Repair and Maintenance

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

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

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

Calibration

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

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

Returning Equipment

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

Contact Information

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

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

Safety Considerations

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

Discontinue use and contact our 24-Hour Sensorline if:

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

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

Definition of Terms and Symbols

The following symbols may be used in this manual:

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

CAUTION
Refers to hazards that could damage the instrument.

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

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

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

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

This symbol indicates safety, earth ground.

PCB工业监视和测量设备 - 中国RoHS2公布表

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

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

CHINA RoHS COMPLIANCE

Component Name	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Chromium VI Compounds (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	O	O	O	O	O	O
PCB Board	X	O	O	O	O	O
Electrical Connectors	O	O	O	O	O	O
Piezoelectric Crystals	X	O	O	O	O	O
Epoxy	O	O	O	O	O	O
Teflon	O	O	O	O	O	O
Electronics	O	O	O	O	O	O
Thick Film Substrate	O	O	X	O	O	O
Wires	O	O	O	O	O	O
Cables	X	O	O	O	O	O
Plastic	O	O	O	O	O	O
Solder	X	O	O	O	O	O
Copper Alloy/Brass	X	O	O	O	O	O
This table is prepared in accordance with the provisions of SJ/T 11364.						
O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.						
X: Indicates that said hazardous substance contained in at least one of the homogeneous materials for this part is above the limit requirement of GB/T 26572. Lead is present due to allowed exemption in Annex III or Annex IV of the European RoHS Directive 2011/65/EU.						

IMI SENSORS
A PCB PIEZOTRONICS DIV.

600A29 USB Programming Kit for 686-Series Smart Vibration Switch

Operating Guide with Enclosed Warranty Information

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MANUAL NUMBER: 74537
MANUAL REVISION: NR
ECO NUMBER: 51575

Table of Contents

Introduction

The 686-Series Smart Vibration Switch comes factory-programmed. The Smart Switch parameters are user-adjustable with Model 600A29 USB 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).

General Features

- Programmable features
    - o Alarm threshold level
    - o Normally Open (NO) or Normally Closed (NC) relay
    - o Latching or non-latching relay
    - o Delays
        - ▪ Power on
        - ▪ Startup
        - ▪ Operational
    - o Residual vibration level
- Magnetically Adjustable Vibration Threshold (MAVT™).

o

Programming Software

The software includes both the drivers and user interface needed for programming the Smart Switch. The provided software (Model EE225) must be installed prior to connecting the Smart Switch to the computer using the USB programmer cable. 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. Model EE225 is also available online at www.pcb.com.

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.
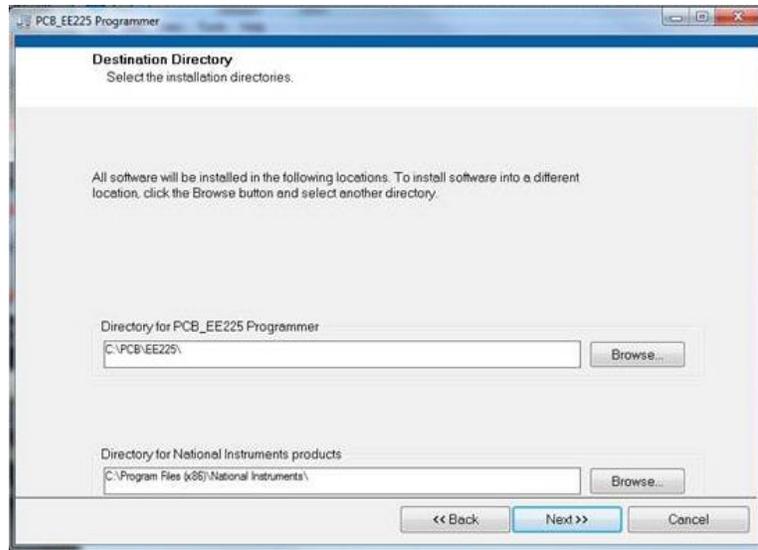
Figure 1 – Install Location Screen

