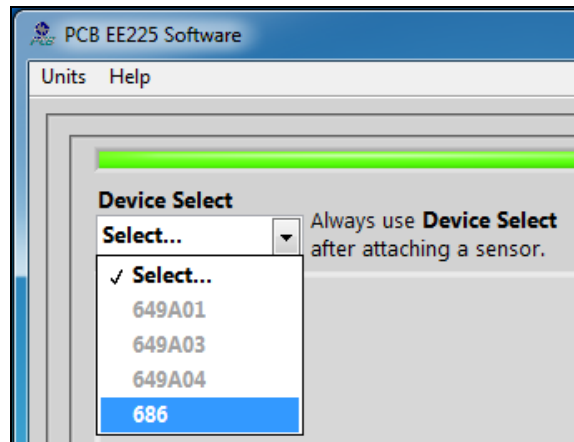


Figure 34 – Device Selection

Once a product is selected, the software will prompt you to confirm connection of the sensor to the PC using the USB programmer cable. Click OK to proceed.

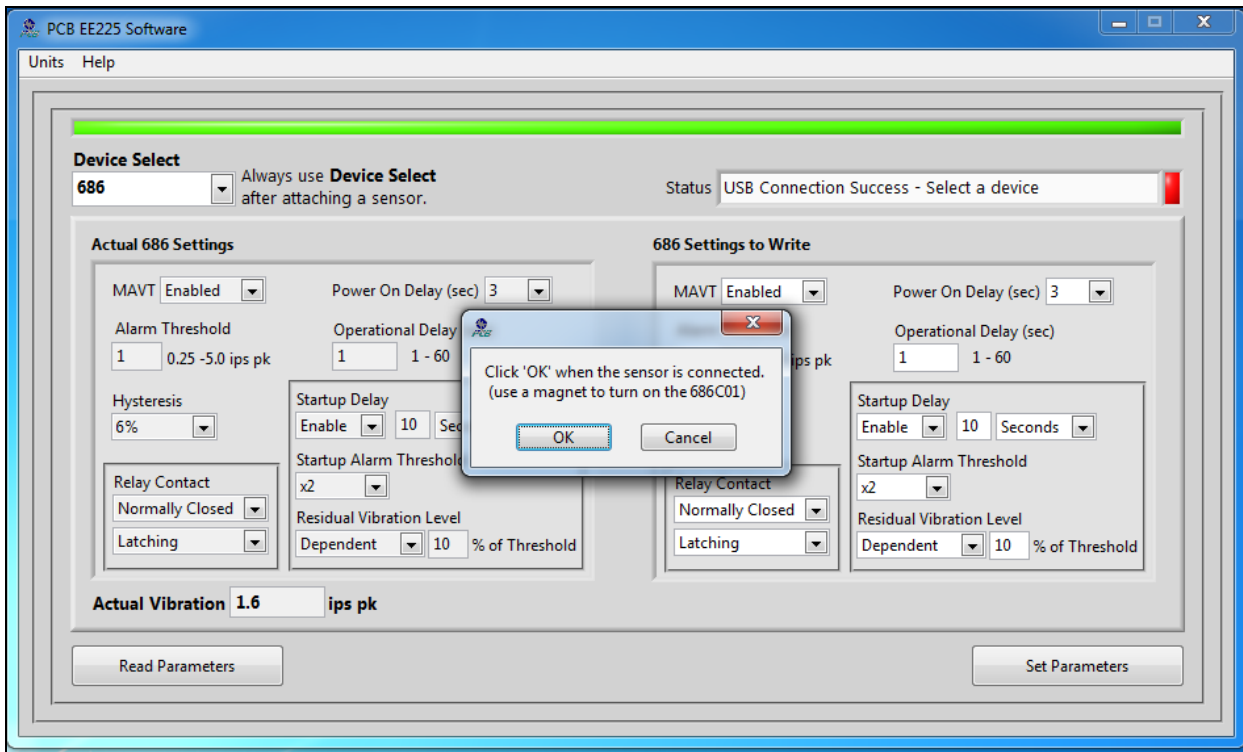


Figure 35 – Sensor Connection Screen

While the software is establishing communication with the sensor, the status will display 'Checking Status...' and the colored indicator box next to the status will alternate between red and yellow. This will take approximately 15 seconds. Once communication is established, the indicator box will turn green and the software will read the sensor's current settings and data. The fields presented in the main body of the screen will be specific to the selected sensor.

Programming Sections

The screen has two sections:

- Actual 686 Settings – This section shows the settings currently programmed in the sensor.
- 686 Settings to Write – This section shows the options for programming the sensor.

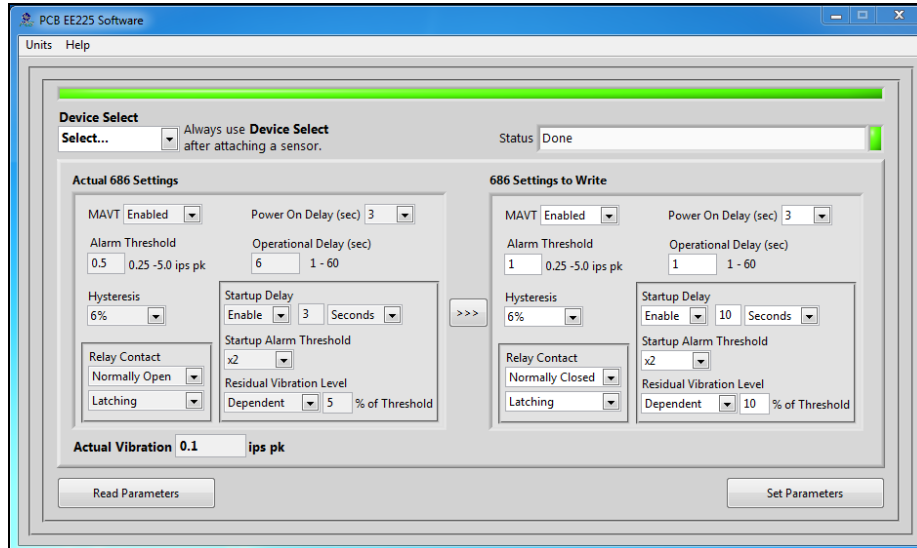


Figure 36 – Typical Smart Switch Screen After Successful Parameter Read

Reading and Writing Parameters

- Reading Parameters - To read the current sensor settings, click the Read Parameters button. This operation takes approximately 45 seconds to complete.
- Transferring Actual Settings to Settings to Write Field - Use the '>>>' button to transfer all Actual Settings to the Settings to Write fields.
- Writing Parameters- Select the appropriate mode and enter any pertinent parameter information. Click the Set Parameters button. This causes the settings to be sent to the sensor and then read back and displayed in the Actual 686 Settings.

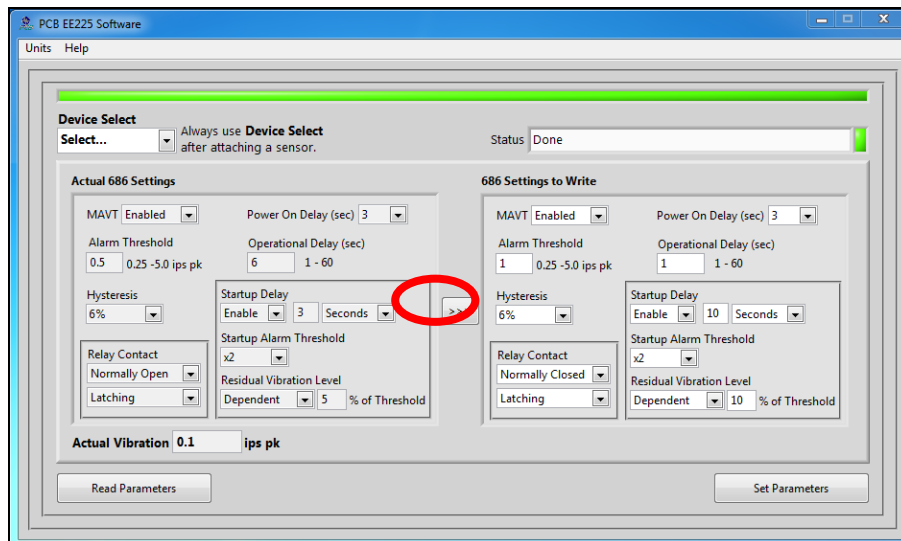


Figure 37 – Transferring Actual Settings to Settings to Write Field

Parameter Options

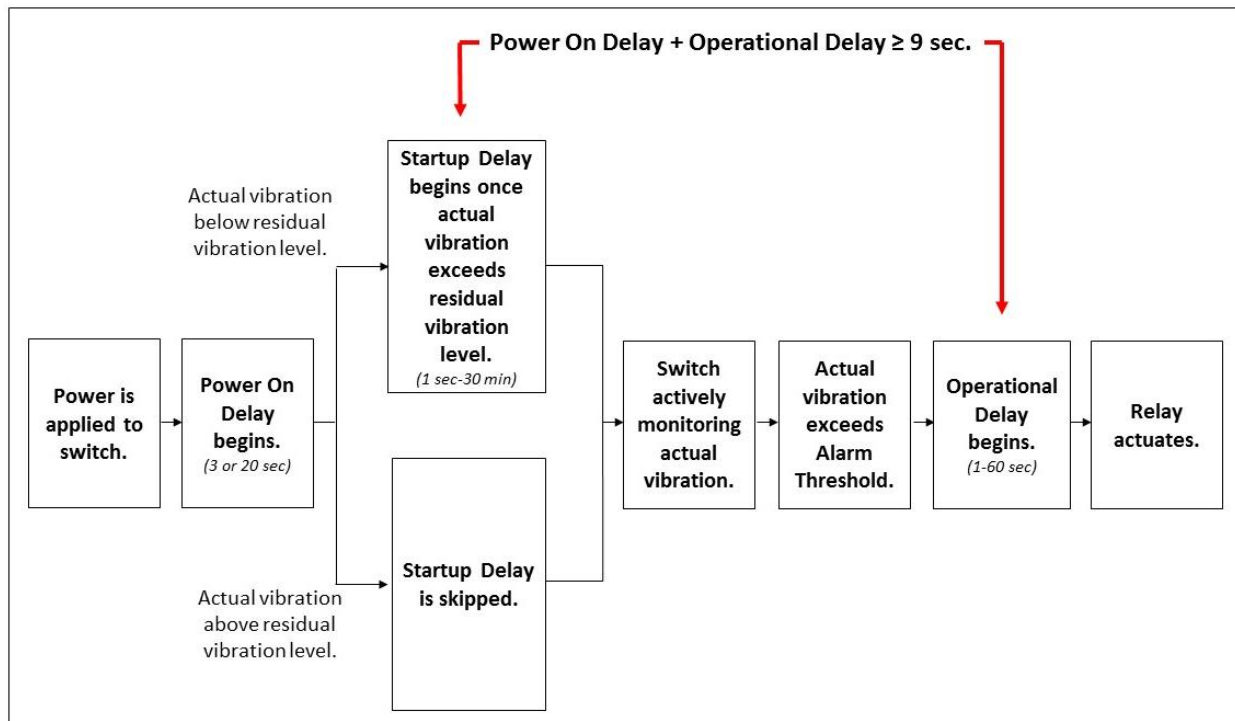
The software presents one read-only parameter (Actual Vibration) and several parameters that can be programmed to optimize performance of the Smart Switch. At any point during the programming process, the values can be changed between imperial and metric measurements by clicking the Units dropdown in the top navigation menu and then selecting the appropriate measurement type.

