

## Model 375A 376A

# Vibraswitch<sup>®</sup> Malfunction Detectors

### General Description

These Robertshaw Vibraswitch Malfunction Detectors are acceleration sensitive vibration instruments with electronic circuitry to provide maximum protection to rotating and reciprocating machinery due to damages resulting from mechanical malfunctions. Although identical in outside appearance and dimensionally the same as the existing Models 365 and 366, these instruments include "built-in" electronic circuitry for start and/or monitoring time delay functions for the prevention of false shutdowns resulting from transient vibrations. All models include provisions for remote reset.

"Start Delay" is often required on machines that start automatically and exhibit excessive vibration for short periods of time only during starting. Proper set point adjustment on the Vibraswitch for adequate protection during normal running conditions may cause the Vibraswitch to "trip" as the instrument senses these high starting transient vibrations without the use of "Start Delay." Examples of such machines are refrigeration compressors and high-speed turbines.

"Monitor Delay" is required on machines that exhibit excessive vibration of a transient nature which occurs during normal operation. If a Vibraswitch without monitor delay has its set point sufficiently high so as not to trip-out under the transient vibration levels; inadequate protection would result during the normal running conditions. Examples of this type machine include liquid pumps that experience momentary cavitations resulting in excessive vibration.

### Principle of Operation

The Model 375A and 376A Vibraswitch employs a magnetic circuit opposed by inertial and adjustable spring forces in the actuating mechanism. Operation of the unit may be understood by reference to Figure 1.

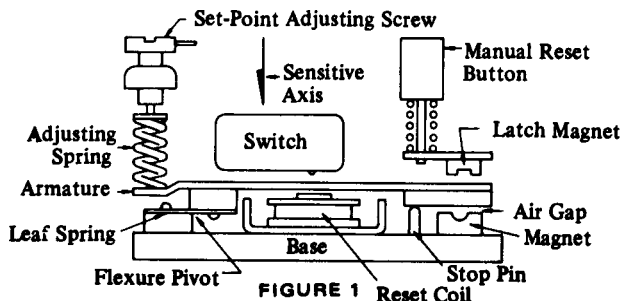
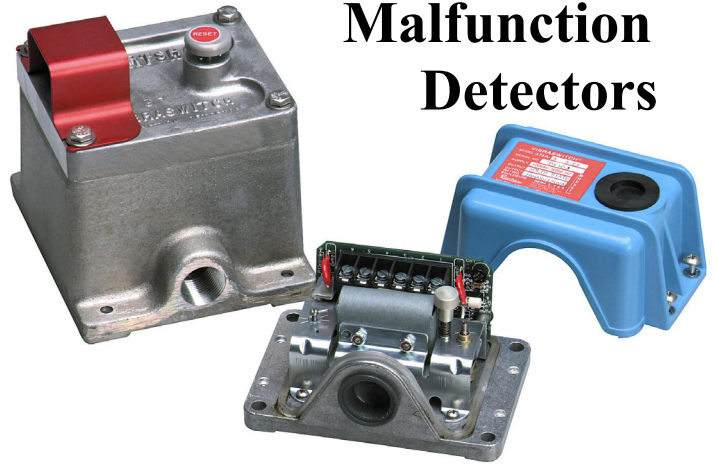


FIGURE 1 Reset Coil



### Features and Benefits

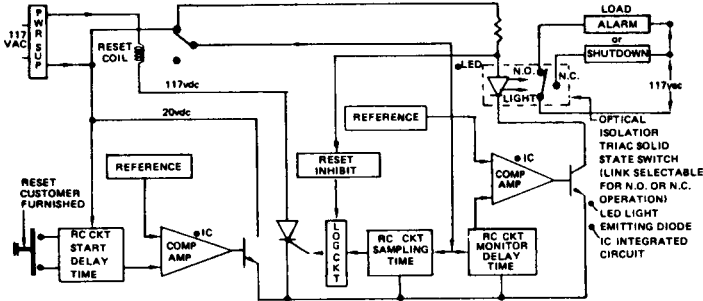
- **Complete Vibration Protection In a Single Package..**  
Reasonably priced, lower installation costs.
- **Acceleration Sensitive...**  
Measures destructive shock, not displacement.
- **Selectable Time Delay Control Options...**  
Permits maximum application flexibility.
- **Simple Adjustment...**  
Set and forget. No operator training or calibration required.
- **Continuous Reliable Protection...**  
No attention required after installation.
- **Solid State Switching...**  
Alarm or Shutdown Voltage Completely Isolated from Instrument Supply.

The armature is constrained so as to respond to only a single direction of motion, by a frictionless flexure pivot composed of two overlapping blocks with a leaf spring loaded in one direction to hold the blocks together. The armature rotates about the pivot, being forced in one direction by the adjusting spring force and the other direction by the magnetic force.

When the entire assembly is subjected to vibration perpendicular to the base, the peak acceleration times the effective mass of the armature produces an inertial force, aided by the adjustable spring tending to force the armature away from the stop pin and the restraining force of the magnet. When the peak acceleration exceeds the set point level, the armature leaves the stop pin, increasing the air gap and decreasing the magnetic force with the armature continuing to move up until it reaches the latch magnet, actuating the switch during its upward travel. The effect of temperature in the mechanism is negligible as the elastic modulus of the adjusting spring and magnetic flux through the air gap both decrease slightly with increasing temperature thereby compensating each other.