Figure 2 – National Instruments Software License Agreement
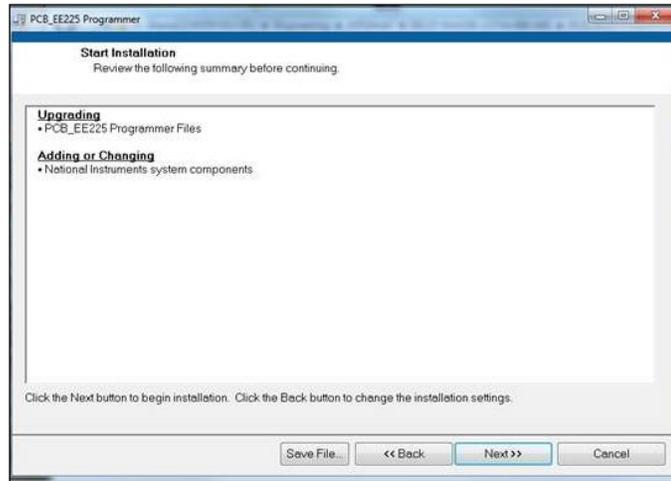
Figure 3 – Installation Verification Screen
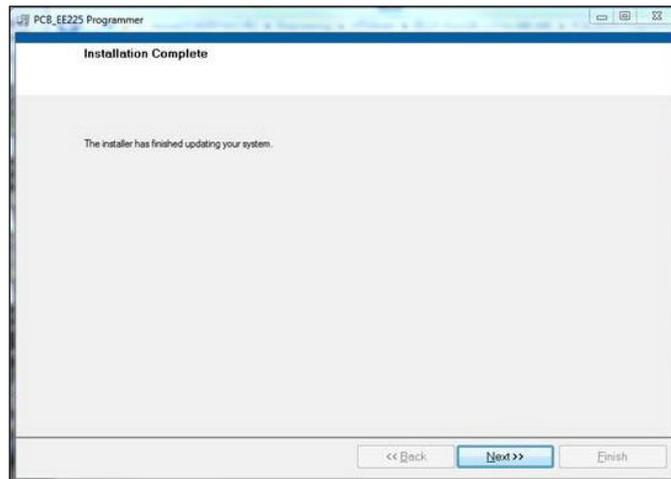
Figure 4 – Installation Complete Screen

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

Figure 5 – 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 6 – 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…".
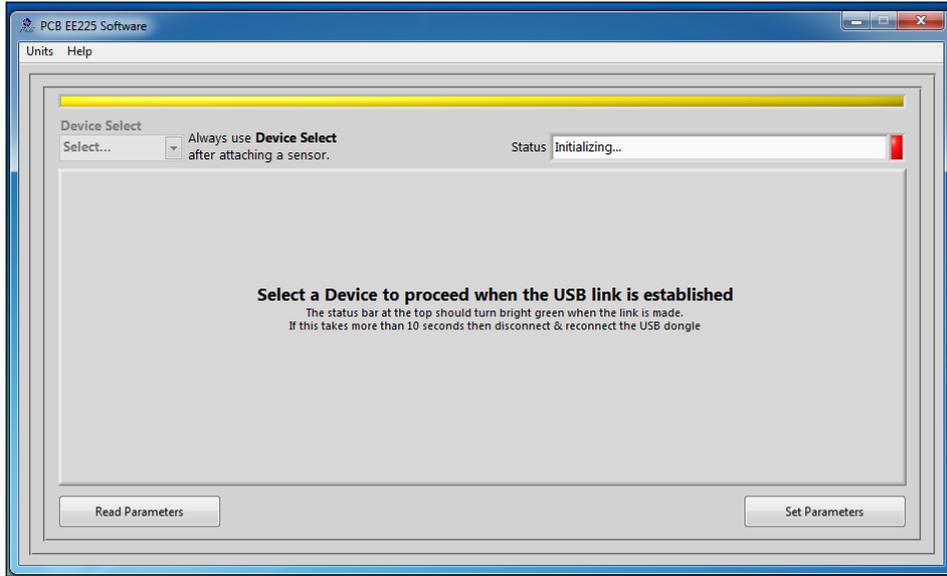
Figure 7 – Software While Connecting to USB Programmer Cable