| Parameter | Description | Acceptable Value(s) |
|--|---|--|
| Actual Vibration | Actual vibration (ips pk) being sensed by the switch at time when Read Parameters button is clicked. | N/A |
| MAVT™ | Capability to determine and set the alarm threshold value automatically by the Smart Switch based on the actual vibration level measured by it. For more information about the MAVT™ feature, see page 16. | Enabled Disabled |
| Alarm Threshold | Vibration level at which the relay will change state. | 0.25- 5.0 ips pk 6.35-127 mm/s pk |
| Hysteresis | Percentage that actual vibration must fall below the alarm threshold in order for a non-latching relay to automatically reset itself. Hysteresis prevents a relay from continually changing states when the vibration level is hovering around the alarm threshold level. | 3% 6% 10% |
| Relay Contacts- Normal State | State in which the relay stays when not tripped. | Normally Open Normally Closed |
| Relay Contacts- Reset State | How the relay operates once actual vibration falls below the alarm threshold. <ul style="list-style-type: none"> Latching: Relay to latch or stay in the alarm state until manually reset regardless of the vibration level. Non-Latching Relay automatically resets once the vibration level falls below the alarm threshold (hysteresis) level. | Latching Non-Latching |
| Power On Delay | Specified time period immediately after power is applied to the switch during which the relay will not trip regardless of the vibration level. Prevents a relay trip during high transient vibration levels that may occur during a normal machine startup. | 3 sec 20 sec |
| Operation Delay | Specified time period for which actual vibration must constantly exceed the Alarm Threshold before the relay changes state. Prevents a relay trip as a result of a short transient spike in vibration level that may not even be caused by a machine fault. | 1-60 sec |
| Startup Delay- Status | Specified time period immediately after power is applied to the equipment being monitored during which the relay will not trip regardless of vibration level. | Enabled Disabled |
| Startup Delay- Time Period | Time period during which vibration is ignored. | 1-60 sec 1-30 min |
| Startup Delay- Startup Alarm Threshold | Maximum vibration ignored during the time period. Calculated as a multiple of the Alarm Threshold. | 2x 4x 8x Blocked (All vibration) |
| Startup Delay- Residual Vibration Level | Minimum vibration level that, once surpassed at equipment startup, triggers the countdown of the Startup Delay Time Period. | Dependent (Threshold %) Independent (Value) Max 40% of Threshold |

Unless otherwise specified, the Smart Switch comes from the factory with a set of default parameters. The specific set of parameters depends on the last alphanumeric character in the model number.

| | | Last Alphanumeric Character | | | | |
|-----------|--|------------------------------|--------------------|------------------|--------------------|---|
| | | 1 | 2 | 3 | 4 | X |
| Parameter | MAVT™ | Enabled | | | | Custom, Customer- Specific Configuration |
| | Alarm Threshold | 0.60 ips | | | | |
| | Hysteresis | 6% | | | | |
| | Relay Contacts- Normal State | Normally Open | Normally Closed | Normally Open | Normally Closed | |
| | Relay Contacts- Reset State | Latching | Latching | Non-Latching | Non-Latching | |
| | Power On Delay | 3 sec | | | | |
| | Operation Delay | 6 sec | | | | |
| | Startup Delay- Status | Enabled | | | | |
| | Startup Delay- Time Period | 3 sec | | | | |
| | Startup Delay- Startup Alarm Threshold | 2x | | | | |
| | Startup Delay- Residual Vibration Level | Dependent 5% of Threshold | | | | |

Execution of Delays



Magnetically Adjustable Vibration Threshold (MAVT™)

Magnetically Adjustable Vibration Threshold (MAVT™) is a Smart Switch selectable feature via USB programming. This unique capability allows the alarm threshold value to be determined and set automatically by the Smart Switch based on the actual vibration level being measured by it. This convenient feature permits any machine to be protected by a vibration switch within seconds without knowing anything about its vibration levels.

The Smart Switch has no accessible mechanical adjustments (ie. screw pots or DIP switches) that are found on other style electronic vibration switches. However, when the MAVT™ option is selected, the hermetically-sealed switch becomes adjustable through magnetic actuation. By touching a specified location on the housing with a strong permanent magnet for 2 seconds, an internal microprocessor is actuated that initiates the test sequence.

Note: The magnet clip (Model 080A214) is a supplied accessory when the Smart Switch is ordered from the factory with the optional 600A29 USB Switch Programmer Kit.



Figure 38 – Magnet Clip

MAVT™ Procedure

Be absolutely sure you do not have the switch connected to the machine's trip circuit during this procedure as the trip relay is activated several times during the procedure and will cause the machine to shut down and turn on several times. This could cause damage to your machinery.

1. Mount the Smart Switch on the machine that the switch will monitor. Be sure that the machine is operating in a steady state condition. If it is not operating, turn the machine on and allow enough time for the vibration level to normalize before going to the next step.
2. Connect the switch to the power supply using an appropriate cable. Since the Smart Switch operates off universal power, any power supply that outputs 24-240 VDC or 24-240 VAC, 50/60 Hz will work. A simple 24V power supply/signal conditioner (Model 480C02) will also work well and has the added advantage of visually indicating when the calibration process has been completed via its built-in meter. Allow 30 seconds for the switch to power up.
3. Touch the permanent magnet to the target on the side of the switch for approximately 2 seconds to initiate the process.
4. The alarm threshold calibration process takes approximately 30 seconds. (The amount of time needed varies based on the difference between the previous and new alarm threshold values.) During this process, the unit will measure the average vibration amplitude, set the alarm threshold value to two times this average value and store this value in a non-volatile memory. The relay contacts open and close repeatedly during this process.
5. Disconnect the Smart Switch from the power supply.
6. The switch can now be permanently installed on the machine for protection.

Switch Model Number Template

Prefix Option

- Blank** No Prefix Option
- EX** CSA Approval
- M** Metric Stud (Not w/ Terminal Block)
- EXM** Metric Stud, CSA Approval (Not w/ Terminal Block)

Version

- B** B Version (All models except those listed for C version)
- C** C Version (Models 686C01 & 686C0X only)

Electrical Connection

- 0** 2-Pin Mil-C-5015 Connector
- 1** Integral Cable
- 6** Integral Armored Cable
- 7** Terminal Block

Program Configuration

- 1 1 0 060 1 06 0 0 1 0 03 0 0 005
- 2 " " " " " 1 " " " " " " " "
- 3 " " " " " 2 " " " " " " " "
- 4 " " " " " 3 " " " " " " " "
- X Custom Program Configuration (Fill out form below)

Use for Integral Cable Models Only

Cable Length Units

- Blank** English (ft)
- M** Metric (m)

Cable Length

- 001 to 200** Cable Length in ft
- 001 to 060** Cable Length in m

Cable Termination

- AB** BNC Jack
- AC** BNC Plug
- AD** Pigtail
- BZ** Blunt Cut

Armor Length

- Blank** Same as Cable Length
- 001 to 050** Armor Length in ft
- 001 to 015** Armor Length in m

Suffix Option

- Blank** No Suffix Option
- D** ATEX/IECEx Ex d Approval (EX prefix must also be selected)

Custom Program Configuration

MAVT™

A

| | |
|---|----------|
| 0 | Disabled |
| 1 | Enabled |

Alarm Threshold

B

| | |
|---|---------|
| 0 | English |
| 1 | Metric |

C Value = 0.25 to 5.00 ips pk
04.5 to 90.0 mm/sec pk

e.g.: 0.25 ips =

| | | |
|---|---|---|
| 0 | 2 | 5 |
|---|---|---|

25.4 mm/sec =

| | | |
|---|---|---|
| 2 | 5 | 4 |
|---|---|---|

Hysteresis

D

| | |
|---|-----|
| 0 | 3% |
| 1 | 6% |
| 2 | 10% |

Operational Delay

E

Value = 01 to 60 sec

Relay Contact

F

| | |
|---|-------------------------------|
| 0 | Latching, Normally Open |
| 1 | Latching, Normally Closed |
| 2 | Non-Latching, Normally Open |
| 3 | Non-Latching, Normally Closed |

Power On Delay

G

| | |
|---|--------|
| 0 | 3 sec |
| 1 | 20 sec |

Startup Delay

H

| | |
|---|----------|
| 0 | Disabled |
| 1 | Enabled |

I

| | |
|---|---------|
| 0 | Seconds |
| 1 | Minutes |

J

Value = 01 to 60 sec. or 01 to 30 min.

Alarm Threshold During Startup

(Multiplier of the Alarm Threshold)

K

| | |
|---|---------|
| 0 | x2 |
| 1 | x4 |
| 2 | x8 |
| 3 | Blocked |

Residual Vibration Level

L

| | |
|---|-------------|
| 0 | Dependent |
| 1 | Independent |

M

Value = For **Dependent** 001 to 040% of Alarm Threshold.
For **Independent** 0.01 to 5.00 ips
00.1 to 90.0 mm/sec

Figure 39 – Ordering Guide

Battery-Powered Signal Conditioner

Power supply/signal conditioner (Model 480C02) is for use with the Smart Switch when determining the alarm threshold level using the MAVT™ feature. The built-in meter indicates when the process is complete. See www.pcb.com for product details.



Figure 40 – Battery Powered Signal Conditioner

Calibration Cable

The calibration cable (Model 052BR010AC) is a 10 foot, twisted-pair, shielded cable with a 2-Pin MIL type connector terminating to a BNC plug for use with 480C02 power supply and Smart Switch.



Figure 41 – Calibration Cable

Magnet Clip

The magnet clip (Model 080A214) is supplied as part of the optional 600A29 USB Programmer Kit or can be ordered separately for use with the MAVT™.



Cable Ordering Information

Go to www.pcb.com for complete information on cables.

IMI Part Number: **052** **BR** **010** **BZ**

Cable Model Series

- 052 Polyurethane, Shielded, Twisted Pair
- 048 Armored Polyurethane, Shielded, Twisted Pair

Switch Connector Type

- AE 2 socket MIL type with environmental boot
- BP 2 socket MIL type high temp with strain relief
- BR 2 socket MIL type molded composite
- BQ 2 socket MIL type molded composite, right angle

Cable Length

- 010 10 feet
- 020 20 feet
- 030 30 feet
- 040 40 feet
- 050 50 feet
- XXX Any length

Cable termination

- BZ Blunt Cut
- (Consult factory for additional options)



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.

