MARLEY®

user manual

IMI 685A vibration switch

INSTALLATION - OPERATION - MAINTENANCE

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READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.

contents

overview

The IMI 685A mechanical switch is a shock sensitive mechanism for shutdown of the electric fan motor. This switch uses a patented linear adjustment magnetic latch technology to ensure reliable operation. Pushing the reset button moves the tripping latch into a magnetically held position. A shock/vibration will move the magnet beyond this holding position, thus freeing the spring loaded tripping latch to transfer the contacts and shut down the machinery.

General Features

- Designed to detect severe shock/vibration in three planes of motion
- Fully adjustable, with patented linear adjustment technology
- Includes magnetic latching feature
- Accommodates normally open (NO) and normally closed (NC) wiring schemes
- Manual reset button with red trip indicator
- NEMA 4X (IP66) rated enclosure
- Remote options
  - 24VDC Remote Reset
  - 120VAC 60Hz Remote Reset
  - 240VAC 50Hz Remote Reset
- Top cover is secured with socket head cap screws for easy access to wiring terminals

⚠ Warning

If using a VFD to control fan speed, identify and lock out system resonant frequencies during start up and commissioning. Prolonged operation at resonant frequencies may lead to excessive vibration, equipment damage and/or possible injury.

⚠ Warning

AC and DC input signals and power supply voltages could be hazardous.

- ***Do not connect live wires to screw terminal plugs***
- ***Do not insert, remove, or handle screw terminal plugs with live wires connected***
- ***Do not make any adjustments to the set-point with live wires present***
- ***Do not open the unit if fan motor is powered or running***
- ***Do not open the unit if the relays are energized***
- ***Do not open the unit if the reset coil is energized***
- ***Do not make any adjustments if fan motor is energized and/or power is present anywhere in the switch***

installation

Before Installation

- Stop the fan motor
- Disconnect all electrical power to the fan motor
- Make sure the machine cannot operate during installation by following proper lock-out tag-out procedures
- Follow all cooling tower safety warnings
- Read and follow all installation instructions

⚠ Warning

Remove power before opening the cooling tower access door. Stop the fan motor and disconnect all electrical power before beginning the wiring operation. It is your responsibility to have a qualified person install and wire the unit and make sure it conforms with NEC and applicable codes.

The vibration switch is sensitive to shock and vibration in all three planes of motion – up/down, front/back and side/side.

1. Firmly secure the unit to the equipment using the base foot mount.
2. Mount the enclosure with conduit port located downwards.
3. For retrofit installations, this switch may have a different footprint than an existing switch. Field drill four holes into the existing mounting plate or mechanical beam and mount switch with hardware based on mounting hole dimensions below. Replacement mounting plate and hardware can also be purchased through SPX, if desired.
4. Make the necessary electrical connections to the vibration switch. See **Figure 1** for electrical terminal locations and for typical wiring. ***Do not exceed voltage or current ratings of the contacts***. Follow appropriate electrical codes/methods when making electrical connections. Be sure that the run of electrical cable is secured to the machine and is well insulated from electrical shorting. Use of conduit is recommended.

Note

If the electrical cable crosses a pivot point such as at the pivot of the walking beam, be sure to allow enough slack in the cable so that no stress is placed on the cable when the beam moves.

If conduit is not used for the entire length of wiring, conduit should be used from the electrical supply box to a height above ground level that prevents damage to the exposed cable from the elements, rodents, etc, or as otherwise required by applicable electrical codes. If conduit is not attached directly to the switch, use a strain relief bushing and a weatherproof cap on the exposed end of the conduit. A “drip loop” should be provided in the cable to prevent moisture from draining down the cable into the conduit should the weatherproof cap fail.