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.
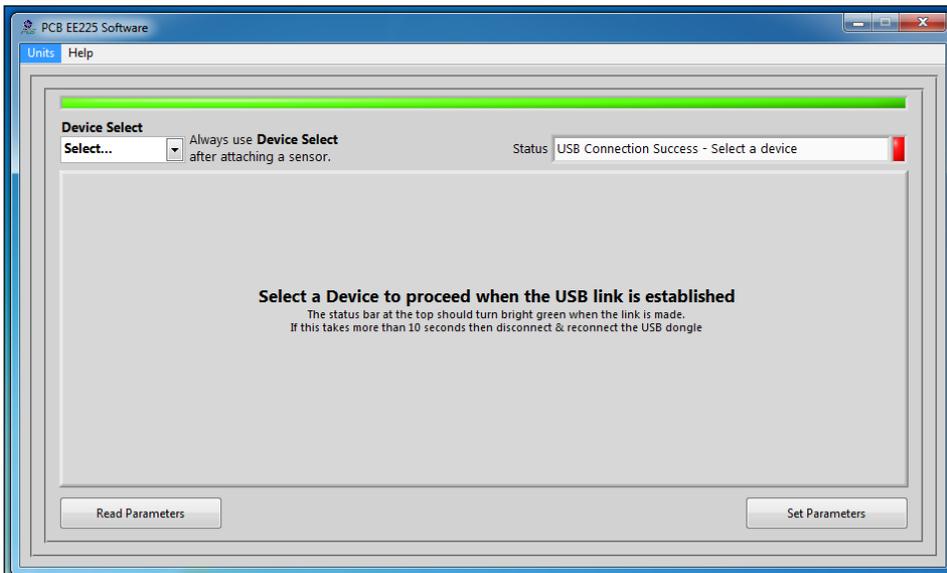
Figure 8 – Software After Connecting to USB Programmer Cable

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.
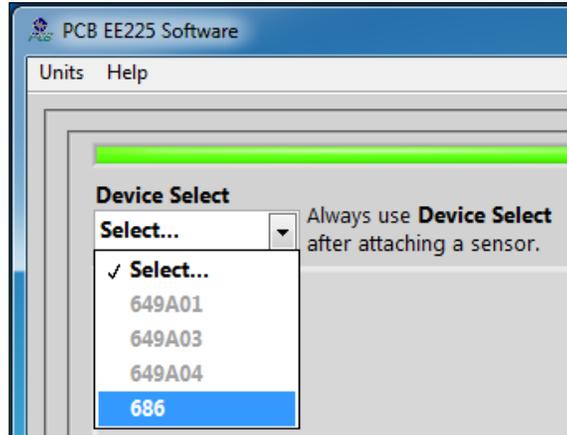
Figure 9 – Device Selection

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.
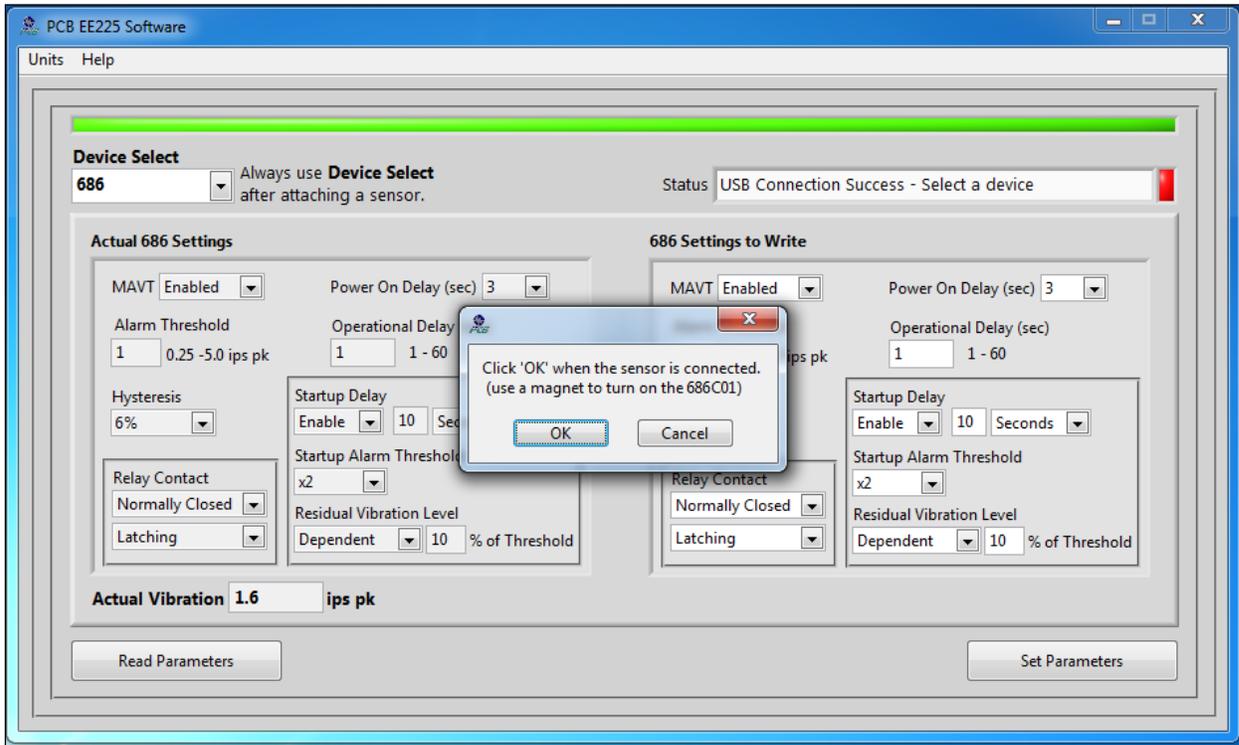
Figure 10 – Sensor Connection Screen

