# SMART
# VIBRATION SWITCH

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The Smart Vibration Switch is USB programmable with two-wire operation, universal power and a single stud mount. The product has an embedded precision accelerometer, a solid state relay and adjustable time delays to provide accurate, repeatable results. Smart Switches monitor vibration in velocity and are in a robust stainless steel housing that is hermetically-sealed for use in the harshest environments.

## APPLICATIONS

- Cooling Towers
- Air-Cooled Heat Exchangers
- Evaporative/Steam Condensers
- Air-Cooled Chillers

## HAZARDOUS AREA APPROVALS

### CSA (CANADA & US; EX686BX ONLY)
- AEx/Ex IIC T3 Class I, Div 2 Groups A-D
- Ex nL IIC T3 Class I, Div 2, Groups A-D

### ATEX (EX686B7XD ONLY)
- Ex d IIC T4 Gb

### IECEX (EX686B7XD ONLY)
- Ex d IIC T4 Gb

# HIGHLIGHTS

- Field-programmable with use of PC for precise setting of vibration threshold and other parameters.

- Customizable time delays prevent false trips from errant vibration spikes during start-up and operation.

- Measurement range in velocity provides more effective monitoring for equipment with low running speeds.

- Magnetically-Adjustable Vibration Threshold (MAVT™) feature allows for field modification of vibration threshold without in-depth knowledge about equipment's actual vibration levels.

- Small footprint and accelerometer-style housing facilitate mounting in tight installation applications.

**SMART VIBRATION SWITCH**
SERIES 686
(US Patent No. 7,767,919)

**Models 686C0X & (EX)686B0X**
Smart Switch with
2-Pin MIL Connector



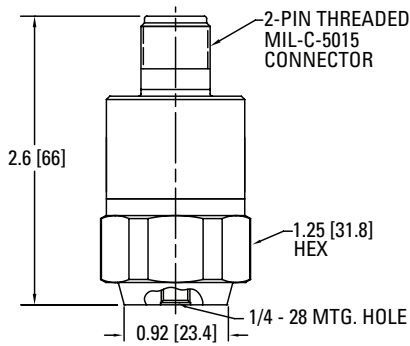**Models (EX)686B1X**
Smart Switch with
Integral Cable



**Models (EX)686B6X**
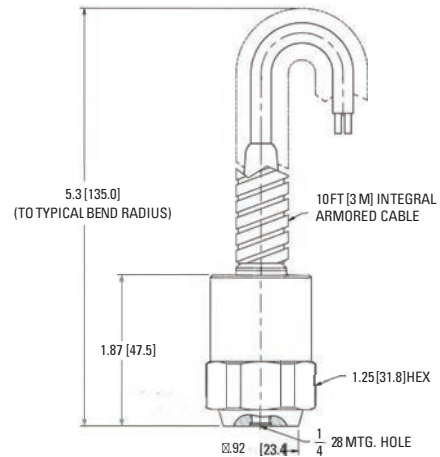Smart Switch with
Integral Armored Cable



**Models (ex)686b7x(d)**
Smart Switch with
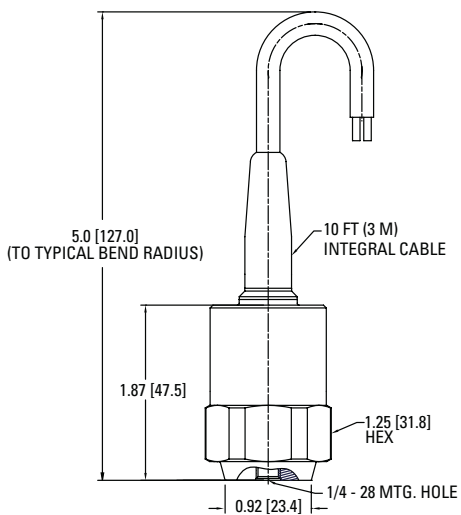Terminal Block and
Conduit Elbow

## Models 686C0X & (EX)686B0X



2-PIN THREADED
MIL-C-5015
CONNECTOR

2.6 [66]

1.25 [31.8]
HEX

1/4 - 28 MTG. HOLE

0.92 [23.4]

## Models (EX)686B6X



5.3 [135.0]
(TO TYPICAL BEND RADIUS)

10FT [3 M] INTEGRAL
ARMORED CABLE

1.87 [47.5]

1.25 [31.8]HEX

.92 [23.4]    1/4 28 MTG. HOLE

## Models (EX)686B1X



5.0 [127.0]
(TO TYPICAL BEND RADIUS)