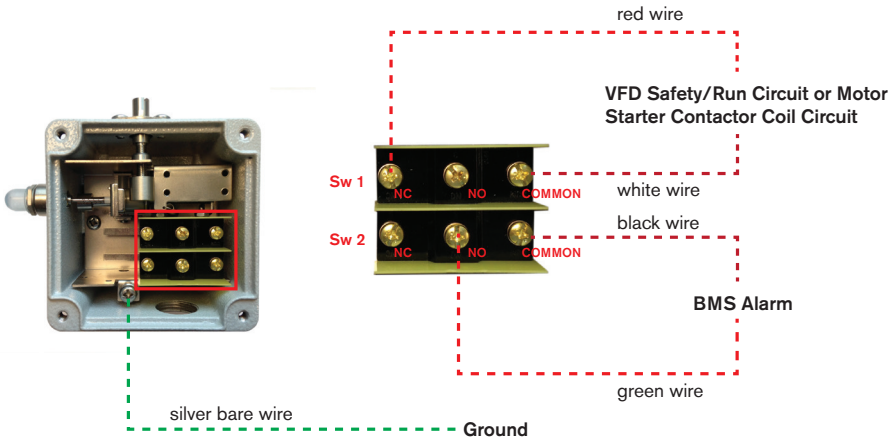


Figure 1

Field Wiring

Typically this switch is used to shut off the tower fan motor and provide an alarm. The switch has two SPDT (single pole double throw) contacts operating in unison providing a contact closure or contact opening in the event of a trip. The NC contact of Sw 1 may be used to complete a safety/start circuit of a VFD or motor starter. When the switch trips this contact will open and break the circuit. The NO contact of Sw 2 may be used to complete the alarm circuit. When the switch trips this contact will close and complete the alarm circuit.

⚠ Caution

The factory installed cord set is furnished with a water tight vapor barrier cord grip. If conduit is used, the inside of the conduit must be sealed to prevent water vapor from reaching the inside of the switch. A vapor barrier may be created in the field using expanding foam injected into the conduit after wiring connections have been made. Quality conduit fittings and proper installation of the switch lid is required to maintain product warranty.

Internal Switch Contact Ratings

The vibration switch uses two SPDT switch terminals with removable screws for all connections (see below). Wire the switch contacts depending on application, either Normally Open or Normally Closed. The Normally Open and Normally Closed are referenced to the Common screw terminal connector.

Rated Voltage	Resistive Load	Inductive Load	Motor, Lamp Load	
			NC	NO
AC 125V	15A	10A	4A	2A
AC 250V	15A	10A	3A	1.5A
AC 480V	3A	2A	-	-
DC 8V	15A	15A	-	-
DC 14V	15A	10A	-	-
DC 30V	6A	5A	-	-
DC 125V	0.5A	0.05A	-	-
DC 250V	0.25A	0.03A	-	-

operation

⚠ Caution

Do not exceed the maximum relay ratings as noted below.

Switch Setup

The IMI switch is factory set to trip in the event of excessive shock/vibration within its capability and should not require adjustment. If adjustment is required, either the trip point needs to be adjusted or the switch is being subjected to an abnormally high vibration or shock. Should adjustment be desired, reference the procedure below or contact your local Marley representative for assistance.

Adjustment Procedure

⚠ Warning

Resetting the vibration switch may cause the fan motor to operate. Follow lock out, tag out procedures.

Press the reset push-button to engage the magnetic latch, **Figure 2**. Be sure the reset button remains depressed. If it does not remain depressed, turn the sensitivity adjustment screw clockwise until it does, **Figure 3**. Turning the adjustment screw clockwise increases the set-point at which the switch will

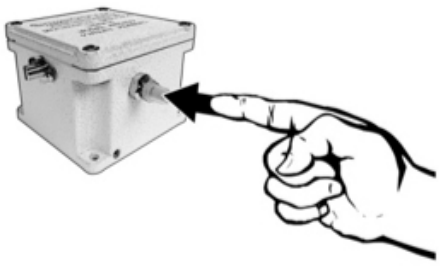


Figure 2

trip making it less sensitive to vibration. Turning the adjustment screw counter-clockwise reduces the set-point making it more sensitive to vibration. The adjustment range is 0 to 7g. Refer to **Figure 4** for the factory default setting.