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 programed in the sensor.
- 686 Settings to Write – This section shows the options for programming the sensor.
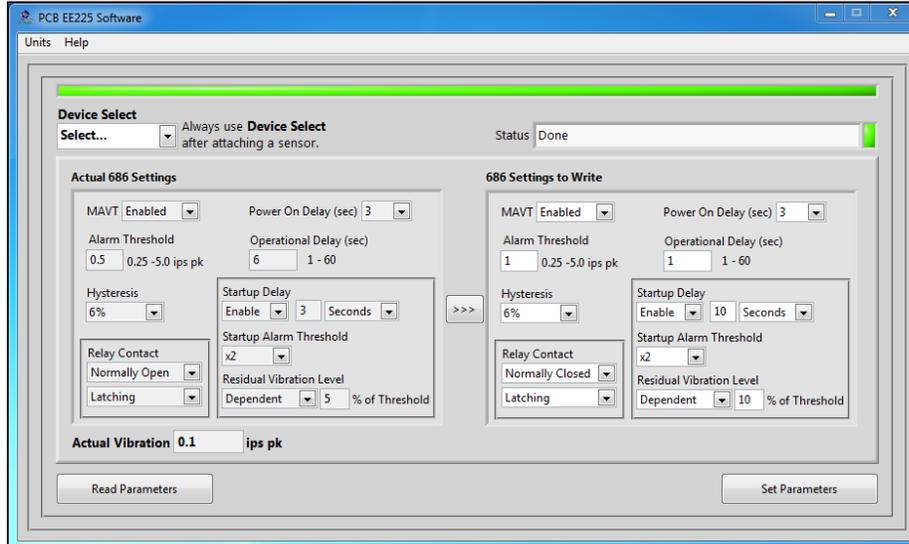
Figure 11 – Typical Smart Switch Screen After Successful Parameter Read

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.
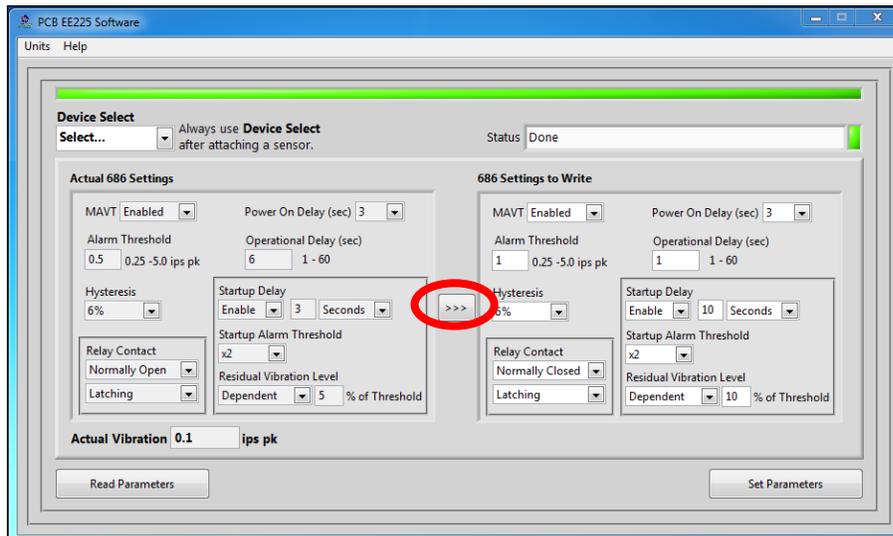
Figure 12 – Transferring Actual Settings to Settings to Write Field

