



## USER'S GUIDE

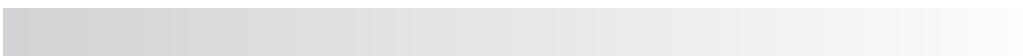
Installation & Operation



VS12-AC/DC

Vibration Switch

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### VS12-AC/DC Vibration Switch



The VS12 is a vibration switch designed to protect rotary machines (such as motors, pump and fans, etc.) by shutting the system down when an excessive rate of vibration has been detected. Machine vibration is constantly monitored by the VS12 and when the limit has been exceeded, an output is triggered, so that the machine is either disarmed or an auxiliary alarm is activated to prevent damage or a state of process shutdown.

**Technology:** The VS12 uses a 1-axis accelerometer to monitor misalignment and imbalance generated by incorrect installation, machine defects or faulty windings or bearings, etc.

2 modes of operation can be configured to either disarm the system or create an alarm state without disarming the system when indicating a failure due to excessive vibration is preferred.

Programming the unit is achieved with a magnet pen (included) and does not require the use of software. Just set the limit (as expressed in the percentage of excess vibration) which can be adjusted between 5% and 100% of the full scale/range of vibration (normally 1 inch or 25.4mm/second RMS). When the vibration exceeds this limit, the output state changes.

A programmable delay function enables the user to also set a time delay for tripping the output so that false shutdowns or alarms can be avoided. There is also a non-programmable initial start-up delay of 10 seconds to allow for system stabilization.

The VS12 also features a Bypass function, which enables the user to bypass the VS12 without removing it from the system. This allows the machine to continue operating, so as not to interrupt an important plant process until maintenance personnel can schedule the repair of the rotating machine.

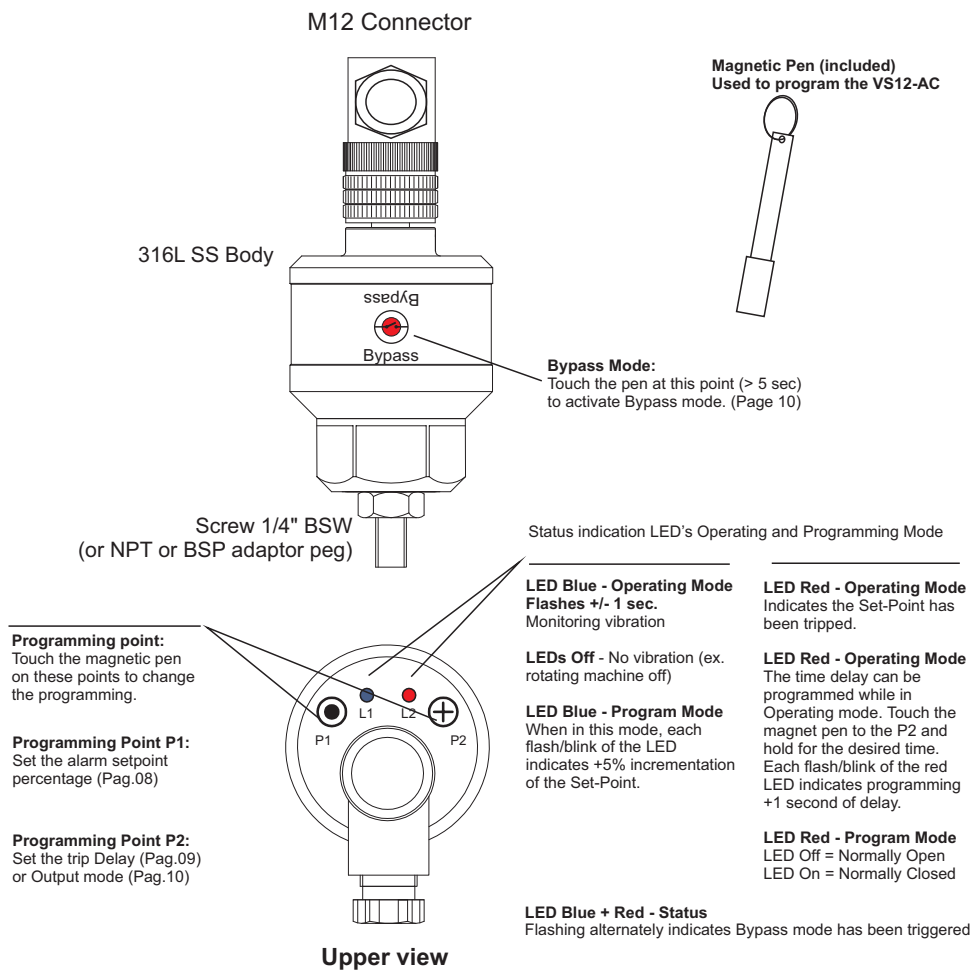
The VS12 operates with only 2 wires. Installation should be made in series with the contactors.