Factory Setting

The switch should be factory set. To confirm factory setting remove the lid and measure the gap distance between the edges of the cylinder and the square magnet, see **Figure 4**. If the gap setting is not 6mm rotate the adjustment screw clockwise or counter clockwise until a 6mm gap is obtained, **Figure 3**. Using a 6mm wide metal strip as a gauge works best.

Note

A slight difference of 2mm either way creates a large change in the trip point setting.

Turning the adjustment screw clockwise increases the trip point making the switch less sensitive to shock. Turning the adjustment screw counter clockwise decreases the trip point making the switch more sensitive to shock.

Adjustment – If Required

Note

Make sure the switch is set per "Factory Setting" before making any adjustments.

Operate fan motor as follows:

Motor starter operation (full voltage or DOL start):

- Start the fan motor. If the switch trips rotate the adjustment screw clockwise one-quarter turn, reset the switch and restart the motor.

VFD operation:

- If the VFD has a bypass motor starter follow the above procedure first using the bypass motor starter.
- Using the VFD speed control, slowly ramp up the motor speed to full speed allowing 5 seconds for every 2 hertz of speed change. If the switch trips during the ramp up procedure, consider performing a vibration analysis on the tower operation.

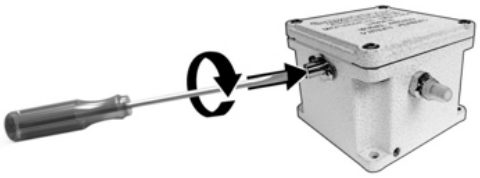


Figure 3

Note

Rotating the adjustment screw clockwise increases the trip point. Turning counter clockwise decreases the trip point

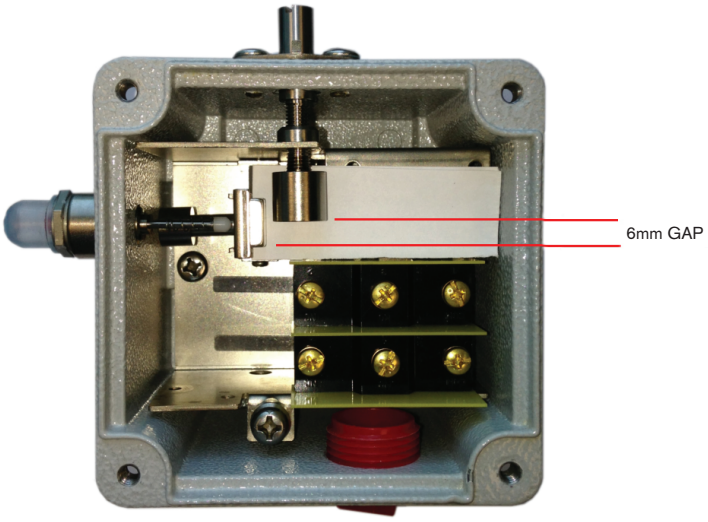


Figure 4

Gap Setting

The factory setting is determined by a 6mm gap measurement illustrated in **Figure 4**. Adjust the sensitivity screw clockwise or counter-clockwise to achieve the dimension shown.

Switches with Remote Reset Option

A switch with the remote reset option uses an internal electrical solenoid with a plunger to remotely reset the internal trip mechanism. The solenoid requires electrical power to operate and is typically provided from the starter equipment in conjunction with a remote reset push-button station.

A mechanical switch is designed to sense a high shock or severe vibration event and cannot sense low vibration frequencies sometimes associated with cooling towers. When the switch trips it typically means a catastrophic event may have occurred. Upon a trip event, a thorough inspection of the tower, fan and drive train should be performed before restarting the fan motor. The operator should not simply reset the switch without an inspection being performed.

