



## Protect Your Valuable Machinery with *Exclusive* Products From IMI

### Model 649A01 Reciprocating Machinery Protector

(US Patent No. 7,171,313)

The RMP is a 4-20 mA transmitter that protects reciprocating compressors 24/7 against serious faults that can cause catastrophic failures quickly. Using patented techniques, it out performs traditional Impact Transmitters.



- Loop powered
- Integrates with plant monitoring systems
- Built-in sensor
- Provides trending, alarm & alert levels
- Field programmable (USB)

### Model 682A05 Bearing Fault Detector

(US Patent No. 6,889,553)

The BFD is a vibration transmitter that provides early warning of typical rolling element bearing faults such as cracked races, spalling, brinelling, looseness, and loss of lubrication; even in slow speed machinery.



- Powers ICP® accelerometers
- Integrates with plant monitoring systems
- Provides 24/7 protection
- Outputs signal for diagnostic analysis
- Works for gearbox monitoring too

### Recommended General Purpose Relays for use with the Series 686B Smart Vibration Switch

Visit [www.omron.com](http://www.omron.com) for additional information

Attribute	Omron Model Number				
	MJN2C-AC120	MJN2C-AC240	MJN2C-DC12	MJN2C-DC24	MJN2C-DC110
Contact Form	2 Form C (DPDT)				
Rated Resistive Load - Relay	10 A @ 240 VAC / 28 VDC				
Service Life - Electrical (Min. @ Rated Loads)	100,000 operations "average"				
Max. Resistive Switching Capacity - Relay	2400 VA, 280 W				
Coil Voltage - Nominal	120 VAC	240 VAC	12 VDC	24 VDC	110 VDC
Coil Power Consumption	1.7 VA		1.2 W		
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				



Model MJN2C-AC24

**Order Online @**  
[www.imi-sensors.com](http://www.imi-sensors.com)



3425 Walden Avenue, Depew, NY 14043-2495 USA

Toll-Free in USA 800-959-4464

24-hour SensorLine<sup>SM</sup> 716-684-0003

Fax 716-684-3823 E-mail [imi@pcb.com](mailto:imi@pcb.com)

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ISO 9001 CERTIFIED ■ A2LA ACCREDITED to ISO 17025

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### Sockets for Omron MJN2C Relays

Omron Model Number	Description
PTF11PC	DIN rail mount relay socket
PTF21PC	Chassis mount relay socket

IMI Sensors designs and manufactures a full line of accelerometers, sensors, vibration switches, vibration transmitters, cables and accessories for predictive maintenance, continuous vibration monitoring, and machinery equipment protection. Products include rugged industrial ICP® accelerometers, 4-20 mA industrial vibration sensors and transmitters for 24/7 monitoring, electronic and mechanical vibration switches, the patented Bearing Fault Detector, high temperature accelerometers to +900 °F (+482 °C), 2-wire Smart Vibration Switch, and the patented Reciprocating Machinery Protector. CE approved and intrinsically safe versions are available for most products.

Visit [www.imi-sensors.com](http://www.imi-sensors.com) to locate your nearest sales office



# Reliable Electronic Vibration Switch Protection At the Low Price of a Mechanical Switch!!!!

An IMI Sensors Industry Exclusive!

## Highlights

- Fully USB programmable
- Solid state relay for reliable operation
- Monitors vibration velocity for consistent results
- 2-wire operation uses existing switch wires
- Remote Reset Anywhere™ for safety and convenience
- Exclusive MAVT™ sets alarm threshold automatically
- Eliminates false trips with programmable delays
- Hazardous area approvals



Photo courtesy of Midwest Towers, Inc.

## Applications

- 24/7 machinery protection
- Cooling tower fans & gearboxes
- Fin fans
- Motors & pumps



Series 686B  
(US Patent Pending)

The All New Electronic Smart Vibration Switch from IMI Sensors is highly versatile, fully user programmable via USB, low cost, and a drop-in replacement for most popular mechanical vibration switches. The Smart Vibration Switch includes an embedded piezoelectric accelerometer for accurate measurement, monitors vibration velocity for more consistent results, and provides the reliability not found in mechanical switches. It's also a significantly lower cost alternative for many electronic vibration switch applications requiring single relay operation.