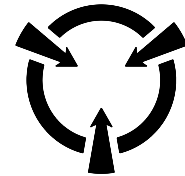
Warning 2 – ESD sensitivity

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.*



CAUTION
ELECTROSTATIC
DISCHARGE SENSITIVE

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 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.

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.

| | ENGLISH | SI | |
|---|-----------------------------|-----------------------------|-----|
| Performance | | | |
| Alarm Threshold(± 10 %) | 0.25 to 5 in/sec pk | 4.5 to 90 mm/s rms | [1] |
| Frequency Range(± 3 dB) | 420 to 60 kcpm | 7 to 1000 Hz | |
| Hysteresis(% < Alarm Threshold) | 3; 6; or 10 % | 3; 6; or 10 % | [1] |
| Residual Vibration Level(Reference) | Dependent or Independent | Dependent or Independent | [1] |
| Residual Vibration Level(% Alarm Threshold) | 1 to 40 % | 1 to 40 % | [1] |
| MAVT(Sets Alarm Threshold to 2X actual vibration) | Enabled or Disabled | Enabled or Disabled | [1] |
| Transverse Sensitivity | <3 % | <3 % | |
| Power On Delay(± 1 sec) | 3 or 20 sec | 3 or 20 sec | [1] |
| Startup Delay(± 1 sec or 1 min)(Time) | 1 to 60 sec or 1 to 30 min | 1 to 60 sec or 1 to 30 min | [1] |
| Startup Delay(x Alarm Threshold) | x2; x4; x8; Blocked | x2; x4; x8; Blocked | [1] |
| Startup Delay(Active) | Enabled or Disabled | Enabled or Disabled | [1] |
| Operational Delay(± 1 sec) | 1 to 60 sec | 1 to 60 sec | [1] |
| Relay(Type) | SPST, Form A or B MOSFET | SPST, Form A or B MOSFET | |
| Relay(Capacity) | 24 to 240 V AC/DC, 500 mA | 24 to 240 V AC/DC, 500 mA | |
| Relay(Latching) | Latching / Non-Latching | Latching / Non-Latching | [1] |
| Relay(Contacts) | Normally Open / Closed | Normally Open / Closed | [1] |
| Environmental | | | |
| Temperature Range(Operating) | -40 to 185 °F | -40 to 85 °C | |
| Temperature Range(Storage) | -40 to 257 °F | -40 to 125 °C | |
| Overload Limit(Shock) | 5000 g pk | 49,050 m/s² pk | |
| Electrical | | | |
| Power Required | 24 to 240 V DC/AC 50/60 Hz | 24 to 240 V DC/AC 50/60 Hz | |
| Current Rating(Relay Closed) | 500 mA | 500 mA | |
| Leak Current(Relay Open) | ≤ 1 mA | ≤ 1 mA | |
| Electrical Isolation(Case) | >10 ⁸ Ohm | >10 ⁸ Ohm | |
| Physical | | | |
| Size (Hex x Height) | 1.38 in x 3.68 in | 1.38 in x 94 mm | |
| Weight | 7.0 oz | 200 gm | |
| Mounting Thread | 1/4 NPT | No Metric Equivalent | |
| Sensing Element(Internal) | Piezoelectric Accelerometer | Piezoelectric Accelerometer | |
| Housing Material | Stainless Steel | Stainless Steel | |
| Electrical Connector | Terminal Block | Terminal Block | |
| Electrical Connection Position | Top | Top | |
| Screw Terminal Wire Size | 12-24 AWG | 3.0 - .2mm² | |
| Conduit Housing Thread | 1" NPT Female | No Metric Equivalent | |

OPTIONAL VERSIONS

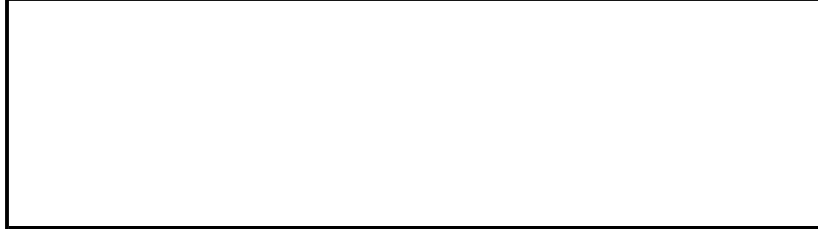
Optional versions have identical specifications and accessories as listed for the standard model except where noted below. More than one option may be used.

EP - Explosion-proof certified conduit housing with 1" pipe thread

EX - Hazardous Area Approval- contact factory for specific approvals
 Hazardous Area Approval CI I, Div 2, Groups A, B, C, D; ExnA IIC T3, AExnA IIC T3 CI I, Div 2, Groups A, B, C, D; ExnA IIC T3, AExnA IIC T3

NOTES:

[1] USB Programmable - See configuration sheet supplied with switch for exact setting.
 [2] See PCB Declaration of Conformance PS051 for details.



| | | | | |
|----------------|----------------|----------------|----------------|--------------|
| Entered: AP | Engineer: do | Sales: EGY | Approved: BAM | Spec Number: |
| Date: 9/4/2012 | Date: 9/4/2012 | Date: 9/4/2012 | Date: 9/4/2012 | 42352 |



[2]



*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.*

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

PCB Piezotronics Inc. claims proprietary rights in the information disclosed herein. Neither it nor any reproduction thereof will be disclosed to others without the written consent of PCB Piezotronics Inc.

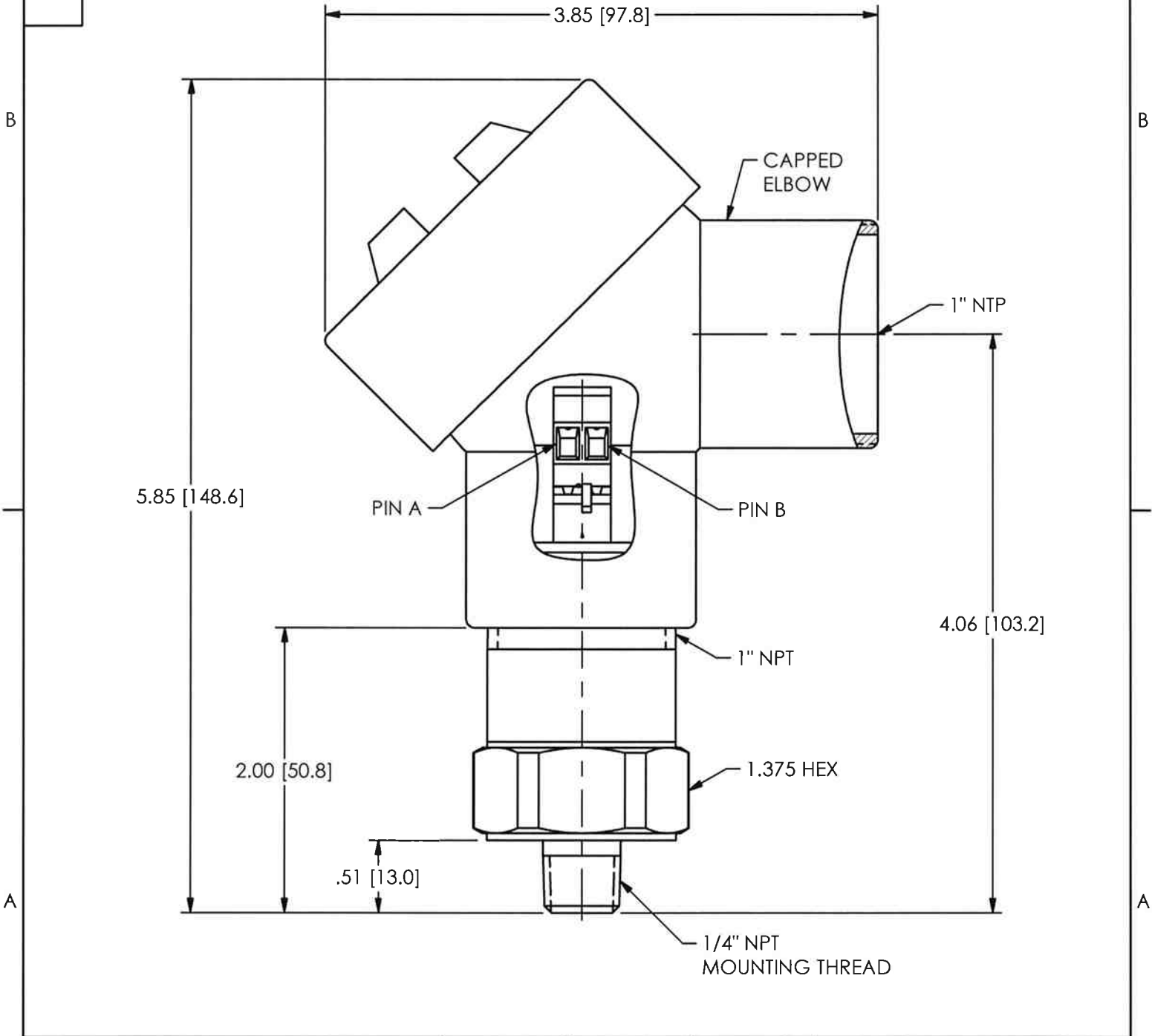
REVISIONS

| REV | DESCRIPTION | ECO |
|-----|---------------------|-------|
| A | ADDED RELATED STAMP | 30762 |
| B | UPDATE TITLE BLOCK | 31223 |

42338

RELATED DRAWING

NO MODIFICATIONS PERMITTED WITHOUT THE APPROVAL OF THE AUTHORIZED PERSON



UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:

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

| DRAWN | CHECKED | ENGINEER |
|-------------|-------------|-------------|
| MDF 8/27/09 | ECS 8/28/09 | JJD 8/27/09 |

TITLE
**OUTLINE DRAWING
 MODEL EP686B7X & EX686B7X
 VIBRATION SWITCH**

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

| | |
|-----------------------|----------------|
| CODE IDENT. NO. 52681 | DWG. NO. 42338 |
| SCALE: FULL | SHEET 1 OF 1 |

EU Declaration of Conformity PS060

In Accordance with ISO/IEC 17050

| | |
|--|---|
| Manufacturer: PCB Piezotronics, Inc. 3425 Walden Avenue Depew, New York 14043 USA | Authorized European Representative: PCB Piezotronics Europe GmbH Porschestrasse 20-30 41836 Hückelhoven, Germany |
|--|---|

Certifies that type of equipment: ICP® Industrial Sensor(s)

Whose Product Models Include: EX602Dxx, EX603Cxx, EX606Bxx, EX607Axx, EX608Axx Series
 Note: "xx" is a place holder for two numbers.

