



# Instruction Manual

## Vibration Switch VS10

### Application and Operation

The instrument enables simple and cost efficient monitoring of vibration on rotating machines, for example, in the frame of preventative maintenance to DIN/ISO 10816. Likewise, it can be used as a limit switch for a diverse range of processes involving vibration and shock. Thanks to its inbuilt piezoelectric accelerometer and signal processing, by means of a micro controller, the vibration switch operates reliably and with high reproducibility.

Selectable filters and integrators, variable alarm settings and the high level of protection IP67 make VS10 ideal for a variety of applications, for example:

- Monitoring compressors, pumps, fans, generators
- Rail vehicles
- Quality control
- Transporting fragile goods
- Surveillance of doors and gates
- Impact and drop testing

By means of the inbuilt piezoelectric accelerometer, VS10 monitors vibrations perpendicular to the lid of its casing. It measures both positive and negative excitation.

VS10 has a digital signal processor and a relay output for signalization. It indicates alarm status via green and red LED's.

### Parametrization

The parametrization is carried out with PC software via a common micro USB cable. To connect the USB cable, unscrew the four socket head screws and remove the lid. Inside you will see the USB connector (Figure 1).

Caution: If a USB cable is connected, the power will be supplied by the PC. Make sure the power is never supplied via a USB cable and the connection terminals simultaneously.

When connecting VS10 to a PC for the first time, you will be prompted to install the driver. The driver file "MMF\_VCP.zip" can be found on our website:

<https://mmf.de/en/produkt/vs10>.

Unzip and save both the enclosed files to a directory on the computer.

When Windows requests the location of the instrument driver, enter this directory. The instrument driver is signed and runs with Windows XP, Vista, 7, 8 and 10.

The driver installs a virtual COM Port on the PC and operates in CDC mode, thus enabling simple control via the ASCII commands.

To setup the VS10 the PC-Software *VS1x* is available under the above link. Unzip the file vs1x.zip into a directory on your PC and then start *setup.exe*. The installation directories can be changed if needed. The program is a LabView application and for this reason installs several components of the LabView Run-Time environment from National Instruments.

Once installed, the program is located under *Metra Radebeul* in the start menu of your computer. (Fig. 2).