**Applications:**

- Protection and preventative maintenance for Pumps, Engines, Compressors, Turbines, Centrifuges, Exhaust Hoods, Generators, etc.

**VS12 characteristics**

- 2 output modes: Alarm (with auto-reset) and Disarm;
- Timings: Initial start-up delay(10 seconds) and Trip delay (adjustable from 1...60 seconds);
- Indicates excessive vibration;
- Programmable Set-Point for excessive vibration: Within the range of 1inch/s (25mm/s) RMS;
- Output (2 wires) load in series with the power supply (Alarm or Disarm);
- 316L Stainless Steel body (IP66 rated);



### Overview

All adjustment must be done using the included magnetic pen. By touching the magnet pen at P1 or P2 programming points, it is possible to change:

Vibration alarm set-point (with incremental 5% percentage increases), Time Delay, Bypass mode and output mode. The VS12 also has LED indication to monitor the operating conditions and system failures.

### **Alarm Set-point:**

The alarm set-point can be programmed with +5% incremental changes. The vibration range may vary (0 ~ 1inch / s) and the alarm set point can be programmed between 5% and 100% of full scale.

### **Bypass mode:**

The VS12 is removed from the system loop. Set this mode when you want to keep the vibration switch inoperative without physically removing it and disconnecting it from the system. (eg when you do not want to allow the continued operation of a rotating machine that you know may have a problem).

### **Other Functions:**

Initial Delay on Start-up.

In general the start-up of a rotating machine can generate higher rates of vibration. Because of this the VS12 has a fixed initialization delay of +/- 10 seconds. This delay has been programmed so that the VS12-AC will only start to monitor the vibration after the systems vibration has stabilized. This delay is factory calibrated and can only be altered by request prior to the unit being manufactured.

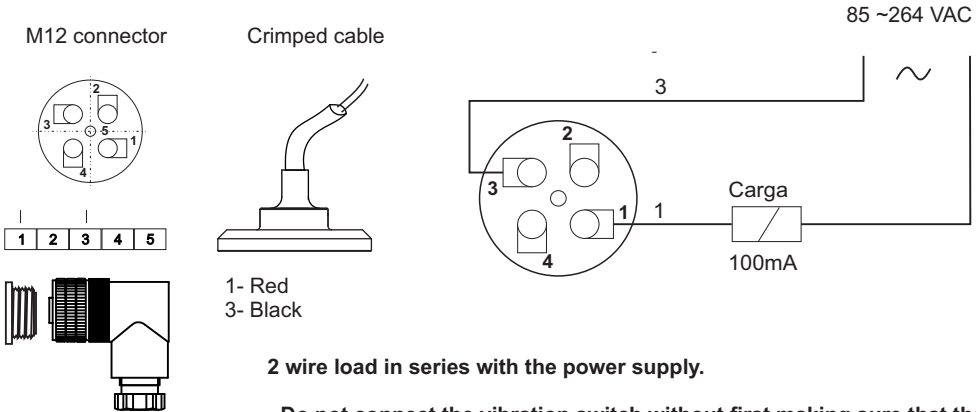
### **Output Alarm Delay**

Additional external vibration near the installation site (such as trucks w/ heavy loads ) or peaks of vibration on the rotating machine can occur. The Output Alarm Delay can eliminate false triggers or alarms from excessive vibration peaks. The Delay function can be set from 1 to 60 seconds (while in Operating Mode). By activating the Delay function, the trip will only occur when the vibration and time delay is exceeded.

### **Output Type:**

The VS12 can be programmed to operate in the Normally Open or the Normally Closed state for disarming (to shut down the system) or for alarm (to indicate excessive vibration without shutting down the system). For the disarming mode the VS12 is installed in series with the control system in order to switch off or disarm the system in the event of excessive vibration. For the alarm mode, the VS12 is installed in series with an alarm siren and the vibration switch acts as an indicator of excessive vibration. (see output mode pag.7 for more details).