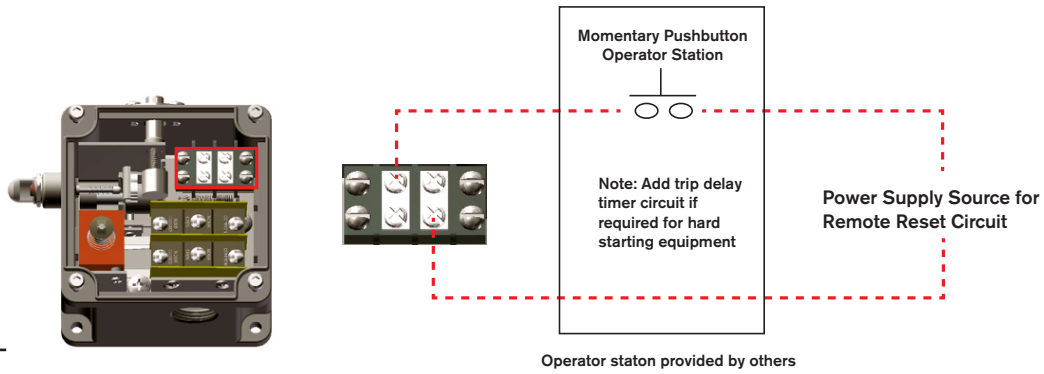


Figure 5

operation

The switch can be remotely reset after being tripped by applying the correct voltage across the reset terminal as shown below in **Figure 5**.

Note

There is no positive/negative polarity needed for the wiring. While the power is applied to the remote reset terminals, the switch cannot be tripped.

24 VDC Switch–A 24VDC power supply is needed to remotely reset the switch by energizing a solenoid. The 24VDC power source must be capable of supplying at least 2A of current. Upon power up, the unit will need the 2A to energize the remote reset coil. Depending on ambient temperature, this will decrease to approximately 0.4A after 5-10 seconds. After that time, the coil can be energized indefinitely.

To protect the remote reset solenoid from overheating, the unit has a built in thermistor that will limit the coil current after a certain amount of time. This time is dependent on ambient temperature and if the reset coil was recently energized. Since the coil needs the peak current only for a short period of time, the thermistor lowers the current but it is still strong enough to hold the switch in reset mode.

Note

The switch will start feeling warm to the touch if the remote reset coil is left energized for more than a few minutes.

120 VAC Switch–A 120VAC, 60Hz power supply is needed to remotely reset the switch by energizing a solenoid. Upon applying 120VAC to the solenoid, the unit will need 184mA to energize the remote reset coil. At standard ambient temperature, the solenoid has a 25% “on” 75% “off” cycle.

Maximum allowed On Time (remote reset energized) versus minimum Off Time (remote reset de-energized).

On Time (25%)	Off Time (75%)	Total Time (100%)
4 Minutes (Max)	12 Minutes	16 Minutes
2 Minutes	6 Minutes	8 Minutes
1 Minute	3 Minutes	4 Minutes
30 seconds	1.5 Minutes	2 Minutes

Note

If using the solenoid for a power on delay, do not exceed the “on” times listed. If the “on” time exceeds 4 minutes and/or the “off” time is shortened before energizing the solenoid again, the solenoid will be permanently damaged.

operation

240 VAC Switch–A 240VAC, 50 Hz power supply is needed to remotely reset the switch by energizing a solenoid. Upon applying 240VAC to the solenoid, the unit will need 92mA to energize the remote reset coil. At standard ambient temperature, the solenoid has a 25% “on” 75% “off” cycle.

Maximum allowed On Time (remote reset energized) versus minimum Off Time (remote reset de-energized).

On Time (25%)	Off Time (75%)	Total Time (100%)
4 Minutes (Max)	12 Minutes	16 Minutes
2 Minutes	6 Minutes	8 Minutes
1 Minute	3 Minutes	4 Minutes
30 seconds	1.5 Minutes	2 Minutes

Note

A power ON delay may be required when starting tower fan motor across the line (DOL). A 15 second delay is suggested to allow the fan to come up to full speed before allowing the switch to activate.

Commissioning

Before testing the switch make sure it is reset. If the red plunger protrudes outwards push the reset button inwards to reset the switch, **Figure 1**.