For example: EX602D01Industrial Vibration Sensor

These letters and numbers are included in the model numbers of the series. For details see the related data sheets.

This declaration is applicable to all Sensor(s) of the above series which have the CE & (EX) ATEX mark on their data sheets and where those data sheets refer to this declaration of conformity. The data sheets for all model numbers referenced above, which include the CE & (EX) ATEX mark on such data sheets and refer to this Declaration of Conformity are hereby incorporated by reference into this Declaration.

| | | |
|---|--|---|
| Conform to the following EU Directive(s) when installed per product documentation: | 2014/30/EU 2014/34/EU 2011/65/EU w/2015/863/EU | EMC Directive ATEX Directive RoHS Directive |
|---|--|---|

Standards to which Conformity is Declared:

| | | |
|---|---|---|
| Harmonized Standards | EN 61326-1:2013 EN 61326-2-3: 2013 EN 61010-1:2010 EN 60079-0 :2012+ A11:2013 EN 60079-11 2012 EN 63000:2018 | Electrical Equipment for Measurement, Control and Laboratory Use- EMC Electrical Equipment for Measurement, Control and Laboratory Use- EMC Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements General Explosive Atmosphere Intrinsic safe, i Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances |
| Emissions Test Standards | EN 55011:2009+ A1:2010 | Industrial, scientific and medical (ISM) radio frequency equipment- Electromagnetic disturbance characteristics- Limits and methods of Measurement Class B |
| Other Standards Applied (non-OJEU) Immunity Test Standards | EN 61000-4-2:2001 EN 61000-4-3:2006 EN 61000-4-4:2004 EN 61000-4-5:2005 EN 61000-4-6:2006 EN 61000-4-8:2001 | Electrostatic discharge (ESD) Radiated, radio-frequency, electromagnetic field immunity Electrical fast transient (EFT) / Burst immunity Surge immunity Immunity to RF conducted line disturbances Power frequency magnetic field immunity |
| Test Reports | EMC Reports Safety Reports | GM29028c, GM29030c, GM29032c, GM29045c GM29029s, GM29031s, GM29033s, GM29046s |
| EC Type Examination | ATEX Certification | LCIE 06 ATEX 6033 X Ex ia IIC T4 Ga, II 1 G |
| Voluntary Certification | Voluntary Type Examination Certificate | LCIE 06 ATEX 6032 X Ex nA IC T4 Gc, II 3 G |
| Other International Certifications | IECEx Certification | IECEx LCIE 13.0045 X Ex ia IIC T4 Ga Ex nA IIC T4 Gc |

| | | |
|--------------------------------|--|---|
| Notified Body Name | | Laboratoire Central des Industries Electriques (0081) |
| Notified Body's Address | | FONTENAY-AUX-ROSES (Head Office) 33, avenue du Général Leclerc FR- 92260 Fontenay-aux-Roses Tel. : + 33 1 40 95 60 60 Fax : + 33 1 40 95 86 56 |

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) Standard(s)

Place: Depew, NY **Date:** 07/02/2021

Signature:



Name:

Carrie Termin

Title: Regulatory Affairs and Product Certification Specialist



Certificado de Conformidade

Certificate of Compliance ♦ *Certificado de Conformidad*

Certificado nº: TÜV 12.2154

Certificate / Certificado nº

Revisão: 01

Review/Revisión

Válido até: 26/02/2019

Valid Until / Válido Hasta

Emitido em 26/02/2016

Issued / Emitido

Produto:

Product/Producto:

SENSOR DE VIBRAÇÃO

Serie EX 686B

Marca:

Mark/Marca:

PCB

Solicitante:

Applicant/Solicitante:

PCB Piezotronics Inc.

3425 Walden Avenue

14043 – Depew, NY - USA

Fabricante:

Manufacturer/Fabricante:

PCB Piezotronics Inc.

3425 Walden Avenue

14043 – Depew, NY - USA

Fornecedor / Representante Legal:

*Supplier/Legal Representative/Proveedor/
Representante Legal:*

Não aplicável.

Normas Técnicas / Regulamento:

Standards/Regulation/Normas/Reglamento:

ABNT NBR IEC 60079-0:2008;

ABNT NBR IEC 60079-11:2009;

Portaria INMETRO nº 179 de 18/05/2010.

Esquema de certificação:

Certification Scheme/Esquema de certificación

Modelo com Avaliação do Sistema de Gestão da Qualidade do

Fabricante e Ensaio no Produto, conforme cláusula 6.1 do

Regulamento de Avaliação da Conformidade, anexo à Portaria nº 179

do INMETRO, publicada em 18 de maio de 2010.

Laboratório, Nº do relatório de ensaios e data:

*Laboratory and test report Nº / date /
Laboratorio y Informe de Prueba nº / fecha:*

LCIE – Laboratoire Central des Industries Electriques.

LCIE nº 93796/586962 de 30/07/2010

Relatório de Auditoria e data:

Audit Report/ data/ Informe de Auditoria/ fecha:

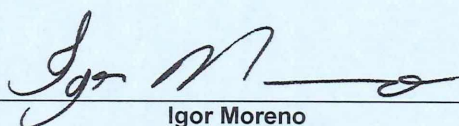
Auditoria realizada em 14/04/2016

Notas:

Notes/Anotación:

“A validade deste Certificado de Conformidade está atrelada à realização das avaliações de manutenção e tratamento de possíveis não conformidades de acordo com as orientações do OCP previstas no RAC específico. Para verificação da condição atualizada de regularidade deste Certificado de Conformidade deve ser consultado o banco de dados de produtos e serviços certificados do Inmetro”.

Este certificado está vinculado à proposta 0400112.0 de 21/11/2012.



Igor Moreno
Gerente de Certificação

Certification Manager / Gerente de Certificación

“Este documento é composto de 03 páginas e é válido quando exibido com todas as suas páginas. Demais informações e notas estão contidas nas páginas subsequentes.”



Certificado de Conformidade

Certificate of Compliance • Certificado de Conformidad

Certificado nº: **TÜV 12.2154**

Certificate / Certificado nº

Revisão: **01**

Review/Revisión

Válido até: **26/02/2019**

Valid Until / Válido Hasta

Emitido em **26/02/2016**

Issued / Emitido

Especificações:

O sensor de vibração modelo Ex 686B utiliza um cristal para converter a medição de vibração mecânica em um sinal elétrico.

O sensor é consiste de um invólucro metálico selado, no interior do invólucro está localizado o conjunto do cristal-piezo e o amplificador.

Característica elétrica:

Tensão: 12-30 Vcc
24-240 Vca

Análise e ensaios realizados:

As análises e os ensaios realizados encontram-se no relatório técnico nº TÜV 12.2154.

Documentação descritiva do produto:

– Relatório de ensaios nº 93796/586962 de 30/07/2010;

| Documento | Páginas | Descrição | Rev. | Data |
|-----------|---------|--|------|------------|
| 40112 | 36 | Operating Guide with Enclosed Warranty Information | C | - |
| 54943-1 | 1 | Approval Assembly models EX686B7X & EX686BXXXXXX6 | 0 | - |
| 54943-2 | 1 | Etching Drawing Models EX686B7X & EX686BXXXXXX6 | 0 | - |
| 54944-1 | 1 | Approval Assembly Model EX686BXXXXXXX | 0 | - |
| 54944-2 | 1 | Etching Drawing Models EX686BXXXXXXX | 0 | - |
| 44170-1 | 1 | Approval Assembly Model EX686BXXXXXXX | 0 | 10/06/2009 |
| 44170-2 | 1 | Etching Drawing Models EX686BXXXXXXX | 0 | 10/06/2009 |
| 44171-1 | 1 | Approval Assembly models EX686B7X & EX686BXXXXXX6 | 0 | 10/06/2009 |
| 44171-2 | 1 | Etching Drawing Models EX686B7X & EX686BXXXXXX6 | 0 | 10/06/2009 |
| 44999 | 2 | Technical File | 0 | - |
| 45000 | 1 | Descriptive Notice | 0 | - |
| 39481 | 5 | Approval Electrical Assembly and Schematic | 0 | 25/09/2008 |
| 39482 | 2 | Approval PC Board Assembly | 0 | 25/09/2008 |
| 41229 | 1 | Approval Radiator Drawing | 0 | - |
| 39484 | 1 | BI-Morph Sensor Assembly | 0 | 25/09/2008 |



Certificado de Conformidade

Certificate of Compliance • Certificado de Conformidad

Certificado nº: **TÜV 12.2154**

Certificate / Certificado nº

Revisão: **01**

Review/Revisión

Válido até: **26/02/2019**

Valid Until / Válido Hasta

Emitido em **26/02/2016**

Issued / Emitido

Marcação:

Os sensores de vibração modelos EX 686B foram aprovados nos ensaios e análises, nos termos das normas adotadas, devendo receber a marcação, levando-se em consideração o item observações.

Ex ic IIC T3 Gc
-54 °C ≤ T_a ≤ +85 °C

Observações:

1. Este certificado de conformidade é válido para os produtos de modelo e tipo idêntico ao protótipo ensaiado. Qualquer modificação de projeto ou utilização de componentes e materiais diferentes daqueles descritos na documentação deste processo, sem autorização prévia da TÜV Rheinland, invalidará o certificado.
2. É responsabilidade do fabricante assegurar que os produtos fabricados estejam de acordo com as especificações do protótipo ensaiado, através de inspeções visuais e dimensionais.
3. Os produtos devem ostentar, na sua superfície externa e em local visível, a Marca de Conformidade e as características técnicas da mesma de acordo com as especificações da ABNT NBR IEC 60079-0 / ABNT NBR IEC 60079-1 / ABNT NBR IEC 60079-11 e Regulamento de Avaliação da Conformidade, anexo à Portaria nº. 179 do INMETRO, publicada em 18 de Maio de 2010. Esta marcação deve ser legível e durável, levando-se em conta possível corrosão química.
4. As atividades de instalação, inspeção, manutenção, reparo, revisão e recuperação dos produtos são de responsabilidade do usuário e devem ser executadas de acordo com os requisitos das normas técnicas vigentes e com as recomendações do fabricante.

Natureza das revisões/Data

Nature of Reviews/Date

Naturaleza de las revisiones/Fecha

Revisão 00:

26/02/2013 – Certificação Inicial;

Revisão 01:

07/06/2016 – Revalidação.