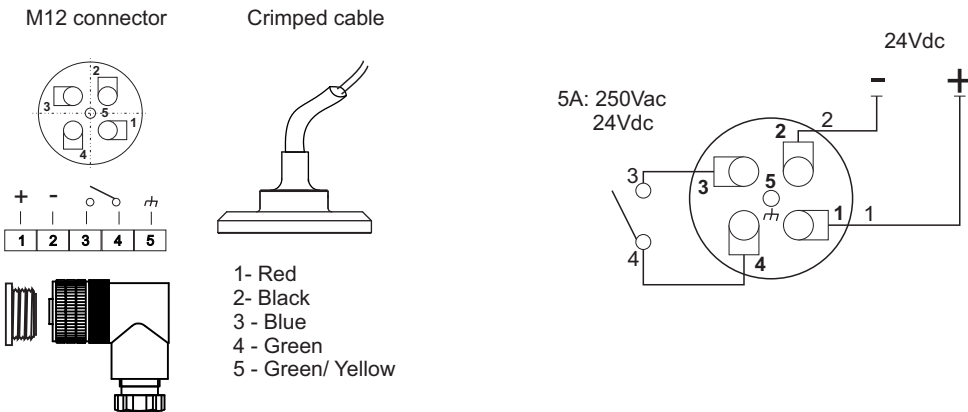
### VS12 AC



2 wire load in series with the power supply.

- Do not connect the vibration switch without first making sure that the load is connected in series so as not to run the risk of short circuiting the Vs12.
- Avoid tripping to power contactors
- Use auxiliary contactors

### VS12 DC

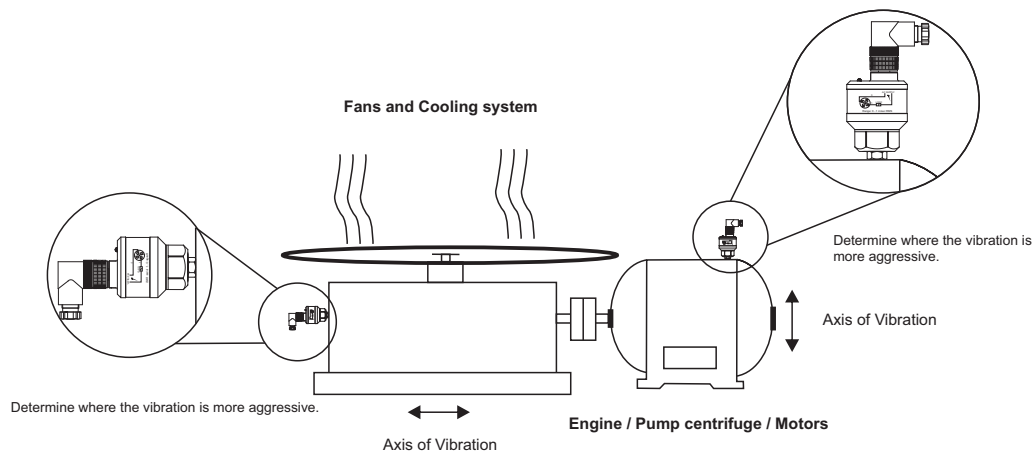


# Installation

## Installation

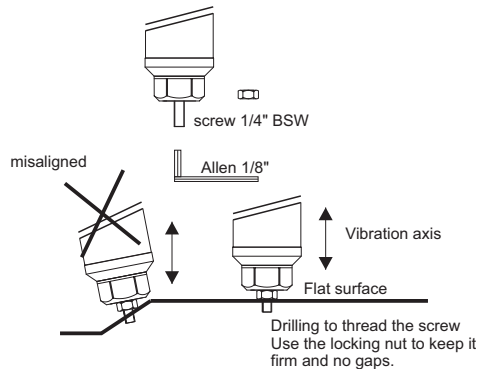
It is important that the VS12 is mounted on the best axis relative to direction of vibration. To decide which orientation is best, first determine in which direction the machine manifests more vibration movement. The VS12 should be mounted parallel to, or along the same vibration axis as the machine.

To avoid interference, the VS12 should be installed as close as possible to the origin of the vibration or directly to the part of the equipment that is vibrating (such as motor, pump, bearing,



### SV42/MV42 Screw and Nut (1/4" BSW)

Stud bolt for permanent and safe installation. Do not attempt to mount on curved, rough or uneven surfaces as the misalignment potential and the limited contact surface can significantly reduce the operating frequency range of the sensor. Attach the screw to the base of the transmitter with a 1/8" allen wrench. Prepare the surface and leave the surface smooth and then drill with 1/4" BSW male drill bit to use the nut for tightening and fastening without gap. For threaded connections keep the same procedures.

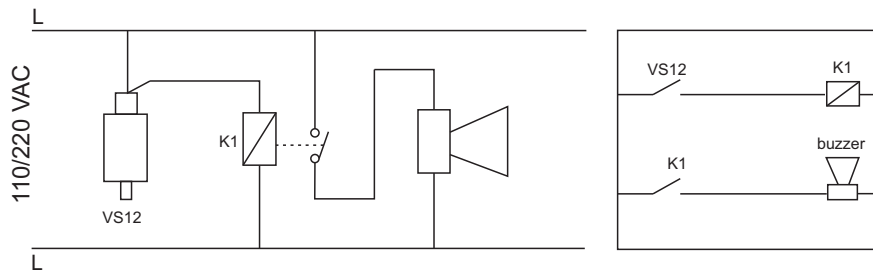


## Output Modes

### Wiring examples

#### **Alarm Only Mode:**

**Vibration switch set to Alarm Only Mode and operating as Normally Open (N.O.)**  
In this mode the switch will not de-activate a pump.

