



Model 375A/376A Vibraswitch[®] 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.



Features and Benefits:

- **Complete Vibration Protection in a Single Package**
Reasonably priced, lower installation costs
- **Explosion Proof Model (375A)**
FM Approved
- **Weather Proof Model (376A)**
NEMA 4
NEMA 4X (optional)
- **Acceleration Sensitive**
Measures destructive forces
- **Selectable Time Delay Control Options**
Permits maximum application flexibility
- **Ease of Adjustment**
Set it and forget it – one adjustment
- **Continuous Reliable Protection**
No attention required after installation
- **Solid State Switching**
Alarm or shutdown voltage completely isolated from instrument supply

Principle of Operation

The Model 375A and 376A Vibraswitches employ 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

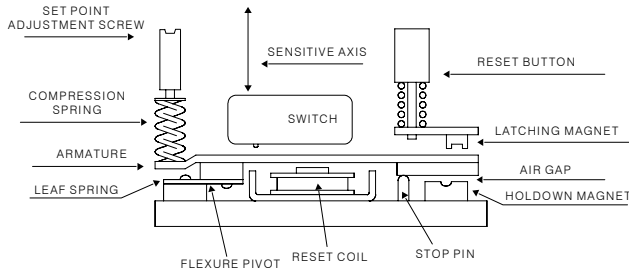


FIGURE 1

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.

"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 "TRIAC" switch can be set for either NO or NC operation by repositioning the jumper plug located on the circuit board.

"Start and Monitor Delay" models provide the control functions of both START delay and MONITOR delay in a single instrument. The "Start and Monitor Delay" models employ the same "TRIAC" switch found in the "Monitor Delay Only" models.

Specifications

Enclosure:

- 375A** Aluminum, unpainted (standard)
 FM Approved for Class I, Division 1,
 Groups C & D; Class II, Division 1,
 Groups E, F & G hazardous locations
 Aluminum, epoxy painted (optional)
- 376A** Aluminum base, unpainted (standard)
 with ABS thermoplastic cover &
 Kraton thermoplastic gasket, NEMA 4.
 Epoxy painted base (optional), NEMA 4X

Switch Contacts:

Start Delay Only Models:

- SPDT (dry contacts)
 5 A at 120 or 240 VAC

Monitor or Start & Monitor Delay Models:

- SPST Triac (solid state contacts)
 2 A maximum, 50 mA minimum at
 120 VAC only (will not switch DC)
 Field selectable for NO or NC operation

Set Point Range:

- Mounted Horizontal** 0 to 4.5 G (peak)
Mounted Vertical 0 to 3.5 G (peak)

Frequency Range

- 0 to 300 Hz

Set Point Adjustment

- 1 G per turn (approximate)

Temperature limits:

- Storage** -40° to +160° F (-40° to +71° C)
Operating -20 to +140° F (-29° to +60° C)

Shock

- 75 G @ 11 ms maximum

Supply Voltage:

- 120 VAC ±10%, 50/60 Hz

Supply Power:

- 15 W maximum

Delay Time Accuracy:

- ±30%

Net weight:

- 375A** 6.5 lbs (2.9 kg)
376A 2.25 lbs (1 kg)

Shipping weight:

- 375A** 7 lbs (3.2 kg)
376A 3 lbs (1.4 kg)

Agency Certification:

- 375A** FM Files 0Q7A3.AE & 0R1H7.AE
376A None

Ordering Information

375A - A 3 - C 4 - E

Key Model Number	_____	_____	_____	_____
Supply Voltage – See Table 1	_____	_____	_____	_____
Delay Function – See Table 2	_____	_____	_____	_____
Start Delay Time – See Table 3	_____	_____	_____	_____
Monitor Delay Time – See Table 4	_____	_____	_____	_____
Special Options – See Table 5	_____	_____	_____	_____

Key Model Number

Designation	Description
375A	Explosion Proof Vibraswitch, FM Certified
376A	Weather Proof Vibraswitch, NEMA 4