10 FT (3 M)
INTEGRAL CABLE

1.87 [47.5]

1.25 [31.8]
HEX

1/4 - 28 MTG. HOLE

0.92 [23.4]

## Models (EX)686B7X(D)



3.85 [97.8]

CAPPED
ELBOW

1"
NPT

5.85 [148.6]

4.06 [103.2]

1"
NPT

1.38 (3.5)
HEX

.51 [13.0]

1/4" NPT
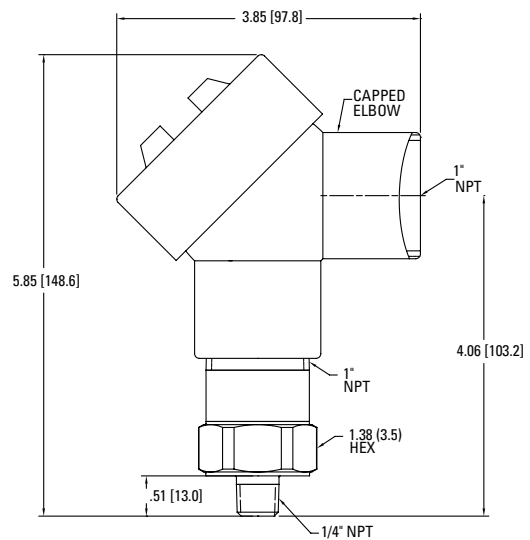
# USB PROGRAMMER KIT

The Smart Vibration Switch is fully user programmable using the optional Model 600A29 USB Switch Programmer Kit. This kit 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.



- Cooling Towers
- Air-Cooled Heat Exchangers
- Evaporative/Steam Condensers
- Air-Cooled Chillers
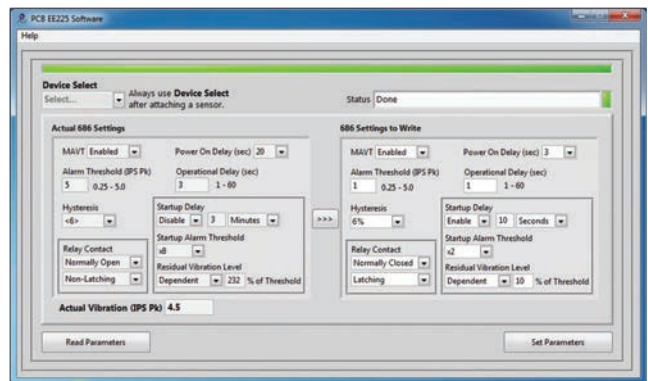


