



# Operator's Manual

## Vibration Switch VS2

### 1. Application

The Vibration Switch VS2 is a simple instrument for triggering a switching process if the vibration at the measuring point exceeds a pre-adjusted level. The adjustable vibration range from 0.2 to 2 g at frequencies from 1 Hz to 1 kHz allows a variety of applications. Typical applications are:

- Plants, where vibrations can lead to dangerous situations for personnel and equipment
- Vibration monitoring in a production processes as part of quality control
- Vibration monitoring on air fans, pumps, compressors etc.
- Vibration monitoring on rail vehicles
- Protection against shock load at the transport of fragile goods
- Safety switch at doors and gateways

In the past, often mechanical switches have been used for such applications. They consist of a spring-mass system, where the vibrating mass at a certain deflection shuts a contact. The advantage of the Vibration Switch VS2 is its easy adjustability and its higher reliability.

### 2. Function

The Vibration Switch VS2 monitors the vibration exciting its case by means of a built-in capacitive accelerometer. When exceeding a pre-adjusted threshold value a relay contact switches. The Vibration Switch comprises all necessary components for vibration monitoring. It needs for its operation a supply voltage of 24 VDC only. Figure 1 shows the switching response of the VS2.

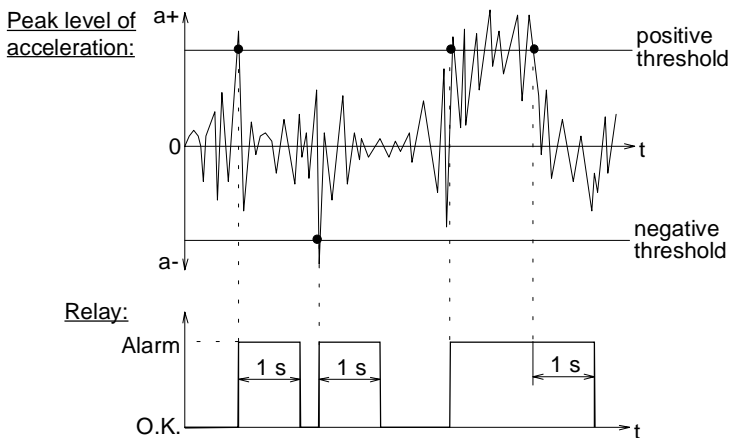


Figure 1: Switching response of the Vibration Switch VS2

The VS2 monitors the peak value of the exciting acceleration. It reacts to positive as well as to negative values of acceleration. As soon as the acceleration exceeds the pre-adjusted threshold level, the relay reacts immediately. To avoid chattering of the relay contacts, the relay has a time delay. As a result of this time delay the relay remains in alarm condition for at least 1 s after the acceleration has fallen below the threshold level. If the acceleration again exceeds the threshold level, before the time delay is over, the relay remains in action.

### 3. Mounting and Connection

After unscrewing 2 screws and removing the lid of the case the connecting terminals and the mounting holes become visible. Figure 2 shows the interior view of the case.

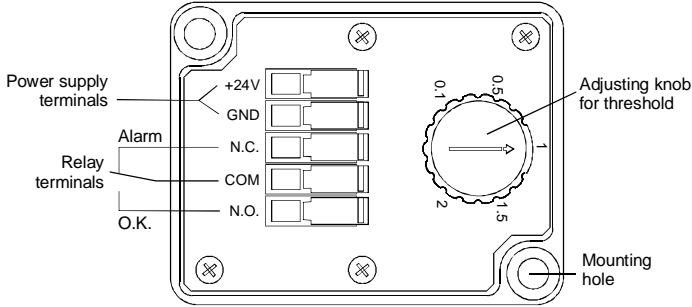


Figure 2: Interior view after removing the lid of the case

The terminals are screwless. They can be opened for slipping in the stripped wire by strong pressure to the lever using a screwdriver. The terminals are designed for installation material with cross sections of 0.08 mm<sup>2</sup> to 2.5 mm<sup>2</sup>.

At the underside of the printed circuit board there are no serviceable elements. Unfastening the screws of the printed circuit board will make the warranty void.

#### 3.1. Mounting

The Vibration Switch VS2 is attached by two screws M4. The mounting holes will become visible after removing the lid of the case. Figure 3 shows the measures of the mounting holes. When mounting the VS2, make sure that the measuring direction is right. The main sensitivity axis of the built-in sensor points to the cable entry (see Figure 3).

