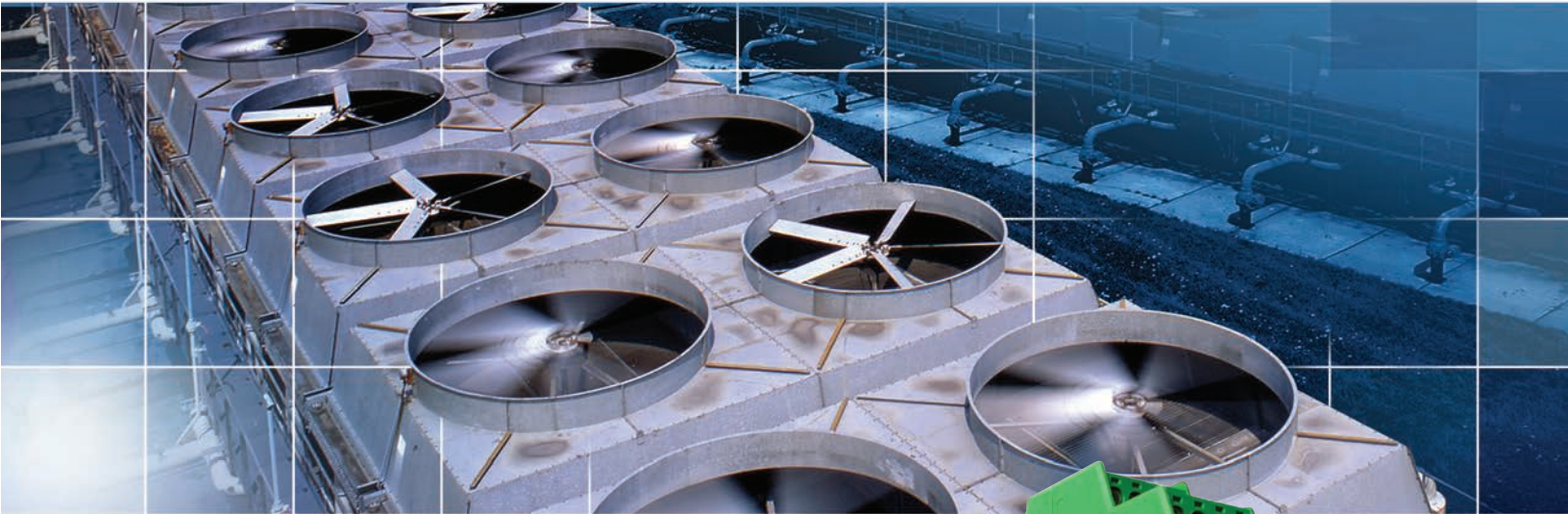


Protecting Axial Fan HVAC Systems Including Cooling Towers

Cost-Effective Vibration Monitoring Solutions for Low-Frequency Propeller Fans



Process Monitoring & Protection

Protecting Axial Fan HVAC Systems

Most mechanical and evaporative heat rejection equipment in an HVAC system has an induced-draft configuration typically including one or more axial fans mounted at the top of a steel structure. The fans move outdoor air through the equipment in order to expedite the heat transfer process. Because axial fans are large-diameter propeller fans with long blades, their stable performance is easily influenced by mechanical or environmental imbalance, damaged or worn gears and damaged shaft/coupling. When not at a stable operating level, the fans tend to vibrate at increased amplitude. Vibration monitoring is essential to provide signals for early warning or provide shutdown when vibration levels exceed a predetermined threshold.

There are several variations of the outdoor equipment:

- Air-cooled chiller
- Air-cooled fluid cooler
- Air-cooled condensing unit
- Air-cooled heat exchanger (Fin-Fan®)
- Cooling tower
- Evaporative/steam condenser

IMI offers three types of vibration switches in order to provide effective vibration monitoring:

- The 685A Series mechanical switches utilize a patented spring / magnet design and are designed to mechanically trip during high vibration.
- The 686 Series smart vibration switches are USB programmable and employ a piezoelectric sensing element coupled with field-adjustable threshold settings. In addition, integrated programmable time delays virtually eliminate false trips.
- When streaming vibration data is required, the 685B Series electronic vibration switch provides 4-20 mA output as well as analog vibration data output for data analysis. Two separate relay outputs for alert and alarm are field-adjustable with separate time delays for each relay.