Certificado de Conformidade

Certificate of Compliance + Certificado de Conformidad

Certificado nº: TÜV 12.2154

Certificate #/Certificado nº

Válido até: 26/02/2016

Validity Term/Fecha de Vencimiento

Produto:
Product/Producto

SENSOR DE VIBRAÇÃO

Tipo / Modelo:
Type - Model/Tipo - Modelo

SERIE EX 686B

Solicitante:
Applicant/Solicitante

**PCB Piezotronics Inc.
3425 Walden Avenue
14043 – Depew, NY - USA**

Fabricante:
Manufacturer/Fabricante

**PCB Piezotronics Inc.
3425 Walden Avenue
14043 – Depew, NY - USA**

Normas Técnicas:
Standards/Normas

ABNT NBR IEC 60079-0:2008, ABNT NBR IEC 60079-11:2009

Laboratório de Ensaio:
Testing Laboratory/Laboratorio de Ensayo

LCIE – Laboratoire Central des Industries Electriques

Nº do Relatório de Ensaio:
Test Report Number/Nº del informe de Ensayo

LCIE nº 93796/586962 de 30/07/2010

Observações:
Notes/Observaciones

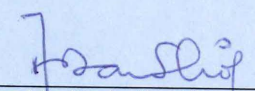
Certificado emitido com base no Modelo com Avaliação do Sistema de Gestão da Qualidade do Fabricante e Ensaio no Produto, conforme cláusula 6.1 do Regulamento de Avaliação da Conformidade, anexo à Portaria nº 179 do INMETRO, publicada em 18 de Maio de 2010

Portaria:
Governmental Regulation/Regulación Oficial

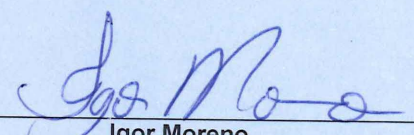
INMETRO nº 179 de 18/05/2010

Data de Emissão:
Date of issue/Fecha de Otorgamiento

São Paulo, 27 de Fevereiro de 2013.



Arnaldo Barbulio Filho
Executivo Sênior
Senior Executive/ Ejecutivo Senior



Igor Moreno
Gerente de Certificação
Certification Manager /Gerente de Certificación



Certificado de Conformidade

Certificate of Compliance + Certificado de Conformidad

Certificado nº: **TÜV 12.2154**

Certificate #/Certificado nº

Válido até: **26/02/2016**

Validity Term/Fecha de Vencimiento

Especificações:

O sensor de vibração modelo Ex 686B utiliza um cristal para converter a medição de vibração mecânica em um sinal elétrico.

O sensor é composto de um invólucro metálico selado, no interior do invólucro está localizado o conjunto do cristal-piezo e o amplificador.

Característica elétrica:

Tensão: 12-30 Vcc
24-240 Vca

Análise e ensaios realizados:

As análises e os ensaios realizados encontram-se no relatório técnico nº TÜV 12.2154.

Documentação descritiva do produto:

– Relatório de ensaios nº 93796/586962 de 30/07/2010;

| Documento | Páginas | Descrição | Rev. | Data |
|-----------|---------|--|------|------------|
| 40112 | 36 | Operating Guide with Enclosed Warranty Information | C | - |
| 54943-1 | 1 | Approval Assembly models EX686B7X & EX686BXXXXXX6 | 0 | - |
| 54943-2 | 1 | Etching Drawing Models EX686B7X & EX686BXXXXXX6 | 0 | - |
| 54944-1 | 1 | Approval Assembly Model EX686BXXXXXX | 0 | - |
| 54944-2 | 1 | Etching Drawing Models EX686BXXXXXX | 0 | - |
| 44170-1 | 1 | Approval Assembly Model EX686BXXXXXX | 0 | 10/06/2009 |
| 44170-2 | 1 | Etching Drawing Models EX686BXXXXXX | 0 | 10/06/2009 |
| 44171-1 | 1 | Approval Assembly models EX686B7X & EX686BXXXXXX6 | 0 | 10/06/2009 |
| 44171-2 | 1 | Etching Drawing Models EX686B7X & EX686BXXXXXX6 | 0 | 10/06/2009 |
| 44999 | 2 | Technical File | 0 | - |
| 45000 | 1 | Descriptive Notice | 0 | - |
| 39481 | 5 | Approval Electrical Assembly and Schematic | 0 | 25/09/2008 |
| 39482 | 2 | Approval PC Board Assembly | 0 | 25/09/2008 |
| 41229 | 1 | Approval Radiator Drawing | 0 | - |
| 39484 | 1 | BI-Morph Sensor Assembly | 0 | 25/09/2008 |



Certificado de Conformidade

Certificate of Compliance ♦ Certificado de Conformidad

Certificado nº: TÜV 12.2154

Certificate #/Certificado nº

Válido até: 26/02/2016

Validity Term/Fecha de Vencimiento

Marcação:

Os sensores de vibração modelos EX 686B foram aprovados nos ensaios e análises, nos termos das normas adotadas, devendo receber a marcação, levando-se em consideração o item observações.

Ex ic IIC T3 Gc
-54 °C ≤ T_a ≤ +85 °C

Observações:

1. Este certificado de conformidade é válido para os produtos de modelo e tipo idêntico ao protótipo ensaiado. Qualquer modificação de projeto ou utilização de componentes e materiais diferentes daqueles descritos na documentação deste processo, sem autorização prévia da TÜV Rheinland, invalidará o certificado.
2. É responsabilidade do fabricante assegurar que os produtos fabricados estejam de acordo com as especificações do protótipo ensaiado, através de inspeções visuais e dimensionais.
3. Os produtos devem ostentar, na sua superfície externa e em local visível, a Marca de Conformidade e as características técnicas da mesma de acordo com as especificações da ABNT NBR IEC 60079-0 / ABNT NBR IEC 60079-1 / ABNT NBR IEC 60079-11 e Regulamento de Avaliação da Conformidade, anexo à Portaria nº. 179 do INMETRO, publicada em 18 de Maio de 2010. Esta marcação deve ser legível e durável, levando-se em conta possível corrosão química.
4. As atividades de instalação, inspeção, manutenção, reparo, revisão e recuperação dos produtos são de responsabilidade do usuário e devem ser executadas de acordo com os requisitos das normas técnicas vigentes e com as recomendações do fabricante.

Histórico:

26/02/2013 – Certificação Inicial – Efetivação;



LCIE

1 **ATTESTATION D'EXAMEN DE TYPE VOLONTAIRE**

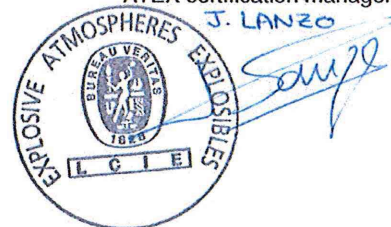
- 2 **Appareil** destiné à être utilisé en atmosphères explosibles (Directive 94/9/CE)
- 3 Numéro de l'attestation d'examen de type LCIE 10 ATEX 1008 X
- 4 Appareil
Capteur de vibrations
Type : EX686B series
- 5 Demandeur : PCB Piezotronics
Adresse : 3425 Walden Avenue
Depew, New York 14043 USA
- 7 Cet appareil et ses variantes éventuelles acceptées sont décrits dans l'annexe de la présente attestation et dans les documents descriptifs cités en référence.
- 8 Le LCIE certifie que cet appareil est conforme aux exigences essentielles de sécurité et de santé pour la conception d'appareils, électriques de catégorie 3 ou non électriques de catégorie 2 et 3, destinés à être utilisés en atmosphères explosibles, données dans l'annexe II de la directive 94/9/CE du Parlement européen et du Conseil du 23 mars 1994.
- Les résultats des vérifications et essais figurent dans le rapport confidentiel N° 93796/586962.
- 9 Le respect des exigences essentielles de sécurité et de santé est assuré par la conformité à :
- EN 60079-0 (2006)
- EN 60079-15 (2005)
- 10 Le signe X lorsqu'il est placé à la suite du numéro de l'attestation, indique que cet appareil est soumis aux conditions spéciales pour une utilisation sûre, mentionnées dans l'annexe de la présente attestation.
- 11 Cette attestation d'examen de type concerne uniquement la conception, les vérifications et essais de l'appareil de spécifié, conformément à l'annexe VIII la directive 94/9/CE. Des exigences supplémentaires de la directive sont applicables pour la fabrication et la fourniture de l'appareil. Ces dernières ne sont pas couvertes par la présente attestation.
- 12 Le marquage de l'appareil doit comporter les informations détaillées au point 15.

Fontenay-aux-Roses, le 9 août 2010

1 **VOLUNTARY TYPE EXAMINATION CERTIFICATE**

- 2 **Equipment** intended for use in potentially explosive atmospheres (Directive 94/9/EC)
- 3 Type Examination Certificate number LCIE 10 ATEX 1008 X
- 4 Equipment
Vibration sensors
Type : EX686B series
- 5 applicant : PCB Piezotronics
Address : 3425 Walden Avenue
Depew, New York 14043 USA
- 7 This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.
- 8 LCIE certifies that this equipment has been found to comply with the essential Health and Safety Requirements that relate to the design of equipment, of category 3 electrical or categories 2 and 3 non electrical, which is intended for use in potentially explosive atmospheres, given in Annex II of the Directive 94/9/EC of the European Parliament and Council of 23 March 1994.
- The examination and test results are recorded in confidential report N° 93796/586962.
- 9 Compliance with the Essential Health and Safety Requirements has been assured by reference to :
- EN 60079-0 (2006)
- EN 60079-15 (2005)
- 10 If the sign X is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.
- 11 This type examination certificate relates only to the design, examination and tests of this specified equipment, in accordance with annex VIII to the directive 94/9/EC. Further requirements of the Directive may apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.
- 12 The marking of the equipment shall include information as detailed at 15.

Le responsable de certification ATEX
ATEX certification manager



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The LCIE's liability applies only on the French text. This document may only be reproduced in its entirety and without any change



LCIE



13 ANNEXE

14 ATTESTATION D'EXAMEN DE TYPE VOLONTAIRE

LCIE 10 ATEX 1008 X

15 DESCRIPTION DE L'APPAREIL

Capteur de vibrations
Type : EX686B series

Le capteur de vibrations piézo-électrique utilise un cristal pour convertir une mesure de vibration mécanique en un signal électrique.

Le capteur est en une seule partie, consistant en une enveloppe métallique étanche, contenant un ensemble piézo-cristal et un amplificateur.

Paramètres spécifiques du ou des modes de protection concernés :

12-30VDC ou 24VDC/VAC-240VDC/VAC

Le marquage doit être :

Modèles EX686Bxxxxxx :

PCB Piezotronics Adresse : ...

Type : EX686Bxxxxxx (1)

Numéro de fabrication : ...

Date de fabrication : ...

Ex II 3G

Ex nL IIC T3

LCIE 10 ATEX 1008 X

T amb : -54°C à + 85°C

(1) complété avec le modèle

Modèles EX686B7xxxxxx et

EX686Byyyyyy6 :

PCB Piezotronics Adresse : ...

Type : EX686B7xxxxxx ou EX686Byyyyyy6 (1)

Numéro de fabrication : ...