*Get Smart and replace your troublesome mechanical vibration switches with the economical, electronic Smart Vibration Switch today!*





# Replaces Mechanical and Electronic Vibration Switches



**Model 686B01**  
Smart Vibration Switch  
with 2-pin MIL Connector



**Model 686B7X**  
Smart Vibration Switch  
with Terminal Block Connector



**Model 686B11**  
Smart Vibration Switch  
with Integral Cable



**Models EP686B7X & EX686B7X**  
Smart Vibration Switch with  
Explosion Proof Condulet Enclosure

## The Versatile Smart Vibration Switch

The New Series 686B Smart Vibration Switch is now fully USB programmable and more cost-effective than ever. With two-wire operation, universal power, and a single 1/4-28 stud mount, it is simple to install and a near drop-in replacement for mechanical vibration switches. With Remote Reset Anywhere™, you no longer need to climb your cooling tower to reset a tripped switch. Simply install the reset button at any convenient location in the 2-wire power loop for safe and easy access. This unique, low cost vibration switch can replace most mechanical and many electronic vibration switches.

The Series 686B Smart Vibration Switch is a *smart alternative to troublesome mechanical vibration switches*. Mechanical vibration switches, or earthquake switches as they are commonly referred to, can stick, corrode, be inconsistent in their protection, and are notorious for false trips or worse yet, not tripping at all. This can result in dangerous and costly catastrophic failures of cooling towers fans. The Smart Vibration Switch has an embedded precision accelerometer, a solid state relay, and adjustable time delays providing much better accuracy, repeatability, and reliability than earthquake switches. Additionally, it monitors vibration velocity, which is a much more repeatable and consistent measurement than acceleration. It is housed in a robust stainless steel housing that is hermetically sealed for use in the harshest environments and is Intrinsically Safe (optional) for use in hazardous areas.

## Comparison of Mechanical Vibration Switches to the IMI Sensors Smart Vibration Switch

Feature	SVS	MVS
2-wire operation	✓	✓
Low Cost	✓	✓
Latching	✓	✓
Non-Latching	✓	
Normally Open	✓	✓
Normally Closed	✓	✓
Remote Reset Anywhere™	✓	
Precision Measurements	✓	
Alarm on Velocity	✓	
Power On Delay	✓	
Start Up Delay	✓	
Operation Delay	✓	
Residual Vibration Threshold	✓	
USB Programmable	✓	
MAVT™	✓	
Small Footprint	✓	
Single Stud Mount	✓	
Hermetically Sealed	✓	

## Low Cost Electronic Switch Replacement

In addition to being a more reliable device than mechanical vibration switches, the Unique Series 686B Smart Vibration Switch is a much lower cost solution for many conventional Electronic Vibration Switch applications as well. The Smart Vibration Switch is a great choice in applications where a single relay provides sufficient protection and/or an overall vibration output (typically 4-20 mA) is not required. Multiple Smart Vibration Switches can be used in series or parallel to monitor several points or machines as necessary. They can also be used in conjunction with external SPST and DPDT relays to increase current capacity or when such relays are required.

When a full featured electronic vibration switch is required that includes dual set points (relays), 4-20 mA overall vibration output, or the raw vibration signal output for doing vibration analysis, select an IMI Series 685B Electronic Vibration Switch. It is lower cost and a direct replacement (with optional adapter plate) for popular model 440, 450, 6140, and SW6000 switches.