Table 1 – Supply Voltage

Designation	Description
A	120 VAC ±10%, 50/60 Hz

Table 2 – Delay Function

Designation	Description
1	Start Delay Only
2	Monitor Delay Only
3	Start & Monitor Delay

Table 3 – Start Delay Time

Designation	Description
A	None
C	15 Seconds
D	30 Seconds
E	60 seconds
F	90 Seconds

Table 4 – Monitor Delay Time

Designation	Description
0	None
2	2 Seconds
3	5 Seconds
4	10 Seconds

Table 5 – Special Options

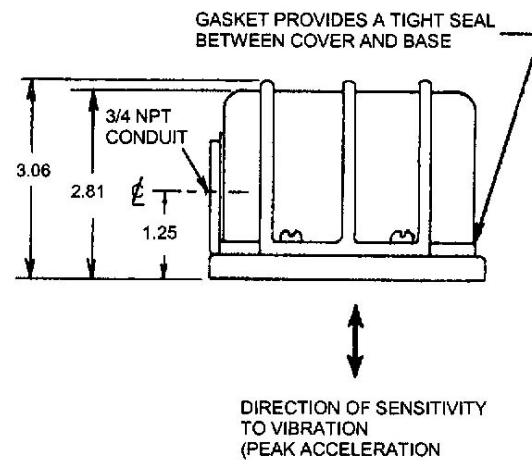
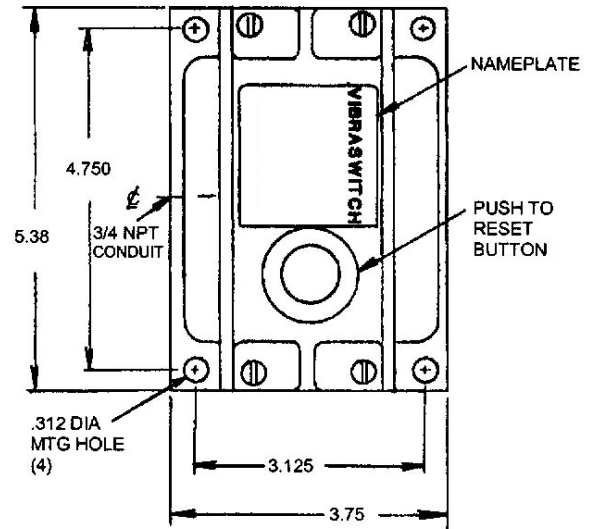
Designation	Description
Omit	No special options
E	For the 375A – Epoxy painted enclosure
	For the 376A – Epoxy painted base, NEMA 4X

Accessory Items

(Must be ordered separately)

Part no.	Description
904GB016	Rainshield for unprotected outdoor installations, steel, zinc plated
904GB016-03	Rainshield, steel, zinc plated and painted with gray epoxy enamel.