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 12.	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. • 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.

Parameter		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
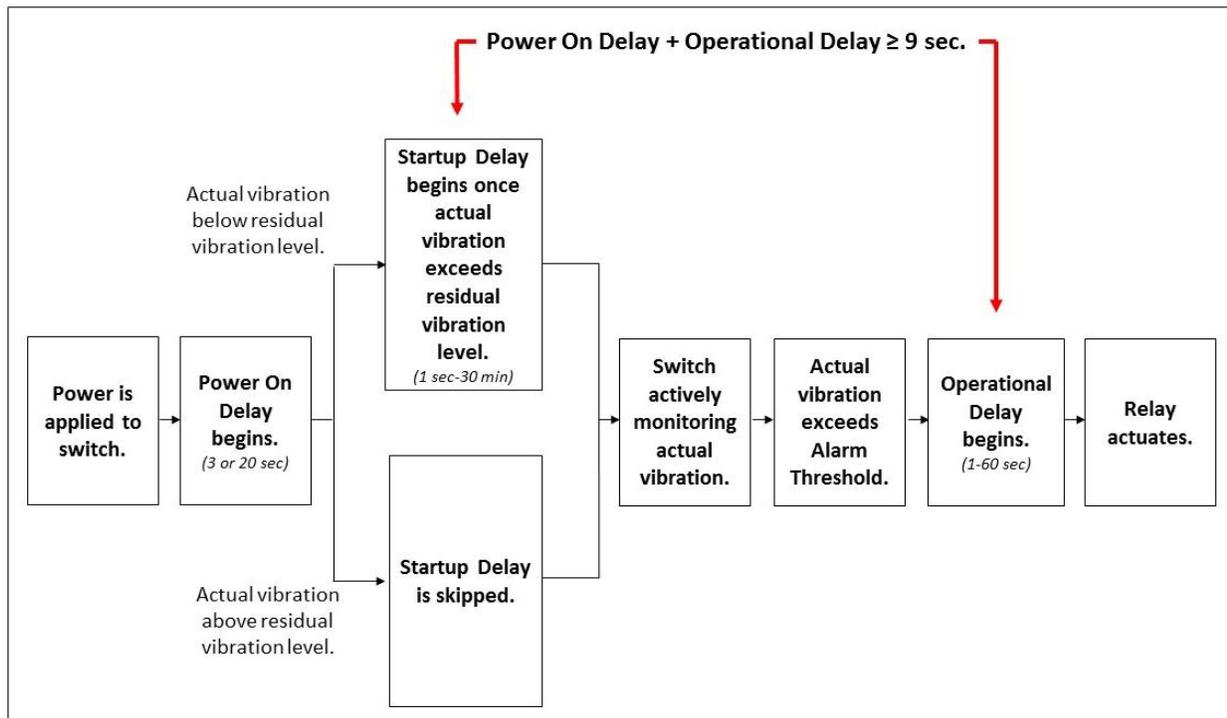
Magnetically Adjustable Vibration Threshold (MAVT™)

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.

Figure 13 – 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.

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 14 – 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 15 – Calibration Cable

Magnet Clip

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

Figures 16 and 17 – Magnet Clip with and without Smart Switch

Warning 1 – ESD sensitivity

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

Warning 2 – ESD sensitivity

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

Caution 1 – ESD sensitivity

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

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

The PCB solution for product safety:

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

Caution 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.