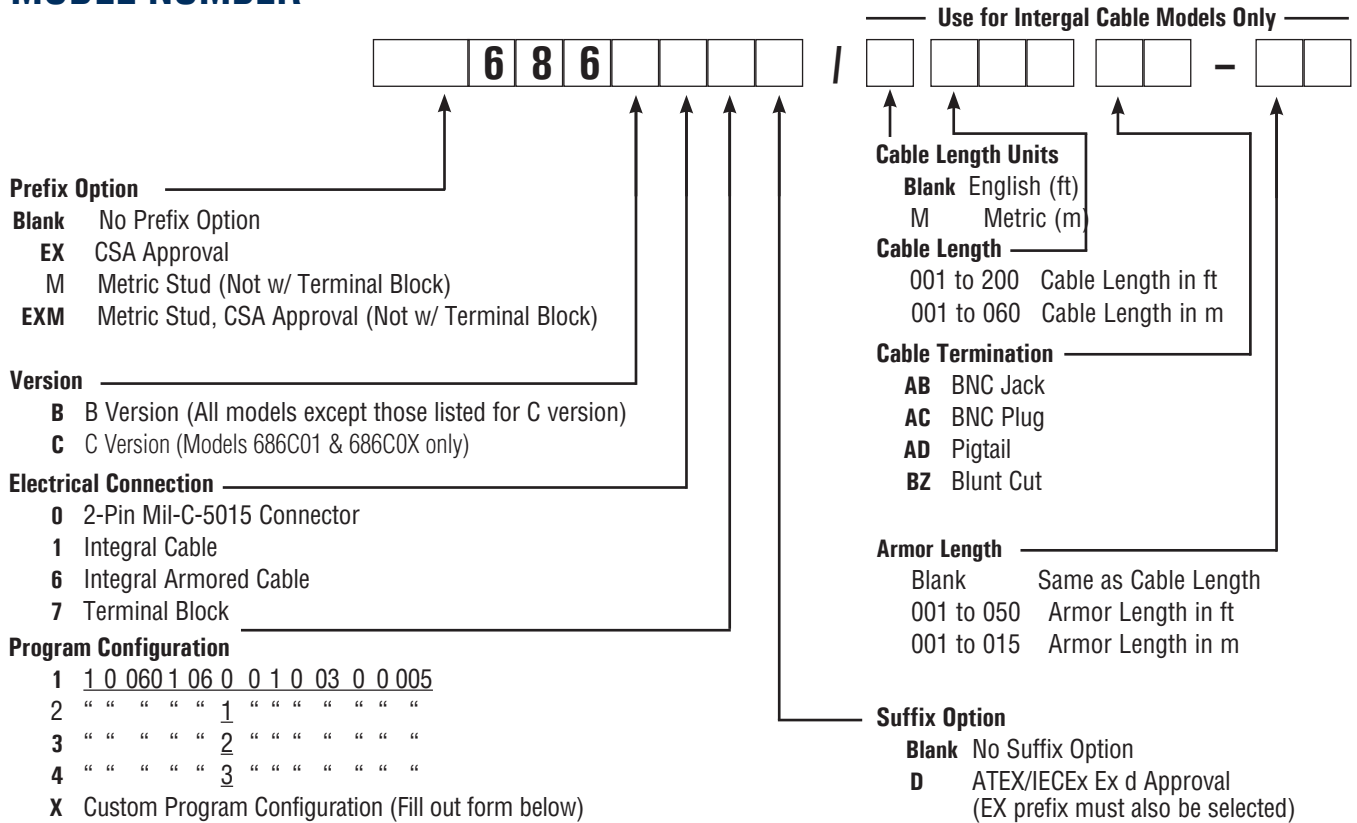Model 080A214 Magnetic Clip

| USB SWITCH PROGRAMMER KIT CONTENTS |
| --- |
| 070A100 - Programming Cable |
| EE225 - USB Software |
| 042M17 - Terminal Block / Integral Cable Adapter |
| 080A214 - Magnetic Clip |

## SPECIFICATIONS

### Performance

| | |
|---|---|
| Alarm Threshold Level | 0.25 to 5.0 in/sec pk<br>6.35 to 127.00 mm/sec pk |
| Frequency Range (±3 dB) | 686B Series:<br>420 to 60,000 cpm<br>7 to 1,000 Hz<br><br>686C Series:<br>120 to 60,000 cpm<br>2 to 1,000 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-Latchinig |

## SPECIFICATIONS

### Environmental

| | |
|---|---|
| Temperature Range (Operating) | -40 to +185° F<br>-40 to +85° C |
| Temperature Range (Storage) | -40 to +257° F<br>-40 to +125° C |
| Overload Limit (Shock) | 5,000 g pk<br>49,050 m/s2 pk |
| Humidity Range (Condensing) | 0 to 100% |
| Electrical Isolation (Case) | >108 ohms |

### Physical

| | |
|---|---|
| Sensing Element (Internal) | Piezoelectric Accelerometer |
| Power On Delay | Stainless Steel |
| Startup Delay (Active) | Welded Hermetic |
| Startup Delay (Time) | ¼" NPT Male ([EX]686B7X[D])<br>¼"-28 Female (All Other Models) |
| Startup Delay (x Alarm Threshold) | 2 to 5 ft-lb<br>2.7 to 6.8 N-m |
| Operational (Alarm) Delay | 2-Pin MIL Conn (686C0X & [EX]686B0X)<br>Integral Cable ([EX]686B1X)<br>Integral Armored Cable ([EX]686B6X)<br>Terminal Block ([EX]686B7X[D]) |
| Relay Type | Top |

# SWITCH
# MODEL NUMBER

**6 8 6 ☐ ☐ ☐ / ☐ ☐ ☐ ☐ ☐ ☐ – ☐ ☐**

**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) |

**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) |

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# 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**