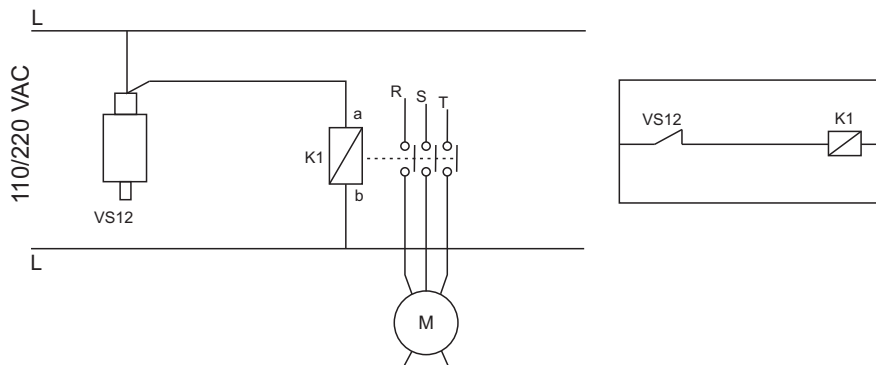


In this type of situation the VS12 will only trigger an alarm when there is an excess of vibration. This type of connection is ideal when you do not want to interrupt the process and stop the rotary machine, but let the operator know that a check and maintenance should be performed.

In this mode it is not necessary to reset the VS12. Whenever the vibration falls below the set point (as well as the Hysteresis delay of +/- 5 seconds) the unit will auto-reset and the output will return to its previous state (Normally Open).

#### **Disarm Mode:**

**Vibration switch set to Disarm mode and operating as Normal Closed (N.C.)**  
Can be used to shut off a motor in case of excess vibration.



In this type of situation the VS12 is connected in series to the drive system of the motor or pump. When a state of excess vibration occurs, the VS12 will disarm the system and a shutdown will occur. This type of situation is ideal when it is necessary to stop the rotary machine and protect it from damage because of some problem.

This mode the VS12 needs to be restarted in the event of excessive vibration.



# Programming



### Programming Set point:

Whenever Programming Mode is engaged, the Set-Point percentage will start at 5% of full scale and increase (in increments of 5%) up to 100%. To fix the Set-Point at a certain percentage of the full scale of vibration, simply remove the pen from the programming point when the desired Set-Point has been achieved and the VS12 will go directly into Operation Mode and start to monitor the vibration.

- 1 - Install the VS12 at the appropriate point on the machine (see page 5).
- 2 - Turn the power to the machine on and restart VS12 while keeping the pen in the programming point P1 and wait for +/- 10 seconds (VS12 stabilization time), then with the pen still on P1, the blue LED will begin to flash indicating that there is a percentage increase. Remember that 1x Blue LED flashes = 5% / 2x Blue LED flashes = 10%, and so on. Remember that it is necessary to start equating these Blue LED flashes with an increase to the Set-Point.

### Function of the Red LED in Programming Mode:

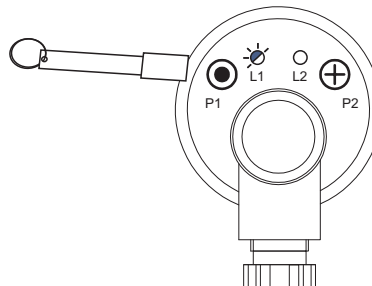
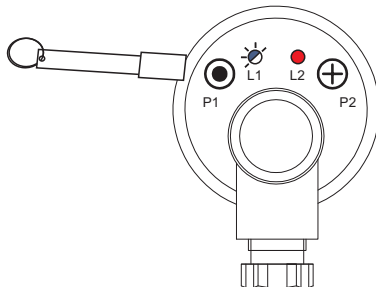
The Red LED functions as a monitor of the actual vibration rate of the machine. The user should use this as a marker between the actual/normal rate of vibration and the Set-Point that will be programmed. Clearly, the user will be programming the Set-Point for a condition in excess of the actual/normal rate of vibration. That is why the Red LED serves as a marker for the user to understand where normal vibration ends and an Alarm or Disarm condition begins.

Red LED ON: Indicates that the setpoint is below machine vibration

Red LED OFF: Indicates that the setpoint is above an ideal state of machine vibration (ideal operating condition).