Année de fabrication : ...

Ex II 3G

Ex nA II T3

LCIE 10 ATEX 1008 X

T amb : -54°C à + 85°C

(1) complété avec le modèle

L'appareil doit également comporter le marquage normalement prévu par les normes de construction qui le concerne.

16 DOCUMENTS DESCRIPTIFS

Dossier technique n° 44999 rév.NR du 16/12/09.

Ce document comprend 8 rubriques (16 pages).

17 CONDITIONS SPECIALES POUR UNE UTILISATION SÛRE

Température ambiante d'utilisation : -54°C à +85°C.

Le matériel ne doit être raccordé qu'à un équipement dont les paramètres électriques sont compatibles aux valeurs mentionnées au paragraphe 15.

13 SCHEDULE

14 VOLUNTARY TYPE EXAMINATION CERTIFICATE

LCIE 10 ATEX 1008 X

15 DESCRIPTION OF EQUIPMENT

Vibrations sensor
Type : EX686B series

The model piezoelectric vibration sensor utilize a crystal to convert a mechanical vibration measurement into an electric signal.

The sensor is 1-piece assembly, consisting of a sealed metal housing, containing the piezo-crystal assembly and the charge amplifier.

Specific parameters of the mode(s) of protection concerned :

12-30VDC or 24VDC/VAC-240VDC/VAC

The marking shall be :

Models EX686Bxxxxxx :

PCB Piezotronics Address : ...

Type : EX686Bxxxxxx (1)

Serial number : ...

Year of construction : ...

Ex II 3G

Ex nL IIC T3

LCIE 10 ATEX 1008 X

T amb : -54°C to + 85°C

(1) completed with the model

Models EX686B7xxxxxx and

EX686Byyyyyy6 :

PCB Piezotronics Adresse : ...

Type : EX686B7xxxxxx or EX686Byyyyyy6 (1)

Serial number : ...

Year of construction : ...

Ex II 3G

Ex nA II T3

LCIE 10 ATEX 1008 X

T amb : -54°C to + 85°C

(1) completed with the model

The equipment shall also bear the usual marking required by the manufacturing standards applying to such equipment.

16 DESCRIPTIVE DOCUMENTS

Technical file n° 44999 rev.NR dated 12/16/09.

This file includes 8 items (16 pages).

17 SPECIAL CONDITIONS FOR SAFE USE

Operating ambient temperature : -54°C to +85°C

The apparatus must be only connected to an equipment whose electrical parameters are compatible with the values mentioned clause 15.

MEg

11/20/09



LCIE

13 ANNEXE (suite)

14 ATTESTATION D'EXAMEN DE TYPE VOLONTAIRE

LCIE 10 ATEX 1008 X

18 EXIGENCES ESSENTIELLES DE SECURITE ET DE SANTE

Couvertes par les normes listées au point 9.

19 VERIFICATIONS ET ESSAIS INDIVIDUELS

Chaque appareil doit être soumis à un essai de rigidité diélectrique pendant 1 minute sous une tension sinusoïdale de 50 Hz et d'une valeur de 1500V appliquée entre les fils de raccordement et le corps de l'appareil.

20 CONDITIONS DE CERTIFICATION

Les détenteurs d'attestations d'examen de type doivent également satisfaire les exigences de contrôle de production telles que définies au paragraphe 5 de l'annexe VIII de la directive 94/9/CE.

13 SCHEDULE (continued)

14 VOLUNTARY TYPE EXAMINATION CERTIFICATE

LCIE 10 ATEX 1008 X

18 ESSENTIAL HEALTH AND SAFETY REQUIREMENTS

Covered by standards listed at 9.

19 ROUTINE VERIFICATIONS AND TESTS

Each apparatus must be submitted to a dielectric strength test during 1 minute, with a sine-shaped voltage at 50 Hz of 1500 V r.m.s. between the wires of the cable and the body of the apparatus.

20 CONDITIONS OF CERTIFICATION

Holders of type examination certificates are also required to comply with the production control requirements defined in paragraph 5 of annex VIII of directive 94/9/EC.

641

11/18



Certificate of Compliance

Certificate: 2033214

Master Contract: 184981

Project: 80020282

Date Issued: 2019-12-19

Issued To: PCB Piezotronics
3425 Walden Ave
Depew, New York, 14043
United States

Attention: Carrie Termin

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.



Issued by: *Thong Tong*
Thong Tong

PRODUCTS

CLASS - C225803 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe and Non Incendive Systems - For Hazardous Locations

CLASS - C225883 - PROCESS CONTROL EQUIPMENT-Intrinsically Safe and Non-Incendive Systems-For Hazardous Locations-Certified to U.S. Standards

Ex nL IIC T3:

AEx nA IIC T3:

Class I, Div. 2, Groups A, B, C, D:

Models EX686X0x Vibration Sensors, input rated 12-30 Vdc max, 1 mA consumption, 100 mA max. flow-through; non-incendive with entity parameters of: U_i (V max) = 30V, I_i (I max) = 100mA, P_i (Pmax) = 1W, C_i = 0, L_i = 28 uH; when installed per installation Dwg 39483; Temp Code T3 @ Max Ambient 85 Deg C.

Models EX686X1y and EX686X6y Vibration Sensors, input rated 12-30 Vdc max, 1 mA consumption, 100 mA max. flow-through; non-incendive with entity parameters of: U_i (V max) = 30V, I_i (I max) = 100mA, P_i (Pmax)



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Project: 80020282

Master Contract: 184981
Date Issued: 2019-12-19

= 1W, Ci = 61 nF, Li = 333 μ H; when installed per installation Dwg 39483; Temp Code T3 @ Max Ambient 85 Deg C.

Notes:

1. For Canadian Installations, sensor case must be bonded to ground according to Section 18 of the CEC, Part 1.
2. For US Installations, sensor case must be bonded to ground according to Articles 501 and 505 of the NEC.
3. Letter X following product identifier number EX686 may be a capital letter from B to Z denoting Model revision level for minor revisions restricted to changes of values of capacitors and resistors within the approval limits specified on control drawing 39481 page 1 and 2. The "x" or "y" in the model code may be a number from 0 thru 9 which denotes variations in frequency response, sensitivity, and mounting configuration of the sensors.
4. An alphanumeric code (-XXXXX) following the Model Number indicates cable length and termination. Cable length not to exceed 304.5m (999ft).

CLASS 2258 02 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations

CLASS 2258 82 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations - CERTIFIED TO U.S. STANDARDS

4.

Ex nA IICT3:

AEx nA IIC T3:

Class I, Div. 2, Groups A, B, C, D:

Models EX686X7x Vibration Sensors, input rated 24-240 Vdc, 1 mA consumption, 500 mA max. flow-through; 24-240 Vac, 50/60 Hz, 1 mA consumption, 500 mA max. flow-through; suitable for use in Class I, Div. 2 or Class I, Zone 2 locations, when installed per installation Dwg 39486; Temp Code T3 @ Max Ambient 85 Deg C.

Models EX686Xyyyyyy6 Vibration Sensors, input rated 24-240 Vdc, 1 mA consumption, 500 mA max. flow-through; 24-240 Vac, 50/60 Hz, 1 mA consumption, 500 mA max. flow-through; suitable for use in Class I, Div. 2 or Class I, Zone 2 locations, when installed per installation Dwg 39486; Temp Code T3 @ Max Ambient 85 Deg C.

Notes:

1. Sensor must be installed in a suitable enclosure, acceptable to the local inspection authority having jurisdiction.
2. Letter X following product identifier number EX686 may be a capital letter from B to Z denoting Model revision level for minor revisions restricted to changes of values of capacitors and resistors within the approval limits specified on control drawing 39481 page 1 and 2. The "x" in the model code may be a number from 0 thru 9 which denotes variations in frequency response, sensitivity, and mounting configuration of the sensors.



Certificate: 2033214
Project: 80020282

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Date Issued: 2019-12-19

3. An alphanumeric code (-XXXXX) following the Model Number indicates cable length and termination. Cable length not to exceed 304.5m (999ft).
4. The “yyyyy” in the model code may be a number from 0 thru 9 which denotes variations in frequency response, sensitivity, and mounting configuration of the sensors.

APPLICABLE REQUIREMENTS

| | | |
|-------------------------------|---|---|
| CAN/CSA-C22.2 No. 0-M91 | - | General Requirements – Canadian Electrical Code, Part II |
| C22.2 No. 142-M1987 | - | Process Control Equipment |
| C22.2 No. 213-M1987 | - | Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations |
| UL 916 (3 rd Ed.) | - | Energy Management Equipment |
| UL 1604 (3 rd Ed.) | - | Electrical Equipment for Use in Class I and II, Division 2; Class III Hazardous (Classified) Locations |
| ANSI/ISA 12.12.01-2007 | - | Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations |
| CAN/CSA-E60079-15:02 | - | Electrical apparatus for explosive gas atmospheres - Part 15: Type of Protection "n" |
| ANSI/UL 60079-15:02 | - | Electrical apparatus for Explosive Gas Atmospheres - Part 15: Type of Protection “n” |

MARKINGS

The manufacturer is required to apply the following markings:

- Products shall be marked with the markings specified by the particular product standard.
- Products certified for Canada shall have all Caution and Warning markings in both English and French.

Additional bilingual markings not covered by the product standard(s) may be required by the Authorities Having Jurisdiction. It is the responsibility of the manufacturer to provide and apply these additional markings, where applicable, in accordance with the requirements of those authorities.

The products listed are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US (indicating that products have been manufactured to the requirements of both Canadian and U.S. Standards) or with adjacent indicator 'US' for US only or without either indicator for Canada only.

Markings are etched directly into the Sensor enclosure body. The following marking details appear:

Div. 2 Non-Incendive models

- CSA Monogram with C US indicator.



Certificate: 2033214
Project: 80020282

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- Submitter Identification
- Model Number
- Serial Number, Date Code or Month and Year of Manufacture
- Electrical Rating
- Hazardous Location Designation (ie Ex nL IICT4, AEx nA IICT4, Class I, Div. 2, Groups A, B, C and D)
(In addition to these required markings, the following optional markings may also appear: Class I, Zone 2, Group IIC, T4)
- Certificate # reference (ie. 2008 2033214)
- "WARNING – EXPLOSION HAZARD. DO NOT CONNECT OR DISCONNECT WHEN ENERGIZED." or equivalent.
- "AVERTISSEMENT – RISQUE D'EXPLOSION. NE PAS BRANCHER NI DÉBRANCHER SOUS TENSION." or equivalent.