Air-cooled chiller



Air-cooled condenser / fluid cooler



Air-cooled heat exchanger



Cooling tower



Air-cooled condensing unit



Photo Courtesy of Midwest Tower, Inc



Electronic Vibration Switches - Process Monitoring & Protection



Electronic Vibration Switch
Series 685B

- On-board or remote piezoelectric accelerometer
- Dual set points (relays)
- Hazardous area approved options available



USB Programmable Smart Switch
Model 686B01

- Programmable delays eliminate false trips
- Competitive price compared to mechanical switches
- Hazardous area approved options

Mechanical Vibration Switches - Process Monitoring & Protection



Linear Adjust Mechanical Vibration Switch
Series 685AX9

- Patented, spring-loaded, magnetically coupled mechanism
- Cost-effective protection for less critical applications
- Manual and remote reset options available



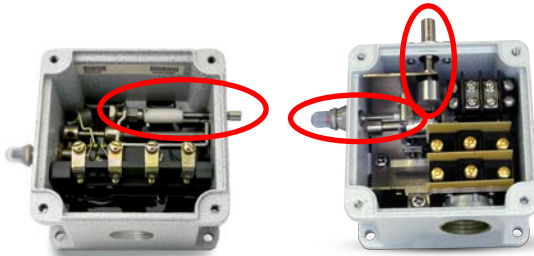
Mechanical Vibration Switch
Model 685A08

- CSA-approved for use in hazardous areas
- IP66 rated enclosure
- Requires no power

Product Spotlight

Linear Adjust Mechanical Vibration Switch

The new patented design innovation provides better performance enhancements over the older parallel design



Parallel Design

Linear Adjust Design

Enhancements:

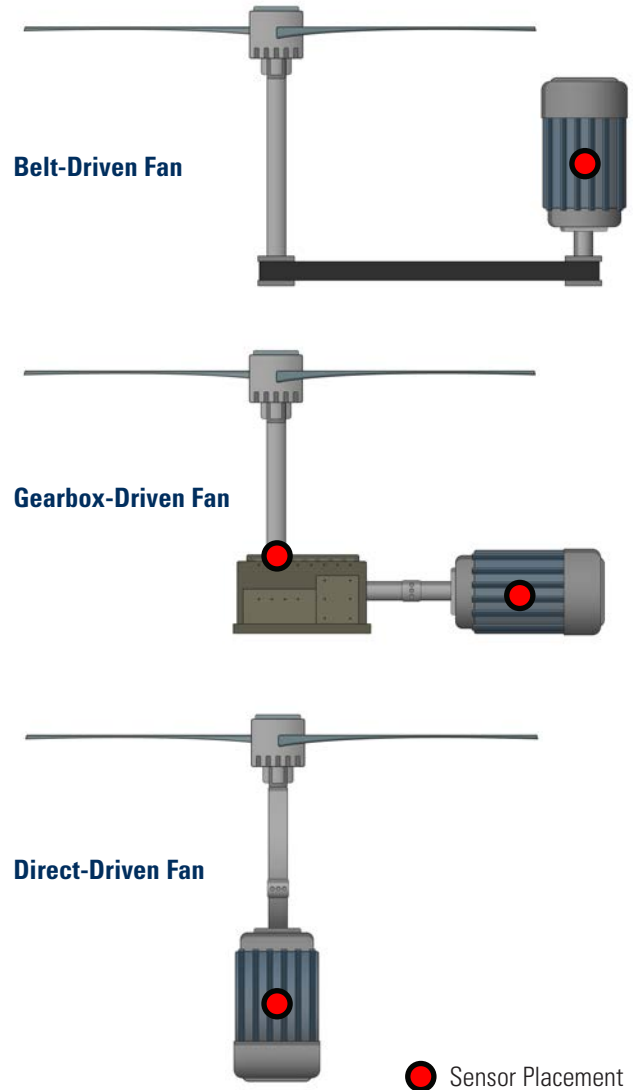
- Adjustment knob changes overlap between magnet and magnetic material rather than gap distance, resulting in linear sensitivity adjustment.
- Inertial forces in all directions have a more similar effect on the position of the mass, resulting in a more even sensitivity across all three axes.

Process Monitoring & Protection

Heating, Ventilation & Air Conditioning (HVAC)

Switch selection and placement is dependent upon several different factors.

- **Industry Standards:** Cooling towers in compliance with the Cooling Technology Institute's Standard 163 (Standard for Vibration Limits in Water Cooling Towers) must monitor vibration in velocity. Only IMI Sensors' electronic and USB programmable smart switches can meet the requirements of the standard.
- **Environment:** Switches installed in a potentially explosive atmosphere will need to be hazardous area approved, indicating they operate with low currents and voltages in order to prevent the provision of a source of explosion ignition.
- **Axial Fan(s) Configuration:** The goal of ideal switch placement is to locate the switch as close to the source of vibration as possible. The axial fan/motor configuration will dictate switch placement as well as the number of switches required for adequate protection. The axial fan / motor configuration may consist of a belt-driven fan, gearbox-driven fan or direct-driven fan. On HVAC equipment with more than one axial fan/motor assembly, switch(es) should be installed on each assembly.



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IMI SENSORS

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IMI-App-CoolingTowers-0516

Printed in U.S.A.