- Restart the VS12. Touch the magnetic pen on this point and wait for the blue LED to flash, slowly indicating that the programmed percentage increase is being recorded. The Red LED lit indicates that alarm setpoint is still below machine vibration.

When the Red LED turns off it indicates the moment that the setpoint exceeded machine vibration. This is the moment that the programmer should note how many more times the Blue LED flashes as this will determine the percentage of vibration above normal vibration that the VS12 has been calibrated to Alarm or Disarm at.



### Theoretical visualization of the Alarm Setpoint programming and LED indication

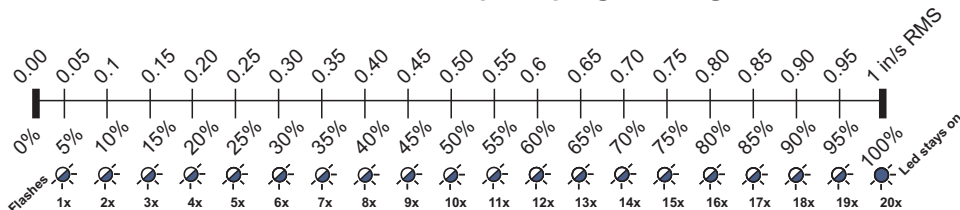


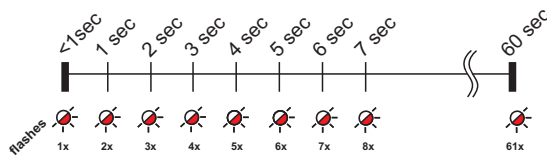
Fig. Set the VS12 to a 30% setpoint. Following the above procedure, hold the pen in the sensitive point and wait for the blue LED to flashes for 6x, then remove the pen from the sensitive point.

## Programming

### How to set Time Delay

- With the VS12 in operation (monitoring vibration), hold the magnetic pen at the programming point  $\oplus$  to set the delay time. See the chart below. Observation: Every time that the magnetic pen is held to the programming point a new count is recorded. This is not a cumulative feature.

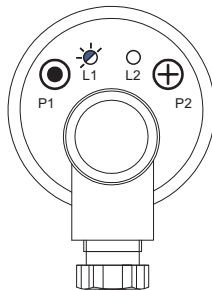
### Theoretical display of the time delay programming and LED indication



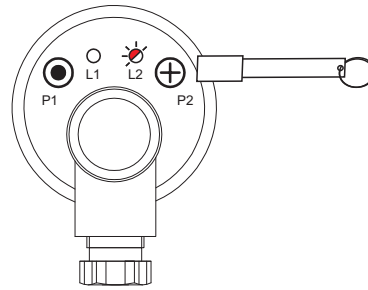
To obtain a time delay of 3 seconds, hold the magnet pen on the programming point and wait for the red LED to flash 4x, then remove the pen from the programming point.

**Delay <1 sec. means a fast trip delay which makes the VS12 very sensitive to vibrations caused by passing trucks, knocks and other abrupt movements to the machine which can cause a false alarm.**

Blue LED flashes continuously +/- 1 sec.  
Indicates that VS12 is monitoring the vibration




$\oplus$  Touch the magnetic pen on this point and the red LED will flash.  
The time delay is defined by the number of flashes.




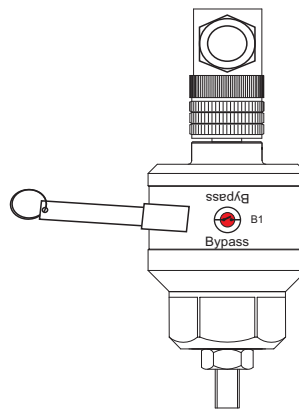
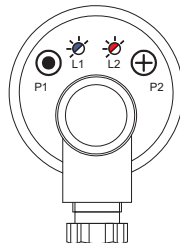
## Bypass Mode

In this mode it is possible to:


Keep the vibration switch inoperative without the need to disconnect or remove it from the circuit or control system.

- Ÿ 1 - While the VS12 is in Operating Mode (monitoring vibration), place the magnetic pen in close proximity to the point for  more than 5 seconds. This will engage Bypass Mode. While in Bypass Mode the LEDs (blue and red) will flash alternately and the output will remain off. In this mode the switch will not monitor vibration.
- Ÿ 2 - To exit this mode simply repeat step #1 or restart the VS12.

 Place the magnetic pen in close proximity to this point for more than 5 seconds. The blue and red LEDs will flash alternately to indicate that you have successfully entered this mode.