**Full Featured Model 685B**  
Electronic Vibration Switch

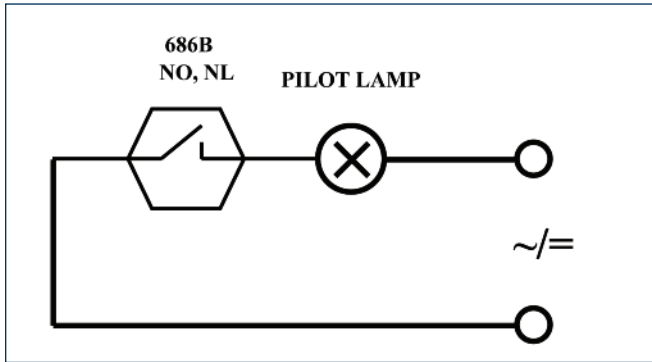


**Model 080A209**  
Adapter Plate



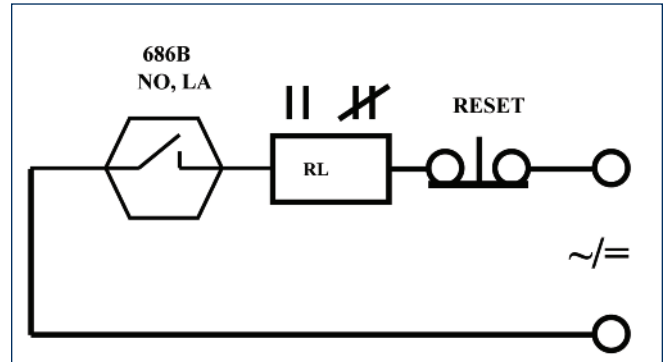


## Typical Smart Vibration Switch Installation



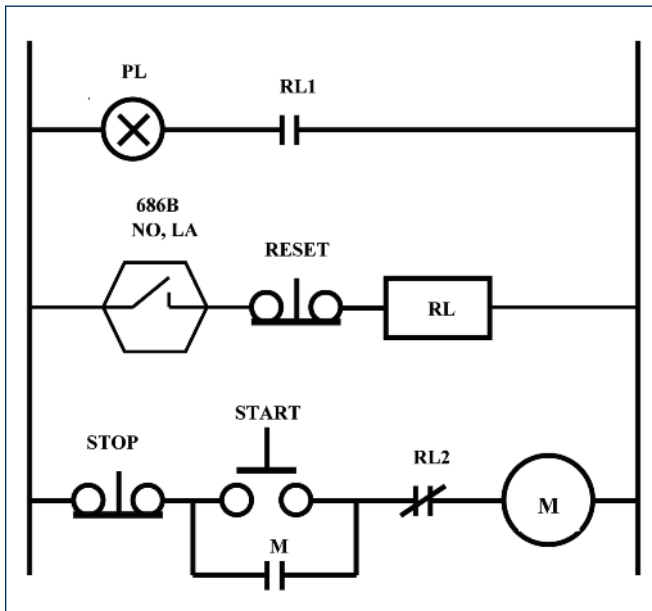
### Basic Installation

This is a typical installation for use with a pilot/indicator light (or other load) where the current is  $\leq 500$  mA. No reset switch is required since the Smart Vibration Switch is set to NL (Non-Latching).



### Installation for Use with an External Relay

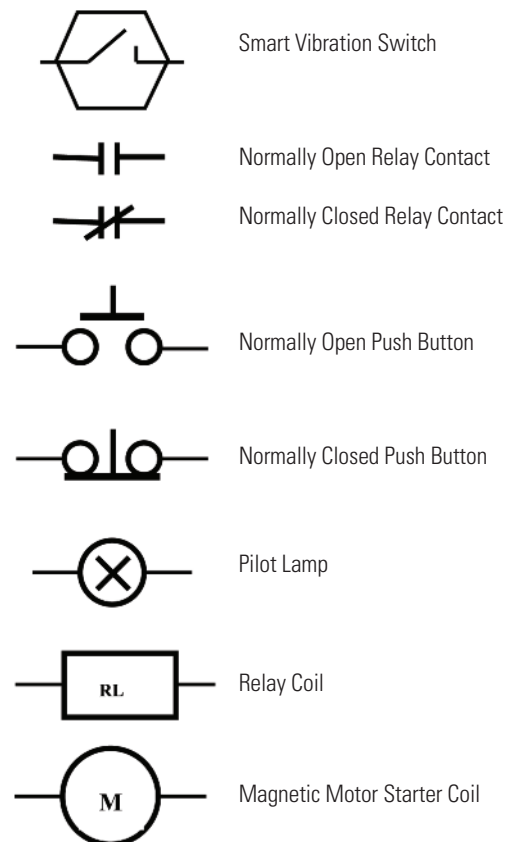
This is a typical installation for use with an external SPDT or DPDT relay (see page 8 for relay selections). This configuration is used when the load requires  $>500$  mA or when using a DPDT relay to switch two circuits using a single Smart Vibration Switch. The switching can be normally open, normally closed, or as shown in the diagram, mixed. The reset switch can be conveniently located anywhere in the 2-wire power loop.