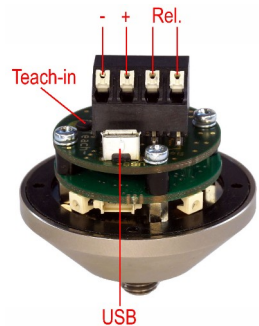


Figure 1: Connections

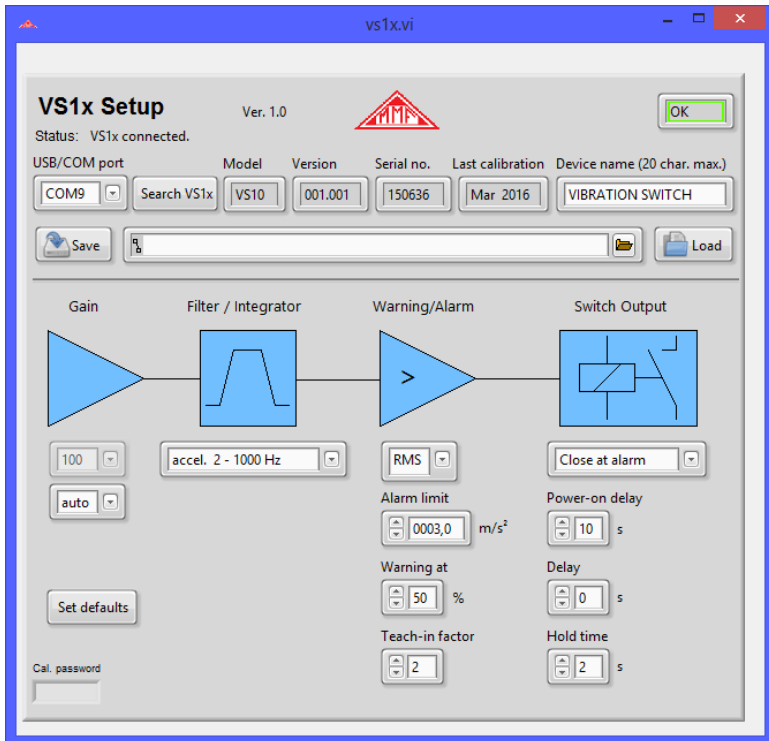


Figure 2: Parameter Program

To establish a connection to VS10, press *Search VS1x*. The program searches COM-Ports 1 to 50 for the instrument. As soon as it has been found the status report *VS1x connected* appears and the instrument settings are read.

In the row next to the COM port number you will find the non-editable data, model, version, serial number and date of calibration. You can enter the device name yourself.

When entering the gain, this refers to the analogue pre-amplification before the analogue-to-digital converter stage. The gain levels 1, 10 and 100-fold are available for selection as well as automatic gain switching. In many cases automatic gain setting is most appropriate. It can, however, occasionally be disadvantageous if single shock pulses are measured. If previously only low amplitudes had been recorded, it may occur that short single impulses fail to trigger the alarm signal immediately, due to the switching of the gain. In such cases a fixed gain should be set according to the maximum expected amplitude (*fix*).

Under *Filter / Integrator* there is a row of high and low pass filter combinations to choose from. Depending on the area of application, you can monitor either acceleration without integration (*accel.*) or the single integrated signal of velocity (*veloc.*). For vibrations below 1 kHz, for which the resulting energy is of relevance, it is recommendable to monitor velocity, whereas for measurements involving higher frequencies and impacts, acceleration is usually preferred.

Under *Warning/Alarm* you can find the limit value settings. Here you can select whether *RMS* values or *Peak* values are to be monitored. Monitoring peak values can be advantageous for recording single events, while RMS is relevant for trend monitoring, for example, in the field of machine condition monitoring. The *Alarm limit* is entered in the unit of measurement ( $m/s^2$  or mm/s). The instrument can give a warning signal before it reaches the alarm limit. The warning threshold is entered as a percentage of the alarm limit.

The *Teach-in factor*, is the factor by which the vibration amplitude currently being measured is multiplied, when by pressing the **Teach-in** (Figure 2) button, the alarm limit is automatically set. The Teach-in button is accessible without opening the casing, you simply need to remove the screw cap. It is useful for setting the alarm limit when there are no specific values available.

Under *Switch Output* you can determine the switching of the relay output. First of all, you can choose whether the relay should open or close when the warning and alarm limit are exceeded. *Power-on delay* is the duration of time between the power supply being connected and the relay being activated. It eliminates false alarms during the settling process. *Delay* is the period of time which occurs between the alarm limit being exceeded and the relay switching. It helps prevent short shock pulses. *Hold time* is the time during which the relay retains its switch status, after the vibration amplitude has dropped below the warning and alarm limit again. It guarantees a minimum duration of time for the signaling of alarm events.

The programmed settings are immediately transferred to VS10. They can additionally be saved to a file (*Save*). The file contains the ending *.xml*. By pressing *Load* you can reload the settings.

*Set defaults* restores VS10 to its factory settings.

## Installation and Operation

Typical attachment points for VS10 are rigid components such as, cast iron cases, bearing houses, profiles and foundations. Flexible components like thin sheet metal or plastic parts are unsuited. The VS10 can be mounted in the vertical or horizontal direction, preferably by means of the supplied M8 screw. It is sufficient to tighten the screw by hand, without using a tool.

The cable is lead-in through a waterproof cable gland. It can be used for multi-wire cables with diameters between 3.5 and 5.5 mm. The power supply (5 .. 30 V / <100 mA) is connected to the screw terminals *0V* (negative pole) and *+U* (positive pole) (Figure 2). It is protected against reverse polarity.