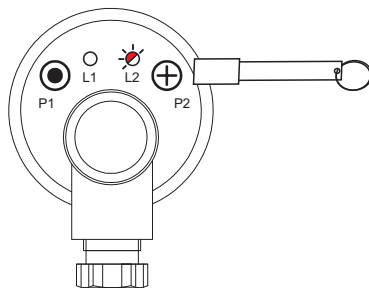


## Programming the Output Type for either Normally Open or Normally Closed (see page 6 - Output Modes - for the wiring diagram)





- Ÿ 1 - Restart the VS12 by holding the pen on the Programming Point . Continue to hold the pen on the Programming Point and wait for the red LED to start slow blinking as shown below. The slow blinking red LED will give the programmer a chance to choose if the LED should stay on or off.

**Red LED On:** VS12 in disarm mode. Remove the pen from the point when the LED is lit.  
**Red LED Off:** VS12 in Alarm mode. Remove the pen from the point when the LED is off to hold the VS12 in this mode.

(see page 7 Output Modes for an understanding of how this will affect operation)  
 After removing the pen from the point the VS12 will auto reset and start to monitor the vibration with new output programming.



### Output State

LED	Output	
Off 		(Alarm mode NO)
On 		(Disarm mode NC)

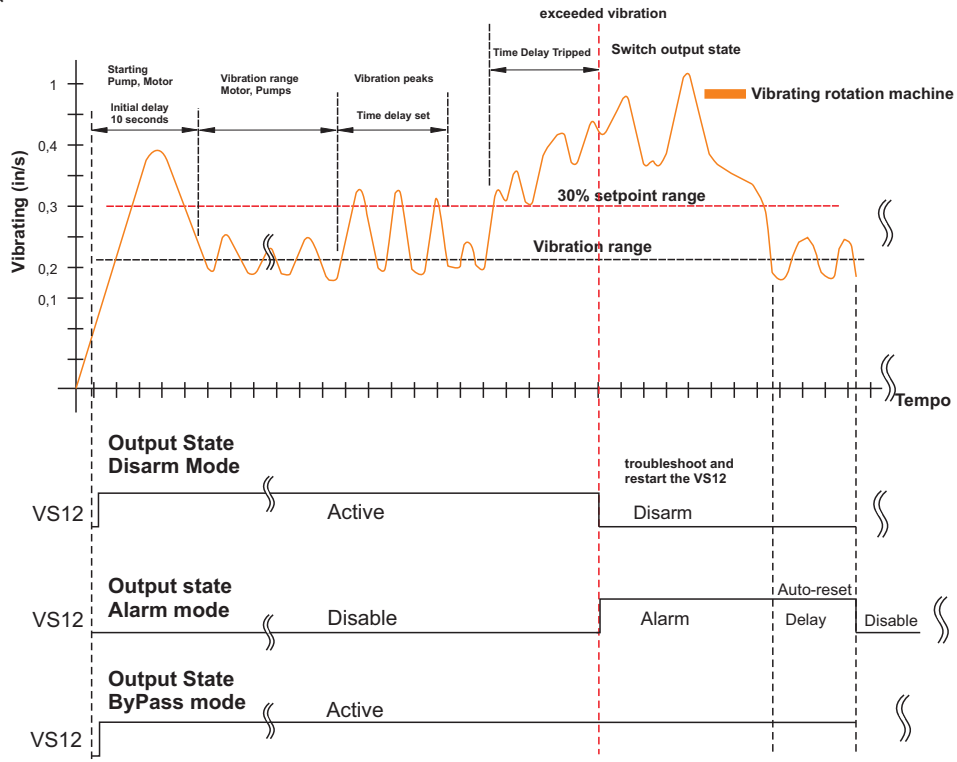
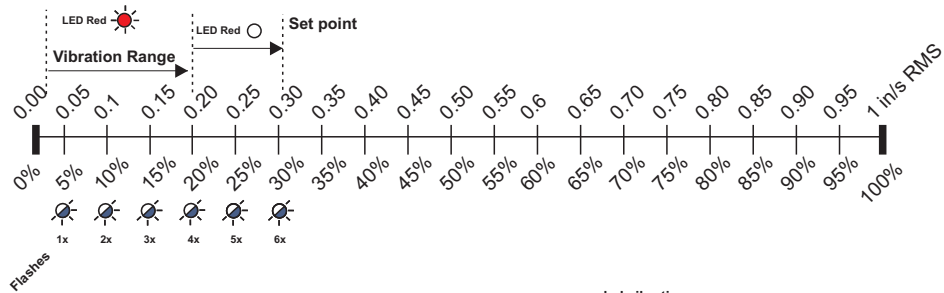
## Programming Example

Example of a graphic for a rotating machine application with natural vibration speed at 0.2 in/s RMS, output percentage 30 ~ 35 % of full scale (0.3 ~ 0.35 in / s RMS) with a time delay.