### Installation for Motor Protection with an Indicator Light

This is a typical setup for use with both a pilot light and motor protection circuit using a single Smart Vibration Switch in conjunction with an external DPDT relay (see page 8 for relay selections). When the vibration exceeds the alarm threshold level, the normally open Smart Vibration Switch relay closes, latches, and energizes the external DPDT (RL) relay coil. The normally closed RL2 relay contacts open, which shuts down the motor. The normally open RL1 relay contacts close, which illuminate the pilot light.

### LEGEND

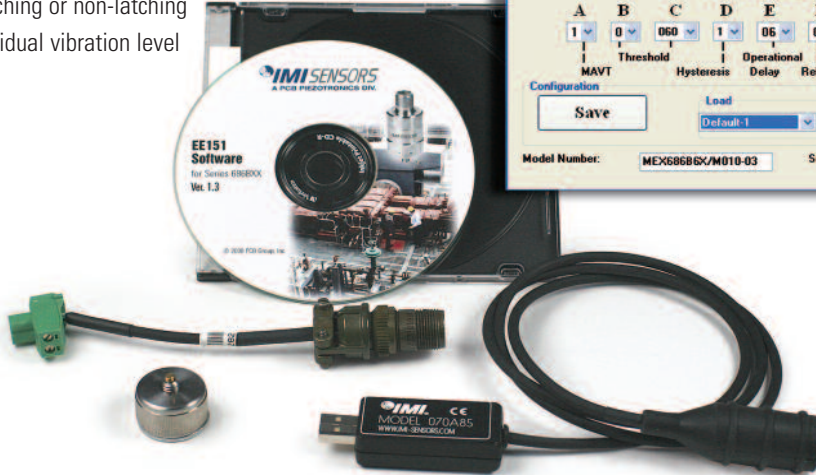
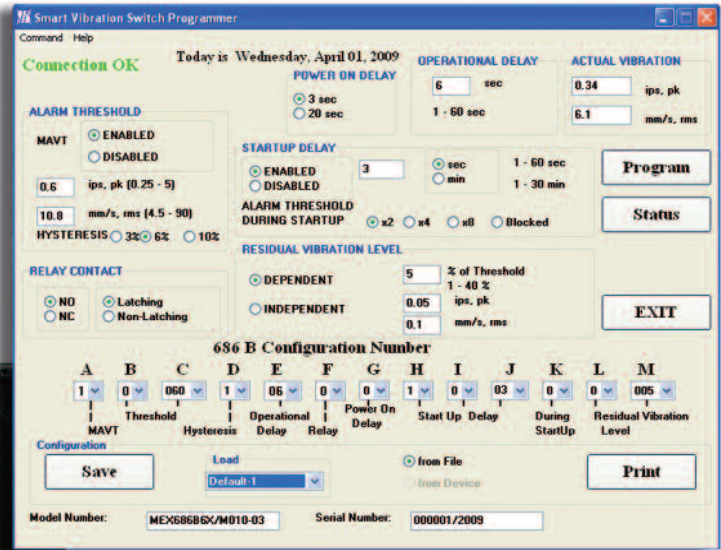




## USB Programmer Kits

The Smart Vibration Switch is fully user programmable using either the Model 600A15 or 600A16 USB Switch Programmer Kit (optional). See the "Specifications and Ordering Information" on page 5 for details. These kits can be used in conjunction with any PC to read or reprogram the settings of the Smart Vibration Switch. The user can enable/disable and set the following switch parameters.