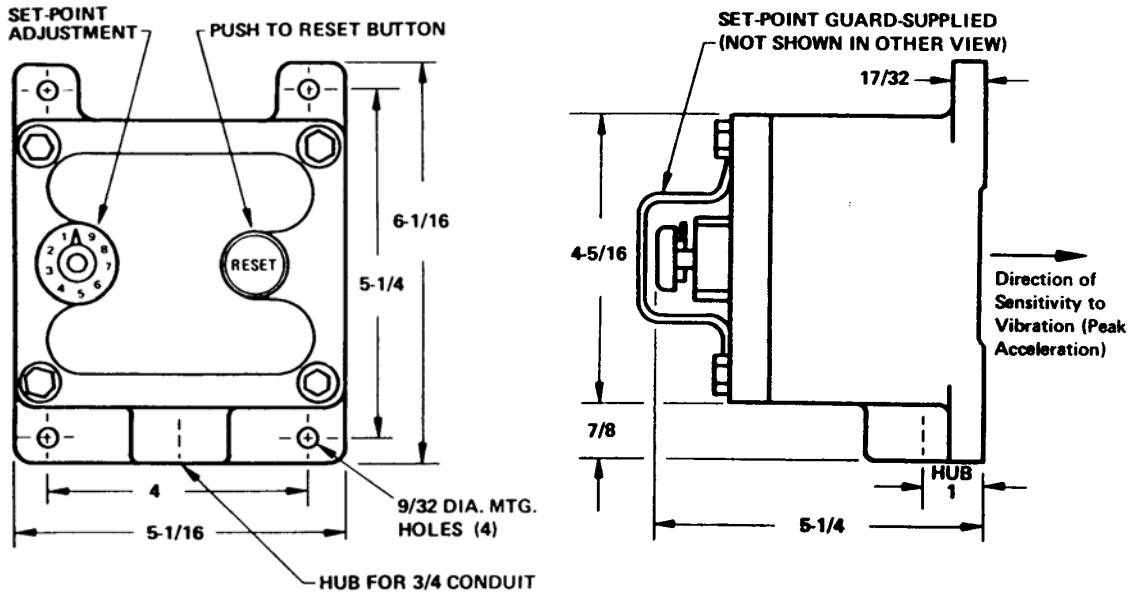
Model 376A Dimensions



Note:

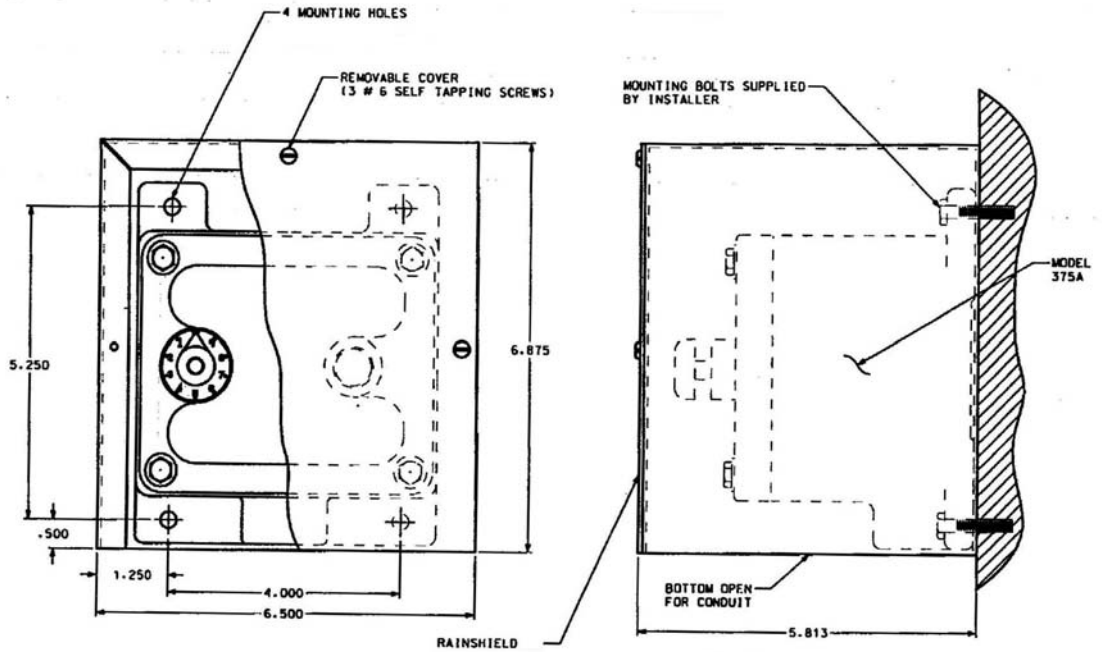
The mechanical reset pushbutton on the Vibraswitch will only reset the mechanical portion of the Vibraswitch and will not re-initiate the Start and/or Monitor Delay function and will not reset the solid state switch. The mechanical reset is normally only used when adjusting the set point.

Model 375A Dimensions



Rainshield Dimensions

Rainshields are recommended for outdoor installations. When using a rainshield the Vibraswitch must be mounted Vertical as shown. Rainshields must be ordered separately.



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