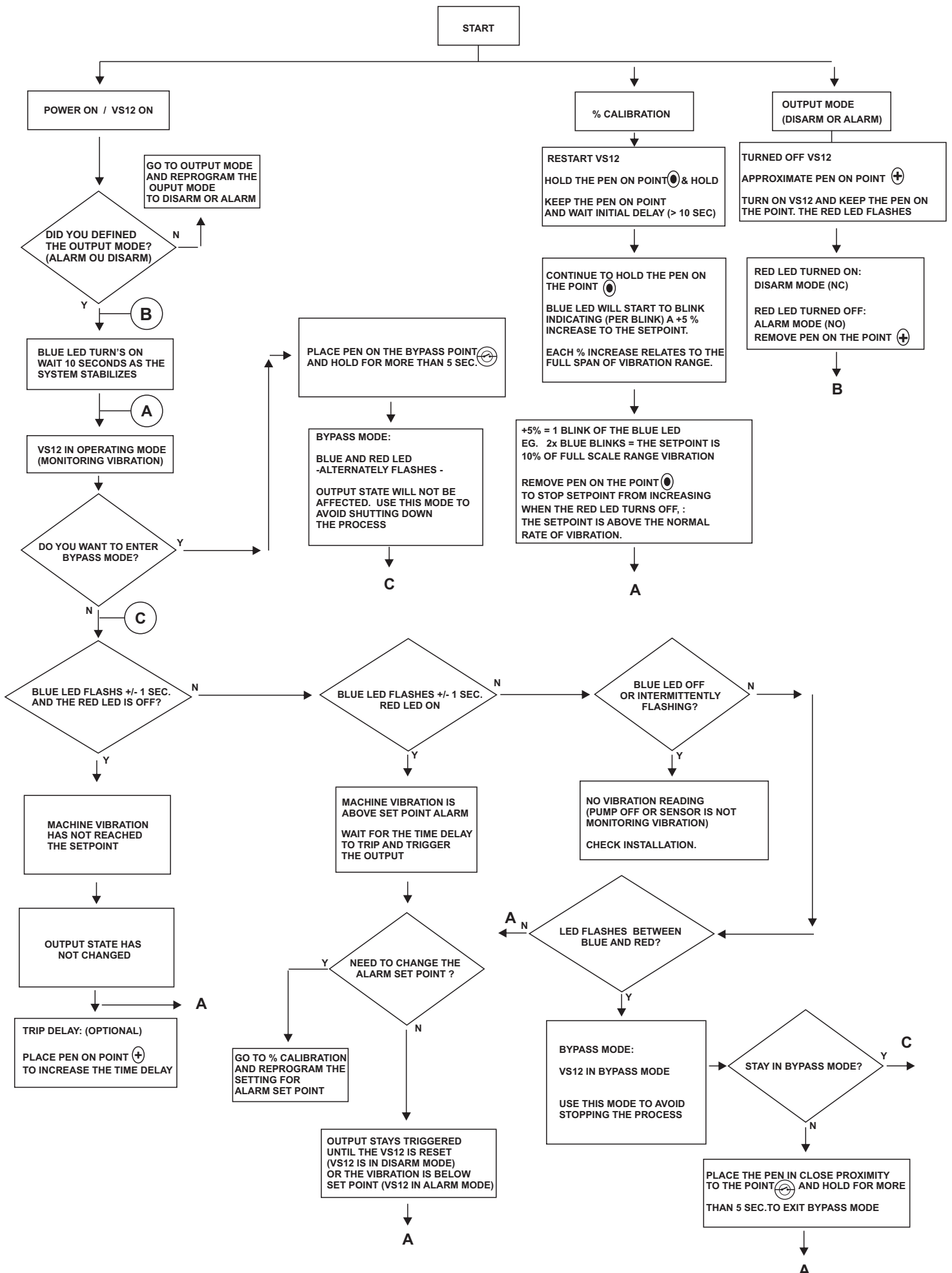
1. Install the VS12 on the rotary machine
2. Program the output type (page 10)
3. Program the alarm setpoint (page 8)
4. Set the time delay if necessary (page 9)

Red LED (ON) indicates that the Setpoint has not exceed the limit of the machine's actual rate of vibration.

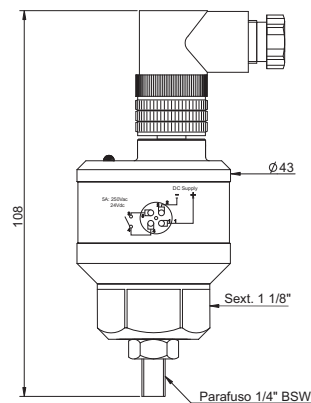
Red LED (OFF) indicates that the setpoint has exceeded the limit of the machine's actual rate of vibration.