Div. 2 Non-arcing models (.....X7x)

- CSA Monogram with C US indicator.
- Submitter Identification
- Model Number
- Serial Number, Date Code or Month and Year of Manufacture
- Electrical Rating
- Hazardous Location Designation (ie Ex nA IIC T3, AExnA IICT3, Class I, Div. 2, Groups A, B, C and D)
(In addition to these required markings, the following optional markings may also appear: Class I, Zone 2, Group IIC, T3)
- Certificate # reference (ie. 2008 2033214 X)
- "WARNING – EXPLOSION HAZARD. DO NOT CONNECT OR DISCONNECT WHEN ENERGIZED." or equivalent.
- "AVERTISSEMENT – RISQUE D'EXPLOSION. NE PAS BRANCHER NI DÉBRANCHER SOUS TENSION." or equivalent.

ALTERATIONS

1. Markings as above appear.
2. Internal wiring is rated for temperatures of 200 Deg. C.



Supplement to Certificate of Compliance

Certificate: 2033214

Master Contract: 184981

*The products listed, including the latest revision described below,
are eligible to be marked in accordance with the referenced Certificate.*

Product Certification History

| Project | Date | Description |
|----------------|-------------|---|
| 80020282 | 2019-12-19 | Update to CSA report 2033214 to change Model EX686B to EX686X to allow minor modifications. |
| 0002033214 | 2008-09-25 | Model EX686B Series Vibration sensors for Class I, Div. 2, and Zone 2 hazardous locations - North America |

СЕРТИФИКАТ СООТВЕТСТВИЯ



№ ЕАЭС RU C-US.AA87.B.00217/19



Серия RU № 0124866

ОРГАН ПО СЕРТИФИКАЦИИ Орган по сертификации взрывозащищенного и рудничного оборудования (ОС ЦСВЭ) Общества с ограниченной ответственностью «Центр по сертификации взрывозащищенного и рудничного оборудования» (ООО «НАНИО ЦСВЭ»). Адрес места нахождения юридического лица: Россия, 140004, Московская область, Люберецкий район, город Люберцы, поселок ВУГИ, АО «Завод «ЭКОМАШ», литера В, Объект 6, этаж 3, офис 26. Адрес места осуществления деятельности в области аккредитации: Россия, 140004, Московская область, Люберецкий район, город Люберцы, поселок ВУГИ, АО «Завод «ЭКОМАШ», Литера В, Объект 6, этаж 3, офисы 26/3, 26/4, 26/5, 27/6, 30/1, 32. Аттестат № RA.RU.11AA87 от 20.07.2015 г. Телефон: +7 (495) 558-83-53, +7 (495) 558-82-44. Адрес электронной почты: ccve@ccve.ru

ЗАЯВИТЕЛЬ Общество с ограниченной ответственностью «Альфатех». Адрес места нахождения юридического лица: Россия, 125009, Москва, Малый Гнезниковский переулок, дом № 12, помещение I, комната 4. Адрес места осуществления деятельности: Россия, 127495, Москва, Долгопрудненское шоссе, дом № 3, Технопарк «Физтехпарк». ОГРН: 1167746393792. Телефон: +7 (495) 642-49-14. Адрес электронной почты: info@alphatechgroup.ru

ИЗГОТОВИТЕЛЬ PCB Piezotronics, Inc Адрес места нахождения юридического лица и адрес места осуществления деятельности по изготовлению продукции: 3425 Walden Av., Depew, NY 14043, США

ПРОДУКЦИЯ Пьезоэлектрические преобразователи, вибропереключатели, предусилители с Ex-маркировкой согласно приложению (см. бланки №№ 0621345, 0621346, 0621347). Документы, в соответствии с которыми изготовлены изделия – см. приложение, бланк № 0621344. Серийный выпуск.

КОД ТН ВЭД ЕАЭС 9031 80 3800, 9026 20 2000, 8517 69 9000

СООТВЕТСТВУЕТ ТРЕБОВАНИЯМ ТР ТС 012/2011 «О безопасности оборудования для работы во взрывоопасных средах».

СЕРТИФИКАТ СООТВЕТСТВИЯ ВЫДАН НА ОСНОВАНИИ Протокола испытаний № 235.2019-Т от 11.09.2019 Испытательной лаборатории технических устройств Автономной некоммерческой организации «Национальный испытательный и научно-исследовательский институт оборудования для взрывоопасных сред» ИЛ Ex TU (аттестат № РОСС RU.0001.21MШ19 от 16.10.2015); Акта анализа состояния производства № 35-А/19 от 14.03.2019 Органа по сертификации взрывозащищенного и рудничного оборудования (ОС ЦСВЭ) Общества с ограниченной ответственностью «Центр по сертификации взрывозащищенного и рудничного оборудования» (ООО «НАНИО ЦСВЭ») (аттестат № RA.RU.11AA87 выдан 20.07.2015); Документов, представленных заявителем в качестве доказательства соответствия продукции требованиям ТР ТС 012/2011 (см. приложение, бланк № 0621344). Схема сертификации – 1с.

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ Перечень стандартов, применяемых на добровольной основе для соблюдения требований ТР ТС 012/2011 (см. приложение, бланк № 0621344). Условия и срок хранения указаны в эксплуатационной документации. Назначенный срок службы – 10 лет.

СРОК ДЕЙСТВИЯ С 13.09.2019 ПО 12.09.2024 ВКЛЮЧИТЕЛЬНО

Руководитель (уполномоченное лицо) органа по сертификации

(подпись)

Залогин Александр Сергеевич

(Ф.И.О.)

Эксперт (эксперт-аудитор) (эксперты (эксперты-аудиторы))

(подпись)

М.П. Рафалович Борис Александрович

(Ф.И.О.)



ПРИЛОЖЕНИЕ

К СЕРТИФИКАТУ СООТВЕТСТВИЯ № ЕАЭС RU C-US.AA87.B.00217/19 Лист 1

Серия **RU** № **0621344**

**I. ПЕРЕЧЕНЬ СТАНДАРТОВ, ПРИМЕНЯЕМЫХ НА ДОБРОВОЛЬНОЙ ОСНОВЕ
ДЛЯ СОБЛЮДЕНИЯ ТРЕБОВАНИЙ ТР ТС 012/2011 «О БЕЗОПАСНОСТИ ОБОРУДОВАНИЯ
ДЛЯ РАБОТЫ ВО ВЗРЫВООПАСНЫХ СРЕДАХ»**

| Обозначение стандартов | Наименование стандартов |
|--|--|
| ГОСТ 31610.0-2014 (IEC 60079-0:2011) | Взрывоопасные среды. Часть 0. Оборудование. Общие требования |
| ГОСТ IEC 60079-1-2011 | Взрывоопасные среды. Часть 1. Оборудование с видом взрывозащиты «взрывонепроницаемые оболочки «d» |
| ГОСТ 31610.11-2014 (IEC 60079-11:2011) | Взрывоопасные среды. Часть 11. Оборудование с видом взрывозащиты «искробезопасная электрическая цепь «i» |
| ГОСТ 31610.15-2012/МЭК 60079-15:2005 | Электрооборудование для взрывоопасных газовых сред. Часть 15. Конструкция, испытания и маркировка электрооборудования с видом защиты «п» |

**II. ДОКУМЕНТЫ, ПРЕДСТАВЛЕННЫЕ ЗАЯВИТЕЛЕМ В КАЧЕСТВЕ ДОКАЗАТЕЛЬСТВА
СООТВЕТСТВИЯ ПРОДУКЦИИ ТРЕБОВАНИЯМ ТР ТС 012/2011**

Руководства по эксплуатации: № 750119 от 23.01.19, № 830119 от 23.01.19, № 940219 от 07.02.19, № 630119 от 22.01.19, № 610119 от 22.01.19, № 910219 от 07.02.19, № 950219 от 08.02.19, № 970219 от 08.02.19.
Технические файлы: № 54202 от 02.02.2017, № 54204 от 02.02.2017, № 22438 С от 19.07.2012, № 62501 от 06.10.2016, № 33699 от 16.06.2016, № 56178 от 01.07.2016, № 70893 от 24.07.2019, № 54707 от 10.08.2016, № 48813 от 06.01.2011
Чертежи: № 47912 от 31.03.2017, № 49038 от 31.03.2017.
Перечень стандартов см. п. I.

III. ДОКУМЕНТЫ, В СООТВЕТСТВИИ С КОТОРЫМИ ИЗГОТОВЛЕНА ПРОДУКЦИЯ

Технические файлы: № 54202 от 02.02.2017, № 54204 от 02.02.2017, № 22438 С от 19.07.2012, № 62501 от 06.10.2016, № 33699 от 16.06.2016, № 56178 от 01.07.2016, № 70893 от 24.07.2019, № 54707 от 10.08.2016, № 48813 от 06.01.2011
Чертежи: № 47912 от 31.03.2017, № 49038 от 31.03.2017

Руководитель (уполномоченное
лицо) органа по сертификации

(подпись)

Эксперт (эксперт-аудитор)
(эксперты (эксперты-аудиторы))

(подпись)



Залогин Александр Сергеевич
(Ф.И.О.)

М.П.

Рафалович Борис Александрович
(Ф.И.О.)

ПРИЛОЖЕНИЕ

К СЕРТИФИКАТУ СООТВЕТСТВИЯ № ЕАЭС RU C-US.AA87.B.00217/19 Лист 2

Серия RU № 0621345

1. НАЗНАЧЕНИЕ И ОБЛАСТЬ ПРИМЕНЕНИЯ

Пьезоэлектрические преобразователи (далее – преобразователи) предназначены для контроля параметров вибрации, динамического давления и преобразования их в электрический сигнал.

Вибропереключатели предназначены для контроля уровня вибрации и защиты оборудования от повышенной вибрации.

Предусилители предназначены для преобразования зарядового сигнала в вольтовый.

Область применения - взрывоопасные зоны помещений и наружных установок согласно Ex-маркировке, ГОСТ IEC 60079-14-2013, регламентирующих применение во взрывоопасных средах.