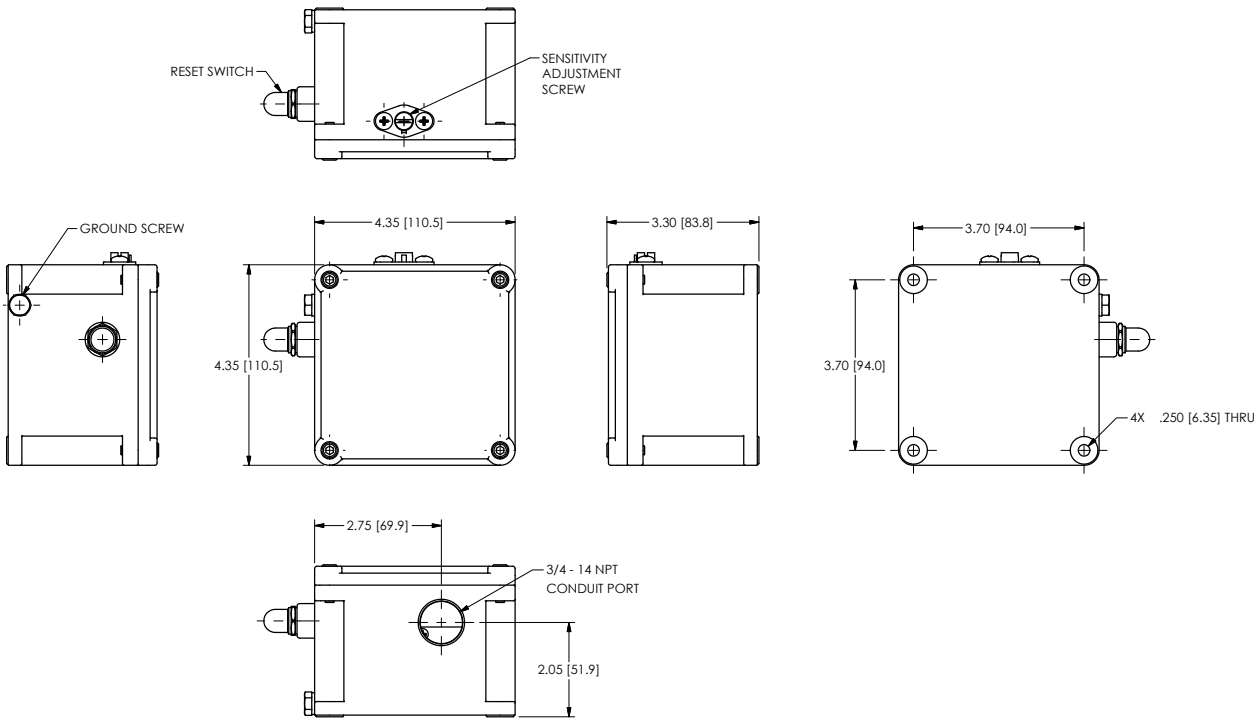
The switch is shock sensitive. Using a dead-blow hammer strike the lid or switch support beam to trip the switch. A trip is visually indicated by a protruding red stem shown in the reset button, **Figure 1**. Reset the switch for operation.

Specifications

Model	Reset	Relay Contact Output	Measurement Range	Frequency Range
2558910	Manual external reset button	One - DPDT form “C” 15 amp at 120 VAC	Inertial 1-7 g pk 0-68.7 m/s^2 pk adjustable	0 to 6000 cpm 0-100 Hz
2558911	Manual external reset button and 24 VDC remote reset solenoid			
2558912	Manual external reset button and 120 VAC 60 Hz remote reset solenoid			
2558914	Manual external reset button and 240 VAC 50 Hz remote reset solenoid			

Model	Startup Delay	Trip Indication	Enclosure Type	Conduit Fitting	Electrical Certification
2558910	No	External red indicator	NEMA 4X / IP66 epoxy painted aluminum	One - 3/4 inch NPT threaded female connection with liquid tight fitting and cord provided	C US CE
2558911	Timer required in customer’s start circuit				
2558912					
2558914					

Dimensions



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