VS10 contains a PhotoMOS relay without mechanical contacts. The relay contacts are located on the two right hand terminal pins. Please pay attention to the limit values for electrical load.

The alarm status of VS10 is indicated by the four LED's on the outer casing. If all LED's are lit green, there is no warning or alarm. If two LED's are lit red and two green this indicates that the warning limit has been exceeded. If all LED's are lit red, the alarm limit has been exceeded.

## Firmware Update

In the case that new software (firmware) for your VS10 is available you can install it yourself. Please open the web address below to check the latest version: <https://mmf.de/en/produkt/vs10>.

The firmware is the same for all VS1x devices.

Connect the VS10 via a USB cable to the PC and check in the setup program the installed firmware version of your vibration switch (Figure 2). If the version number shown on the web page should be higher download the firmware file, unzip it and save it to a folder of your choice.

Install also from above web page the program "Firmware Updater" (Figure 3).

Prepare the vibration switch for the update by clicking the button "Firmware update" in the setup program and confirm the warning. The old firmware will now be erased.

Start "Firmware Updater", choose the device type "VS1x" and select the virtual COM port used for USB connection.

Click the "Load" button and enter the directory of the downloaded firmware file *vs1x.hex*. Then click "Send" to start the update process. The progress will be indicated by a bar graph. After a successful update the vibration switch will restart and "Firmware Updater" will be closed.

Please do not interrupt the update process. After update errors you can restart "Firmware Updater".

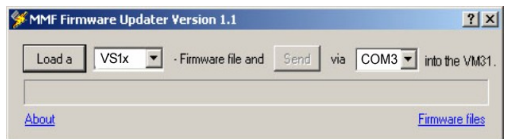


Figure 3: Firmware Updater

## Technical Data

Monitoring Values	Peak value and RMS value of vibration acceleration or vibration velocity
Measuring Range	0.1 to 1000 m/s <sup>2</sup> acceleration, velocity frequency dependent
Sample rate	2892 Spl/s (RMS/peak of velocity) 28370 Spl/s (RMS/peak of acceleration)
Refresh rate	1.4 s (RMS/peak of velocity) 1.0 s (RMS/peak of acceleration)
High Pass Filter	0.1/2/5/10/20/50/100/200/500/1000 Hz (acceleration) 2/5/10/20/50 Hz (velocity)
Low Pass Filter	0.1/0.2/0.5/1/2/5/10 kHz (acceleration); 1 kHz (velocity)
Relay Output	PhotoMOS relay; SPST; max. 60 V / 0.5 A (AC/DC); Open/close programmable, connection via screw terminals
Alarm Delay/ Hold Time	0 – 99 s / 0 – 9 s
USB Connection	USB 2.0 full speed, CDC mode, micro USB socket
Power Supply Voltage	5 to 30 V DC; < 100 mA via screw terminals or USB supply voltage
Protection Grade	IP67
Operating Temperature Range	-40 – 80 °C
Weight	160 g
Dimensions	50 mm Ø, 52 mm height
Mounting	M8 thread Pin; 8 mm length; coupling surface: Ø 25 mm

### Warranty

Metra warrants for a period of

**24 months**

That its products will free from defects in material and workmanship and shall conform to the specifications current at the time of shipment. The warranty period starts with the date of invoice.

The invoice must be presented as proof of purchase.

The warranty period ends after 24 months.

Repairs do not extend the warranty period.

The limited warranty only covers defects which arise as a result of normal use according to the instruction manual.

Metra's obligations under this warranty do not apply in cases of 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 to the customer at Metra's expense.

### Declaration of Conformity

According to EMC Directive 2014/30/EC

Product: Vibration Switch

Type: VS10

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

DIN EN 61326-1: 2013

DIN EN 61010-1: 2011

DIN 45669-1: 2010

The producer is responsible for this declaration

Metra Mess- und Frequenztechnik  
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declared by



Michael Weber  
Radebeul, 3<sup>rd</sup> March 2016