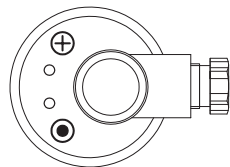
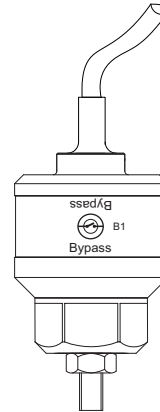
# Operational Flow Chart



M12 connector

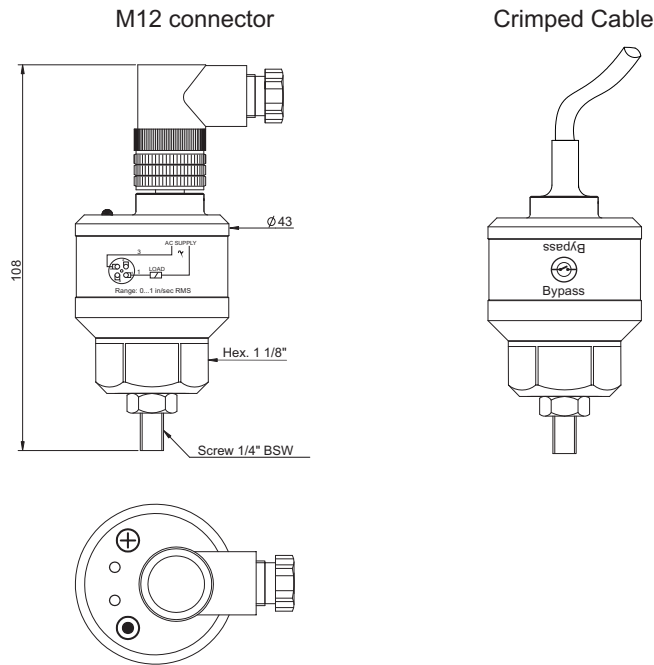


Crimped Cable



## VS12 DC Vibrating Switch

<b>Application:</b>	Monitor and alarm misalignment and imbalance on rotating machines
<b>Power supply:</b>	24Vdc +/- 10%
<b>Output:</b>	1 x SPST (5A/250Vac & 5A/24Vdc)
<b>Consumption:</b>	<25mA
<b>Output type:</b>	Alarm mode (NO)/ Disarm mode (NC)
<b>Programming:</b>	Time delay / Setpoint alarm / Output state / Bypass mode
<b>Indication:</b>	LED's
<b>Set point Error</b>	+/- 3%
<b>Vibrating range:</b>	0...1 in/s (25.4mm/s) RMS
<b>Frequency range:</b>	10Hz to 1000Hz
<b>Sensor type:</b>	1 axis accelerometer
<b>Temperature range</b>	-10...70°C
<b>Process connection:</b>	1/4" BSW / NPT or BSP
<b>Electrical connection:</b>	M12 Connector or Crimped cable (2 meters)
<b>Class protection:</b>	IP66
<b>Body material:</b>	316L SS



### VS12 AC Vibrating Switch

<b>Application:</b>	Monitor and alarm misalignment and imbalance on rotating machines
<b>Power supply:</b>	85...264V AC
<b>Output:</b>	Solid state relay (load in series with power supply)
<b>Load:</b>	100mA Nominal / Current Peaks of (3x 100mA per 1 second)
<b>Output type:</b>	Alarm mode (NO)/ Disarm mode (NC)
<b>Programming:</b>	Time delay / Setpoint alarm / Output state / Bypass mode
<b>Indication:</b>	LED's
<b>Set point Error</b>	+/- 3%
<b>Vibrating range:</b>	0...1 in/s (25.4mm/s) RMS
<b>Frequency range:</b>	10Hz to 1000Hz
<b>Sensor type:</b>	1 axis accelerometer
<b>Temperature range</b>	-10...70°C
<b>Process connection:</b>	1/4" BSW / NPT or BSP
<b>Electrical connection:</b>	M12 Connector or Crimped cable (2 meters)
<b>Class protection:</b>	IP66
<b>Body material:</b>	316L SS

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Order entered but not released for manufacturing	10%
Order in any stage of production	75%
Order complete and ready for shipment	100%

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The Buyer must make all tools, resources or personnel available to help Sitron to diagnose the defect without any back charge. In absence of Buyer's cooperation in this regard, there shall be no liability under the above Warranty.

Sitron's liability under this warranty shall be limited to repair or replacement at Sitron's option of such defective Products, FOB factory, upon proof of defect satisfactory to Sitron. Warranty does not include transport.

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