## Electronic Operation

"Start Delay Only" models hold the Vibraswitch armature in its "reset" position for a preset starting time after application of supply voltage to the instrument. This prevents the Vibraswitch from tripping out during machine startup. Fixed timing periods of 15, 30, 60 or 90 seconds are available. After the time period, the Vibraswitch functions as normal with shutdown or alarm functions provided by utilizing the SPDT switch contacts in the unit.



Block Diagram - Start B, Monitor Electronic Vibraswitch  
FIGURE 2

"Monitor Delay Only" models prevent nuisance shutdowns due to tripping-out of the Vibraswitch during high level short term transient vibration conditions by automatically resetting the Vibraswitch. Under continuing high vibration, the Vibraswitch trips, is immediately reset, trips out again and is reset; this "sampling" process continuing until the time delay period has elapsed, after which the unit remains "tripped" out. An AC output by means of a solid state "TRIAC" switch can be used for either ALARM or SHUTDOWN. The switching mode can be changed by means of a solderable link to the equivalent of an NO or NC electrical contact.

"Start and Monitor Delay" models provide the control functions of both START delay and MONITOR delay in a single instrument.

## Specifications

### Housing:

Model 375A, FM Approved for Class I, Div. 1, Groups C & D; Class II, Div. 1, Groups E,F & G, hazardous locations  
Model 378A, weatherproof

### Environmental:

Storage Temperature Limits ..... -40° F to 160°F  
Operating Temperature Limits ..... -20° F to +140° F  
Operating Vibration limits ..... 4 1/2 G's 0 to 300 Hz  
Operating Humidity Limits ..... to 95% RH @ 100° F  
SET POINT RANGE ..... 0-4.5 G, adjustable 1 G per turn

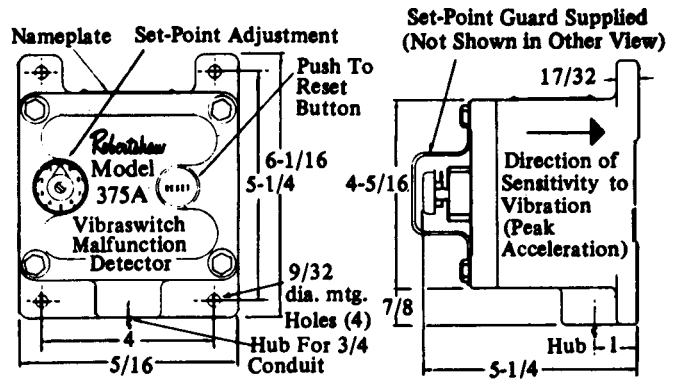
### Electrical:

Supply Voltage ..... 120 VAC ±10%, 50/60 Hz  
Supply Power ..... 15W maximum  
Start Delay Time Options ..... 15, 30, 80 and 90 seconds  
Monitor Delay Time Option ..... 2, 5, 10 seconds  
Accuracy of Delay Times ..... ±30%

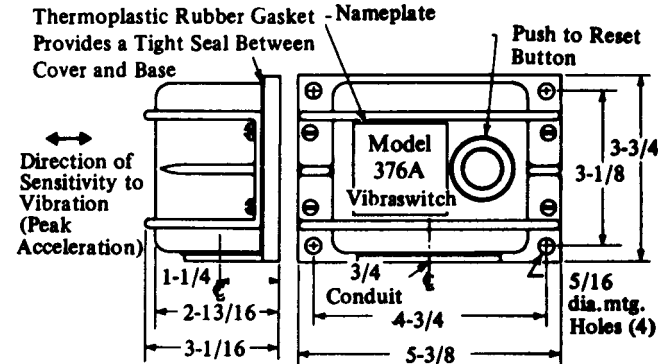
### Output Signal:

Start Delay only ..... SPDT Switch contacts 5 amps @120 or 240 VAC  
Monitor only or Start and Monitor ..... Solid State Switch-TRIAC-120 VAC @ 2 amp max . minimum load current 50 ma

## DIMENSIONS

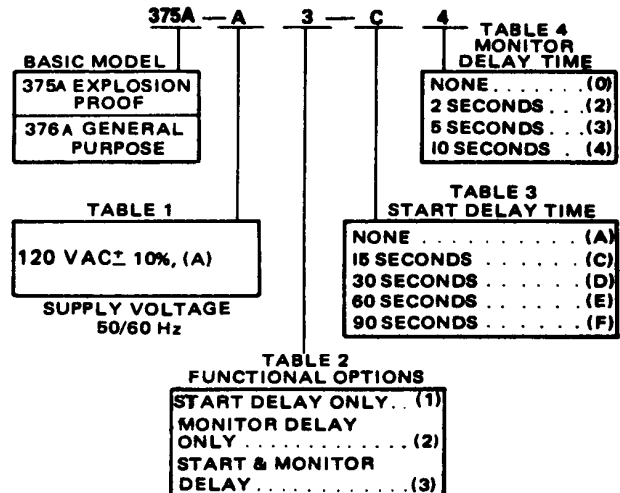


MODEL 375A EXPLOSION PROOF



MODEL 376A WEATHER PROOF

## HOW TO ORDER



# Robertshaw

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