- Alarm threshold level & hysteresis
- Power-on, startup, & operating delays
- Normally open or normally closed
- Latching or non-latching
- Residual vibration level



Model 600A15 USB Switch Programming Kit



Photo courtesy of Midwest Towers, Inc.

An IMI Sensors Industry Exclusive!

## EXCLUSIVE MAVT™

The Alarm Threshold Level (set point) can be set either numerically through USB programming, or if enabled, using Magnetically Adjustable Vibration Threshold (MAVT™). This feature can be enabled by the user via USB programming or, if requested, enabled by the factory.

The *Exclusive* MAVT™ feature can be used to automatically set the alarm threshold level in the field without knowing anything about the equipment's actual vibration level. Mount the Smart Vibration Switch on an operating machine and touch the magnet (contained in the USB Switch Programmer Kit) to the sensor to start the process. *Caution should be taken to disconnect the Smart Vibration Switch from the machine's trip circuit when using this feature.* This convenient feature permits any machine to become vibration switch protected within seconds. MAVT™ can also be used with the switch mounted on a calibrated vibration shaker for precise setting of the alarm threshold value.



Series 686B Smart Vibration Switch with MAVT™ Option

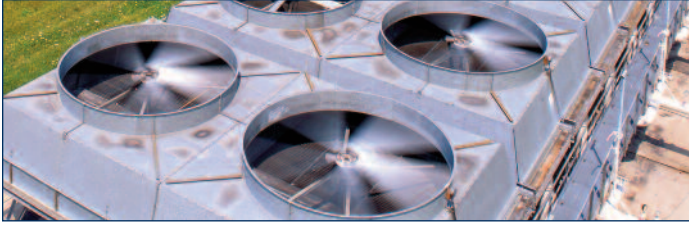
Model 080A121 Magnet (Optional Accessory)

Simply Touch the Magnet to the Switch to Start the Process!

Note: Supplied Magnet may differ



# Specifications and Ordering Information



## Series 686B Smart Vibration Switch Specifications

### Performance

Alarm Threshold Level	0.25 to 5.0 in/sec pk 4.5 to 90.0 mm/sec rms
Frequency Range (±3 dB)	180 to 60k cpm 3 to 1000 Hz
Alarm Threshold Hysteresis	3, 6, or 10%
Residual Vibration Level (Reference)	Dependent or Independent of alarm threshold
Residual Vibration Level (Level)	1 to 40% of alarm threshold level
MAVT™	Enabled/Disabled
Transverse Sensitivity	<3%
Power On Delay	3 or 20 seconds
Startup Delay (Active)	Enabled/Disabled
Startup Delay (Time)	1-60 sec to 1-30 min
Startup Delay (x Alarm Threshold)	x2, x4, x8, Blocked
Operational (alarm) Delay	1 to 60 seconds
Relay Type	SPST Form A or B MOSFET
Relay Rating	24 to 240 VAC/VDC, 0.5 A
Relay Contacts	Normally Open or Normally Closed
Relay Latching	Latching or Non-Latching

### 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/s <sup>2</sup> pk
Humidity Range (Condensing)	0 to 100%

### Electrical

Power Required	24 to 240 V DC/AC 50 to 60 Hz
Current Rating (Relay Closed)	500 mA
Leak Current (Relay Open)	1 mA
Electrical Isolation (Case)	>10 <sup>8</sup> ohms

### Physical

Size (Hex)	1.25 in
Size (Height)	2.6 in 66 mm
Weight	5.2 oz 148 g
Mounting Thread	1/4-28 UNF-2B (Female)
Mounting Torque	2 to 5 ft-lb 2.7 to 6.8 N-m
Sensing Element (Internal)	Piezoelectric Accelerometer
Housing Material	Stainless Steel
Sealing	Welded Hermetic
Electrical Connection	See Models Available
Electrical Connection Position	Top

### Supplied Accessories

081A41 Mounting stud, 1/4-28 x 0.563" long stainless steel screw with hex socket and brass tip