2. СТРУКТУРНОЕ ОБОЗНАЧЕНИЕ

2.1. Преобразователи 176ХУУ/МZZZ-АА

X = от А до Z ревизия продукта, не влияющая на взрывозащиту

УУ = от 01 до 99 для индикации вариантов монтажа, диафрагмы, кабелей или разъемов

M = опционально для указания метрической длины кабеля

ZZZ = от 001 до 999 опционально для указания длины кабеля в футах: (не более 200 футов) или метрах: (не более 61 м)

AA = от 01 до 99 опционально для указания дробной длины кабеля в дюймах или сантиметрах, не влияющей на взрывозащиту

2.2. Преобразователи 351abcd

a – ревизия продукта, может быть: А,В,С,Д,Е,Ф,Г,Н,І,Ј,К,Л или М, не влияющая на взрывозащиту

b – первая цифра вариации продукта, может быть: 0,1,2,3,4,5,6,7,8 или 9, не влияющая на взрывозащиту

c – вторая цифра вариации продукта, может быть: 0,1,2,3,4,5,6,7,8 или 9, не влияющая на взрывозащиту

d – третья цифра вариации продукта, может быть: 0,1,2,3,4,5,6,7,8,9 или отсутствует, не влияющая на взрывозащиту

2.3 Преобразователи EX(TO)(M)602yzzz1aaa, EX(TO)(M)603yzzz/aaa, EX(TO)(M)606yzzz/aaa, EX(TO)(M)607yzzz/aaa, EX(TO)(M)608yzzz/aaa, EX(M)637XYYYZ, (M)638XYYYZ

XX = TO (с температурным выходом), M (с метрической резьбой),

y = одна буква от А до Z, не влияющая на взрывозащиту

zzz = две или три цифры от 00 до 999, не влияющие на взрывозащиту

aaa = длина кабеля и/или тип разъема

2.4 Предусилители EX682XYYY

X – ревизия продукта (А,В ... М), не влияющая на взрывозащиту

YYY: параметры фильтрации, усиления, частотная характеристика, ... (от 1 до 999), не влияющие на взрывозащиту

2.5 Преобразователи EX(RV)(TO)(M)64хухх, EX(RV)(TO)(M)649ухх, EX (RV)(TO) (M)686ухх

XX = M (с метрической резьбой), TO (с температурным выходом), RV (с доп. вольтовым выходом).

Буквы х являются переменными цифрами (значения от 0 до 9), не влияющими на взрывозащиту

y = одна буква от А до Z, не влияющая на взрывозащиту

2.6 Преобразователи EX (XX) 622yzzz / aaa, EX (XX) 623yzzz / aaa, EX (XX) 625yzzz / aaa, EX (XX) 628yzzz / aaa

XX = HT (Высокотемпературная версия), M (с метрической резьбой), TO (с температурным выходом), VO (с выходом по скорости).

y = одна буква от А до Z, не влияющая на взрывозащиту

zzz = две или три цифры от 00 до 999, не влияющие на взрывозащиту

aaa = длина кабеля и/или тип разъема

2.7 Вибропереключатели 685ухх

Буквы х являются переменными цифрами (значения от 0 до 9), не влияющими на взрывозащиту

y = одна буква от А до Z, не влияющая на взрывозащиту

Руководитель (уполномоченное
лицо) органа по сертификации

(подпись)

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ПРИЛОЖЕНИЕ

К СЕРТИФИКАТУ СООТВЕТСТВИЯ № ЕАЭС RU C-US.AA87.B.00217/19 Лист 3

Серия **RU** № **0621346**

3. ОСНОВНЫЕ ТЕХНИЧЕСКИЕ ДАННЫЕ

| | |
|--|---|
| 3.1. Ех-маркировка: преобразователей 176XYU/MZZ-AA | 0Ex ia IIC T660°C...T6 Ga X |
| преобразователей 351abcd | 0Ex ia IIC T4 Ga X |
| вибропереключателей 685yxx | 1Ex d IIB+H ₂ T4 Gb |
| преобразователей EX(TO)(M)602yzzz1aaa, EX(TO)(M)603yzzz/aaa, EX(TO)(M)606yzzz/aaa, EX(TO)(M)607yzzz/aaa, EX(TO)(M)608yzzz/aaa | 2Ex nA IIC T4 Gc X или 0Ex ia IIC T4 Ga X |
| преобразователей EX(M)637XYUZY, (M)638XYUZY | 0Ex ia IIC T4 Ga X или 2Ex nA IIC T4 Gc X |
| предусилителей EX682XYUZY | 0Ex ia IIC T4 Ga X или 2Ex nA IIC T4 Gc X |
| EX(RV)(TO)(M)64хyxx, EX(RV)(TO)(M)649yxx, EX (RV)(TO) (M)686yxx | 1Ex d IIC T4 Gb X или 1Ex d IIC T3 Gb X |
| преобразователей EX (XX) 622yzzz / aaa, EX (XX) 623yzzz / aaa, EX (XX) 625yzzz / aaa , EX (XX) 628yzzz / aaa | 2Ex nA IIC T4 Gc X |
| 3.2. Диапазон температур окружающей среды, °С, преобразователей 176XYU/MZZ-AA | от -70 до 650 |
| преобразователей 351abcd | от -196 до 121 |
| вибропереключателей 685yxx | от -25 до 60 |
| преобразователей EX(TO)(M)602yzzz1aaa, EX(TO)(M)603yzzz/aaa, EX(TO)(M)606yzzz/aaa, EX(TO)(M)607yzzz/aaa, EX(TO)(M)608yzzz/aaa | от -54 до 121 |
| преобразователей EX(M)637XYUZY, (M)638XYUZY | от -196 до 121 |
| предусилителей EX682XYUZY | от -40 до 85 |
| преобразователей EX(RV)(TO)(M)64хyxx, EX(RV)(TO)(M)649yxx, EX (RV)(TO) (M)686yxx | от -20 до 80 |
| преобразователей EX (XX) 622yzzz / aaa, EX (XX) 623yzzz / aaa, EX (XX) 625yzzz / aaa , EX (XX) 628yzzz / aaa | от -54 до 121 |

3.3. Входные искробезопасные электрические параметры преобразователей, предусилителей:

| Модель | U _i , В | I _i , мА | P _i , Вт | C _i , нФ | L _i , мГн |
|---|--------------------|---------------------|---------------------|------------------------------|--|
| преобразователей 176XYU/MZZ-AA | 30 | 300 | 1 | 5 | 0,5 |
| преобразователей 351abcd | 28 | 200 | 1,2 | 61 | 305 мкГн |
| преобразователей EX(TO)(M)602yzzz1aaa, EX(TO)(M)603yzzz/aaa, EX(TO)(M)606yzzz/aaa, EX(TO)(M)607yzzz/aaa, EX(TO)(M)608yzzz/aaa | 28 | 200 | 1 | 16,2 или 77,2 (с кабелем) | пренебрежимо мала или 305 мкГн (с учетом кабеля 305м) |
| преобразователей EX(M)637XYUZY, (M)638XYUZY | 28 | 93 | 0,65 | 6,5 | пренебрежимо мала |
| предусилителей EX682XYUZY | 28 | 100 | 0,7 | пренебрежимо мала | пренебрежимо мала |

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ПРИЛОЖЕНИЕ

К СЕРТИФИКАТУ СООТВЕТСТВИЯ № ЕАЭС RU C-US.AA87.B.00217/19 Лист 4

Серия **RU** № **0621347**

3.4. Электрические параметры:

3.4.1 вибропереключателей 685ухх

Напряжение питания, В 85-245 (AC), 24 (DC)
 Максимальный ток, mA 150

3.4.2 преобразователей EX(TO)(M)602yzzz/aaa, EX(TO)(M)603yzzz/aaa, EX(TO)(M)606yzzz/aaa, EX(TO)(M)607yzzz/aaa, EX(TO)(M)608yzzz/aaa, EX (XX) 622yzzz / aaa, EX (XX) 623yzzz / aaa, EX (XX) 625yzzz / aaa, EX (XX) 628yzzz / aaa

с Ex-маркировкой 2Ex nA IIC T4 Gc X:

Напряжение питания, В 28
 Максимальный ток, mA 200
 Мощность, Вт 1

3.4.3 преобразователей EX(M)637XYYYZ, (M)638XYYYZ

Напряжение питания, В 18 – 28
 Максимальный ток, mA 1,6 – 20
 Мощность, Вт 0,5

3.4.4 Предусилителей EX682XYYY

Напряжение питания, В 22 – 28
 Максимальный ток, mA 3,1 – 4,1
 Мощность, Вт 0,1

3.4.5 преобразователей EX(RV)(TO)(M)64уххх, EX(RV)(TO)(M)649ухх, EX (RV)(TO) (M)686ухх

Напряжение питания, В 18 – 30
 Максимальный ток, mA 1,6 – 20
 Мощность, Вт 0,5

4. ОПИСАНИЕ КОНСТРУКЦИИ И СРЕДСТВ ОБЕСПЕЧЕНИЯ ВЗРЫВОЗАЩИЩЕННОСТИ

Преобразователи состоят из герметичного цилиндрического металлического корпуса, в котором размещается печатная плата и пьезокристаллический элемент. Сборка подключается к разъему или встроенному кабелю. На наружной поверхности корпуса преобразователя нанесена маркировка.

Вибропереключатели серии 685ухх выполнены в металлическом корпусе, внутри которого размещена электронная плата. На наружной поверхности корпуса нанесена маркировка.

Предусилители серии EX682XYYY выполнены в прямоугольном пластиковом корпусе с креплением на DIN рейку. Внутри корпуса размещена электронная плата. На корпусе размещен съемный клеммный блок. На наружной поверхности корпуса нанесена маркировка.

Подробное описание конструкции приведено в Руководствах по эксплуатации №750119 от 23.01.19, №830119 от 23.01.19, №940219 от 07.02.19, №630119 от 22.01.19, №610119 от 22.01.19, №910219 от 07.02.19, №950219 от 08.02.19, №970219 от 08.02.19

Взрывозащищенность преобразователей, вибропереключателей и предусилителей обеспечивается выполнением требований: ГОСТ 31610.15-2012/МЭК 60079-15:2005, ГОСТ 31610.0-2014 (IEC 60079-0:2011), ГОСТ IEC 60079-1-2011, ГОСТ 31610.11-2014 (IEC 60079-11:2011), в соответствии с Ex-маркировкой.

5. МАРКИРОВКА

Маркировка, наносимая на преобразователи, вибропереключатели и предусилители, включает следующие данные:

- товарный знак или наименование предприятия-изготовителя;
- серийный номер или номер партии;
- диапазон значений температур окружающей среды при эксплуатации;
- Ex-маркировку;
- специальный знак взрывобезопасности;
- наименование центра по сертификации и номер сертификата;
- предупредительные надписи;
- искробезопасные параметры

и другие данные, которые изготовитель должен отразить в маркировке, в соответствии с требованиями нормативной и технической документации.

6. СПЕЦИАЛЬНЫЕ УСЛОВИЯ ПРИМЕНЕНИЯ

5.1 Знак X, стоящий после Ex-маркировки, означает, что при эксплуатации преобразователей, вибропереключателей, предусилителей необходимо соблюдать следующие специальные условия:

- преобразователи, вибропереключатели, предусилители должны быть подключены к сертифицированному на соответствие требованиям ТР ТС 012/2011 источнику питания с соответствующей областью применения.

5.2 Свободные концы постоянно подсоединенного кабеля должны подключаться в сертифицированной на соответствие требованиям ТР ТС 012/2011 соединительной коробке или вне взрывоопасной зоны.

Специальные условия применения, обозначенные знаком X, отражены в сопроводительной документации, подлежащей обязательной поставке в комплекте с каждым изделием.

Внесение изменений в конструкцию изделий возможно только по согласованию с ОС ЦСВЭ в соответствии с требованиями ТР ТС 012/2011.

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