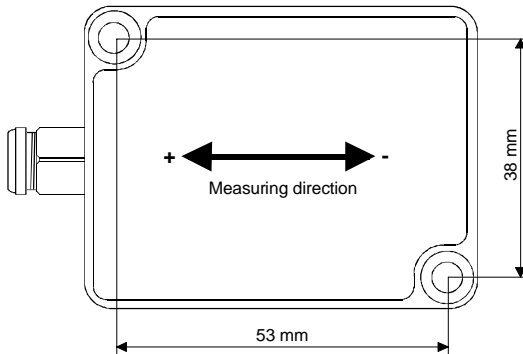


Figure 3: Measuring direction (main sensitivity axis) and fixing points

The cable entry can be used with round cable of diameters from 3.5 mm to 5.5 mm. The case and the cable entry guarantee a protection grade of IP 66 (protected against dust and flooding). Premises for the water protection are a correct lead-in of the cable and a securely screwed cable entry. To avoid the accumulation of water in the cable entry its mounting direction should point to the side or down.

**Important:** Never expose the VS2 to high mechanical shock. The unit withstands a maximum shock acceleration of 500 g. Higher acceleration may damage the sensor.

### 3.2. Power Supply

The VS2 needs for operation a voltage of 24 VDC and has a current consumption of approximately 20 mA. Figure 2 shows the terminals for the power supply. The supply voltage may vary from 20 V up to 28 V without influence to the function. During operation, however, it should not fluctuate too much, because this may cause random triggering. False polarization of the supply voltage can destroy the VS2.

### 3.3. Relay Output

The Vibration Switch VS2 includes a relay with a potential free change over contact. It is rated to switch normal load, inductive load inclusive, in the voltage range below 100 V. The switched power must not exceed 30 W. The maximum switchable current is 1 A. Figure 2 shows the relay terminals. The change over contact allows, depending on the connection to the terminals, to switch on or switch off the load circuit. In the alarm status ( vibration exceeds the adjusted threshold level), the relay will be in the currentless position (“N.C.” shorted). This way an intrinsic self test function is realized, which will switch the relay into the alarm position at a drop out of the supply voltage.

### 3.4. Adjustment of the Threshold Level

The threshold level of acceleration can be set by the adjusting knob (see Figure 2). Its scale reaches from 0.1 g (left stop) up to 2 g (right stop) and allows a rough orientation. The acceleration of gravity 1 g equals 9.81 m/s<sup>2</sup>. In many cases an empirical fine adjustment of the threshold level is necessary. At the left stop the resolution limit of the built-in accelerometer is reached. With some units self-triggering of the relay contact may occur at 0.1 g due to sensor noise. Safe operation is provided from 0.2 g.

## 4. Technical Data

Adjustable range	0.2 .. 2 g (1 g = 9.81 m/s <sup>2</sup> )
Accuracy of graduation	± 10 % of full scale output
Frequency range	1 .. 1000 Hz (-3 dB limits)
Minimum pulse duration for triggering	1 ms
Minimum relay hold time	1 s
Transverse sensitivity	< 10 % of main axis
Relay output	Switching power: 30 W max. Switching voltage: 110 VDC max. 125 VAC max. Switching current: 1 A max.
Terminals	screwless, □ 0.08 to 2.5 mm <sup>2</sup>
Power supply	20 .. 28 VDC/ 20 mA
Maximum acceleration without destruction	500 g
Protection grade	IP66
Operating temperature range	-20 .. 70 °C

## Limited Warranty

Metra warrants for a period of  
**24 months**  
that its products will be free from defects in material or workmanship and shall conform to the specifications current at the time of shipment.

The warranty period starts with the date of purchase.

The customer must provide the dated bill of sale as evidence.

The warranty period ends after 24 months. Repairs do not extend the warranty period.

This limited warranty covers only defects which arise as a result of normal use according to the instruction manual. Metra's responsibility under this warranty does not apply to any improper or inadequate maintenance or modification and operation outside the product's specifications.

Shipment to Metra will be paid by the customer.

The repaired or replaced product will be sent back at Metra's expense.



## Declaration of Conformity

Product: Vibration Switch  
Model: VS2

It is hereby certified that the above mentioned product  
complies with the demands pursuant to the following standards:

- EN 50081-1
- EN 50082-1

Responsible for this declaration is the producer  
Metra Mess- und Frequenztechnik  
Meissner Str. 58  
D-01445 Radebeul

Declared by  
Manfred Weber  
Radebeul, 2<sup>nd</sup> August 2000