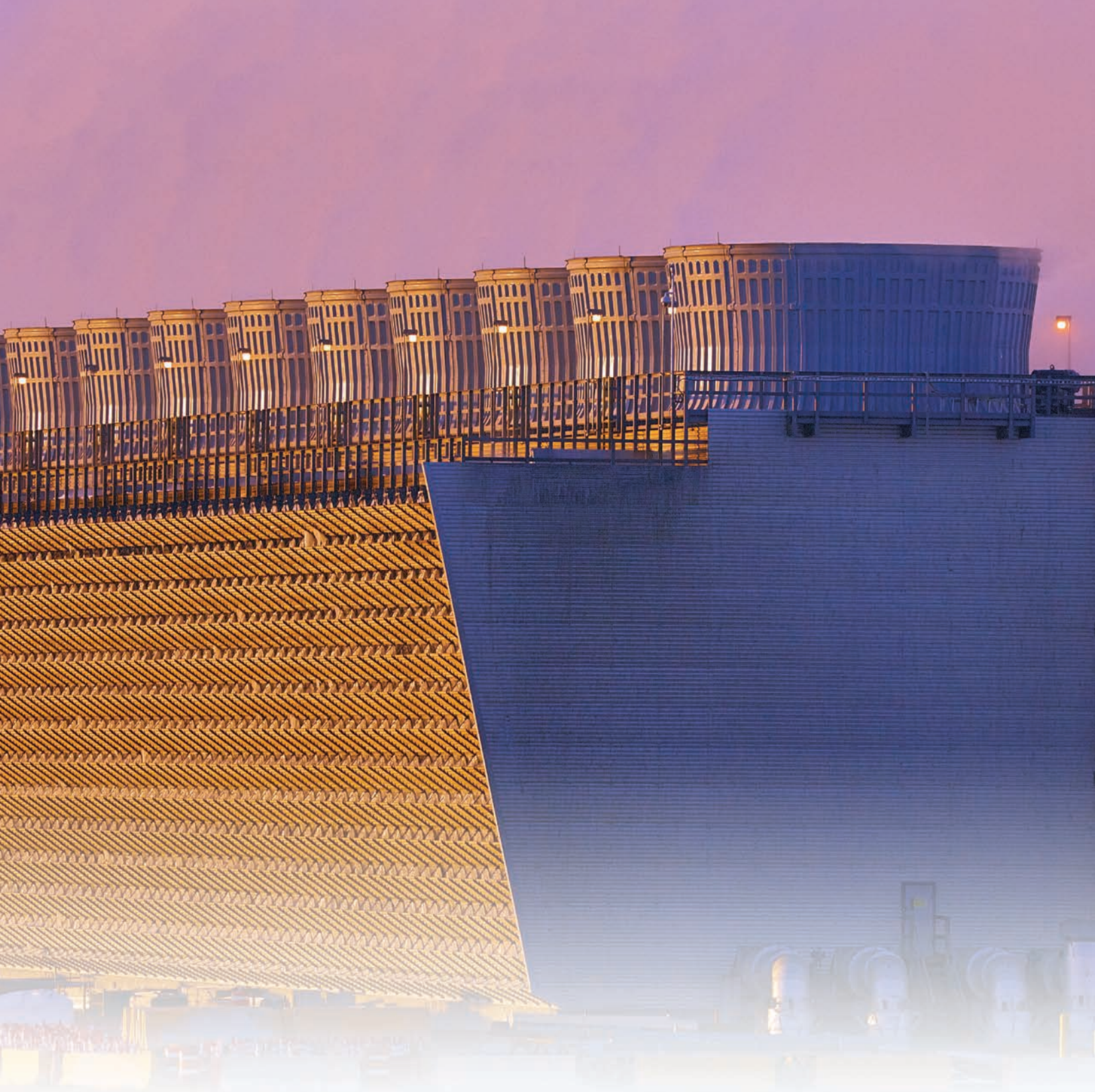| | |
|---|---|
| **0** | x2 |
| **1** | x4 |
| **2** | x8 |
| **3** | Blocked |

**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

**IMI SENSORS**
**A PCB PIEZOTRONICS DIV.**

**3425 Walden Avenue, Depew, NY 14043-2495 USA**
Toll-Free in the USA: **800 959 4464**
Phone: **1 716 684 0001** | Email: **info@pcb.com**

IMI Sensors, a division of PCB Piezotronics, Inc. manufactures industrial vibration monitoring instrumentation, such as accelerometers, vibration transmitters and switches that feature rugged stainless steel housings and survive in harsh environments like paper and steel mills, mines, gas turbines, water treatment facilities and power plants. Integrating with portable analyzers and PLC's, IMI instrumentation helps maintenance departments reduce downtime and protect critical machinery. Visit IMI Sensors at www.pcb.com. PCB Piezotronics, Inc. is a wholly owned subsidiary of MTS Systems Corporation. Additional information on MTS can be found at www.mts.com.