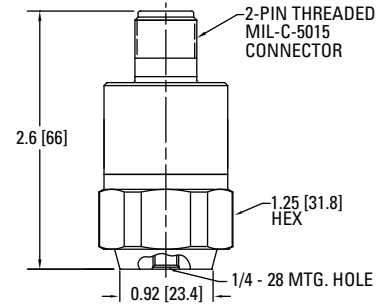
### Optional Versions

M (Metric Mount) - Includes Model M081A61, 1-4-28 to M6 x 1 x 8.6 mm long mounting stud

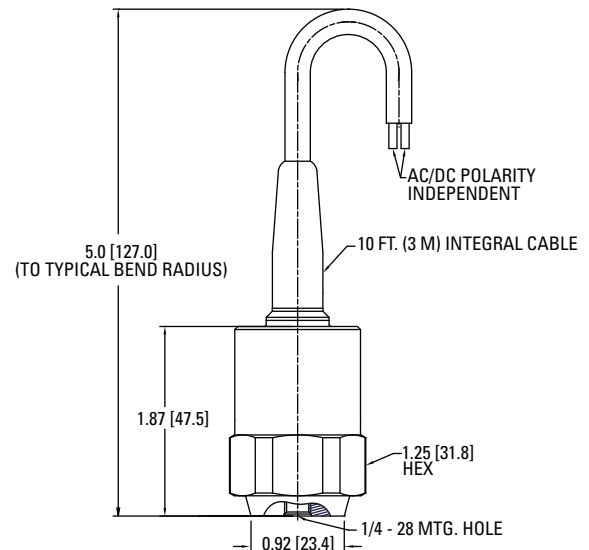
EP (Explosion Proof) - Includes right angle conduit with 1 in NPT threads, terminal block connection, and integral 1/4 NPT mounting stud

EX (Intrinsically Safe, CSA US & Canada) - See EX model tables

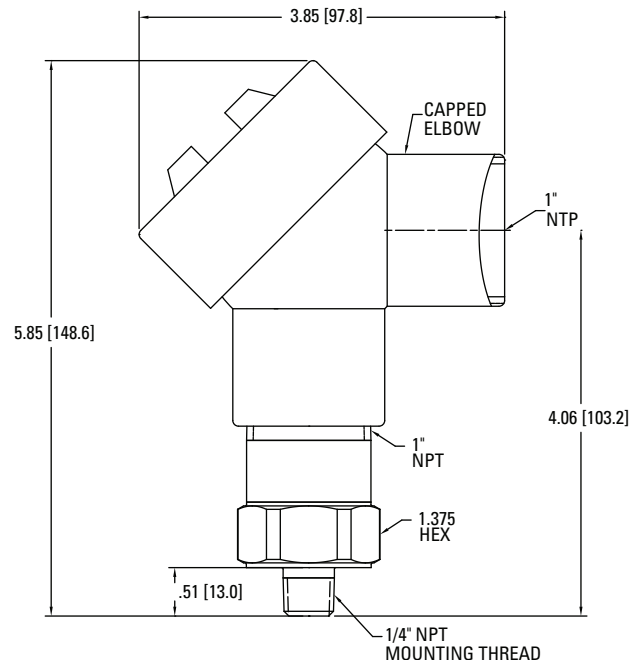
Model 686B01



Model 686B1X



Model EP686B7X



# Specifications and Ordering Information



## EX Models - CSA approved Intrinsically Safe and Non-Incendive for Hazardous Locations

Class I, Div. 2, Groups A,B,C, D Ex nL IICT3 AEx nA IICT3			
	<b>Specification</b>	<b>EX686B0x</b>	<b>EX686B1x</b>
Voltage Rating	10 to 30 VDC	10 to 30 VDC	10 to 30 VDC
Current Rating	100 mA	100 mA	100 mA
Mounting Thread	1/4-28 UNF-2B (Female)	1/4-28 UNF-2B (Female)	1/4-28 UNF-2B (Female)
Electrical Connection	2-Pin MIL-C-5015	Molded Integral Cable	Integral Armord Cable
Cable Length	N/A	10 ft	10 ft
Cable Type	N/A	Polyurethane (Model 052)	Armored Polyurethane (Model 047)

## EX Models - CSA approved for Hazardous Locations

Class I, Div. 2, Groups A,B,C, D Ex nA IICT3 AEx nA IICT3	
	<b>Specification</b>
Voltage Rating	24 to 240 VDC or VAC 50 to 60 Hz
Current Rating	500 mA
Mounting Thread	Integral 1/4 NPT
Electrical Connector	Terminal Block
Models include right angle conduit with 1" NPT threads	

## Series 686B Smart Vibration Switch Models Available

Electrical Connection	Basic	Optional Models				
	Model	Intrinsically Safe	Explosion Proof	Metric Mount	Metric Mount Intrinsically Safe	Metric Mount Explosion Proof
2-Pin MIL-C-5015	686B0x	EX686B0x	N/A	M686B0x	EXM686B0x	N/A
Integral 10' Polyurethane Cable (Model 052)	686B1x	EX686B1x	N/A	M686B1x	EXM686B1x	N/A
Integral 10' Armord Polyurethane Cable (Model 047)	686B6x	EX686B6x	N/A	M686B6x	EXM686B6x	N/A
Terminal Block with integral 1/4 NPT stud	686B7x	EX686B7x	EP686B7x	N/A	N/A	N/A

Note: x in the above model numbers specifies a standard (preprogrammed) configuration

### Specifying Integral Cable and Armor Length

If an integral cable length (with or without armor) other than 10 ft (3 m) is required add the following to the end of model number.

To specify English length (feet)	/ xxx - yy	xxx = length of the cable in feet yy = if specifying armored cable and the length of the armor is shorter than the cable, enter the length in feet
To specify metric length (meters)	/ M xxx - yy	xxx = length of the cable in meters yy = if specifying armored cable and the length of the armor is shorter than the cable, enter the length in meters

## Series 686B Preprogrammed Models

	Configuration 1	Configuration 2	Configuration 3	Configuration 4
<b>Add Prefix for Options</b>	<b>686B01</b>	<b>686B02</b>	<b>686B03</b>	<b>686B04</b>
<b>Add Prefix for Options</b>	<b>686B11</b>	<b>686B12</b>	<b>686B13</b>	<b>686B14</b>
<b>Add Prefix for Options</b>	<b>686B61</b>	<b>686B62</b>	<b>686B63</b>	<b>686B64</b>
<b>Add Prefix for Options</b>	<b>686B71</b>	<b>686B72</b>	<b>686B73</b>	<b>686B74</b>
Relay Status	Normally Open	Normally Closed	Normally Open	Normally Closed
Relay Latching	Latching	Latching	Non-Latching	Non-Latching
MAVT™	Enabled	Enabled	Enabled	Enabled
Alarm Threshold	0.6 ips	0.6 ips	0.6 ips	0.6 ips
Alarm Hysteresis	6%	6%	6%	6%
Power On Delay	3 sec	3 sec	3 sec	3 sec
Startup Delay	Enabled, 3 sec, x2	Enabled, 3 sec, x2	Enabled, 3 sec, x2	Enabled, 3 sec, x2
Operational Delay	6 sec	6 sec	6 sec	6 sec
Residual Vibration Level	Dependent, 5%	Dependent, 5%	Dependent, 5%	Dependent, 5%

### Notes:

Other factory configurations are available for a programming fee. Contact IMI for details. See "Factory Programmed Ordering Guide" on page 7.

## Recommended cables for use with the Model 686BOX Switch



## USB Switch Programmer Kits

### 600A16 - USB Switch Programmer Kit for use with 2-Pin MIL-C-5015 models (e.g., 686B01)

- 070A85 - USB Switch Programmer
- EE151 - 686B Programmer Software
- 080A121 - Magnet

### 600A15 - USB Switch Programmer Kit for use with integral cable and terminal strip models (e.g., 686B1x & EX686B7x)

- 070A85 - USB Switch Programmer
- EE151 - 686B Programmer Software
- 042M17 - 042CE001AD Cable + terminal block connector
- 080A121 - Magnet



**052BRXXXAC Cable & 480C02 Power Supply**  
For use with MAVT™ option for setting alarm level.