

# Instruction Manual

## **Vibration Calibrator VC20**



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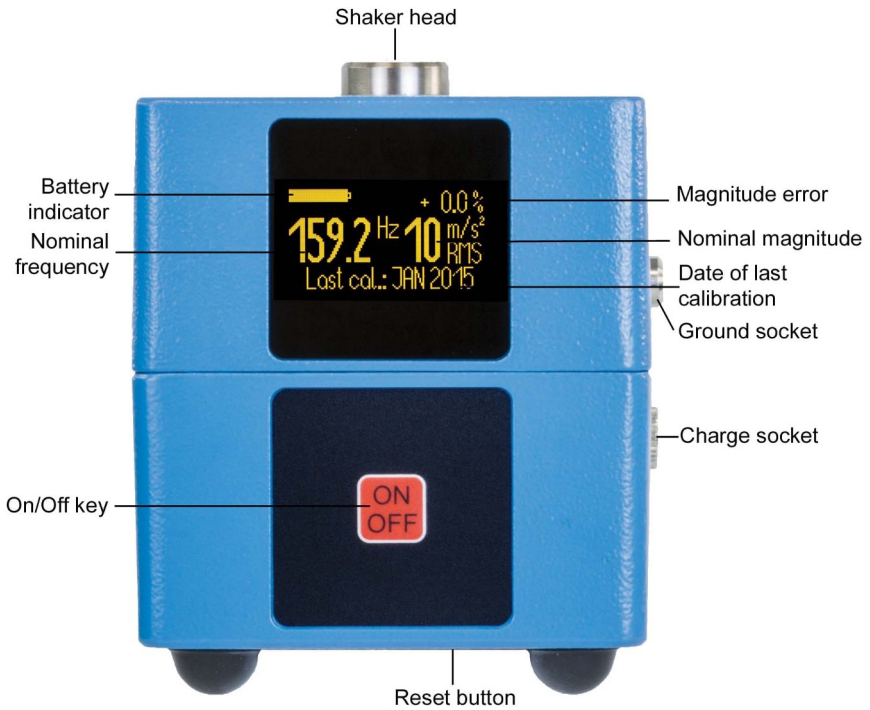
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# Contents

1. Purpose.....	1
2. Properties.....	1
3. Operation.....	1
3.1. Attaching the Test Object.....	1
3.2. Calibration .....	1
3.3. Charging the Accumulator.....	1
3.4. Reset.....	1
4. Calibration .....	1
5. Technical Data.....	1

Appendix: Warranty  
CE Declaration of Conformity



*Thank you for choosing a vibration calibrator from Metra!*

## **1. Purpose**

- Easy and simple calibration of vibration metering, recording and control equipment
- Regular checks of such devices and installations
- Fault finding

## **2. Properties**

- Handy and robust battery device for laboratory and field use
- Load-independent vibration magnitude with an RMS of
  - 10 m/s<sup>2</sup> vibration acceleration
  - 10 mm/s vibration velocity
  - 10 µm vibration displacement
- Quartz stabilized vibration frequency of 159.15 Hz (radian frequency 1000/s)
- Suitable for test objects weighing up to 600g

The vibration calibrator VC20 generates mechanical vibrations with quartz stabilized frequency and precisely controlled magnitude. Vibration sensors, including connected cables, signal conditioners and readout instruments can be calibrated in acceleration, velocity or displacement units.

A reference accelerometer inside the shaker head and a control circuit keep the vibration level constant and independent of the weight of the attached measuring object. A display indicates the error in percent. There is an acoustical warning when the error limit is exceeded.

Because of its internal rechargeable battery, the VC20 is well suited for mobile applications. The instrument features an automatic switch-off function preventing accidental discharging. The display indicates the battery charging condition. The unit comes with an external mains supply for charging.

The supplied plastic carrying case allows convenient handling and safe transport.

### 3. Operation

#### 3.1. Attaching the Test Object

The vibration exciter of the VC20 has a tapped M5 hole with 7 mm depth for the attachment of the device under test. The supplied stud bolts and stud adapters or a clamping magnet can be used for mounting.

The surface of the vibration exciter has been made extremely resistant by plasma nitride coating.

For light transducers, adhesive wax or double sided adhesive tape can be used for mounting. A flat surface for adhesive mounting can be obtained by using the M5 insulating flange Model 029 which is available from Metra.

Magnetic and adhesive attachment are only allowable for roughly estimated calibrations. Accuracy is only guaranteed for screw attachment.

When mounting the specimen, pay attention to the symmetrical distribution of the object weight. Otherwise, the vibrating system may be deflected from its main axis. When using coupling structures for calibration of transducers, symmetrical attachment becomes especially important, for instance, at the calibration of the x and y axis of a triaxial accelerometer. In this case, using a balance weight as shown in the following illustration is recommended.

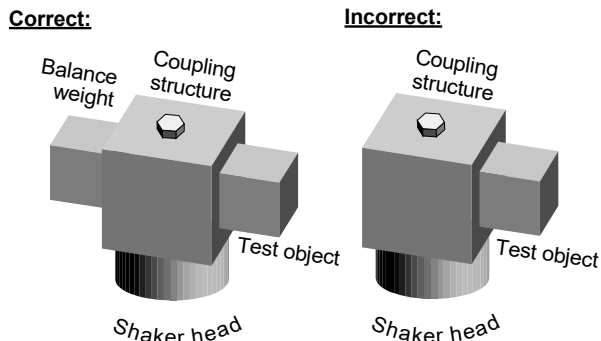


Figure 1: Load balancing

Please note that heavy connecting cables should be supported close to the test object. However, an application of force via the cable must be avoided.

The maximum torque rating of **1 to 2 Nm** at the vibration exciter must not be exceeded since this may damage the instrument.

The VC20 should be placed on a rigid surface. Hand-held operation is not recommended because of possible errors.

## 3.2. Calibration

After attaching the device under test switch the VC20 on by depressing the “On/Off” button until the display lights up. Device information, such as hardware and software versions and the date of the last calibration, is displayed for a few seconds. After short time the vibration signal becomes stable. The display shows the values of vibration frequency and magnitude (2). Please note that these are not measuring values but only nominal values.

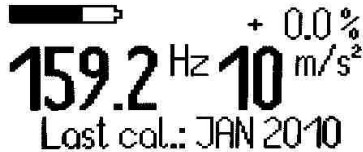


Figure 2: Display in calibration mode

In the upper right hand corner you will see the actual accuracy of the vibration magnitude in percent. After short period of time the percent value should converge on zero.

If the absolute error exceeds 3 %, the percent value will change to inverse characters and a beep sound will be generated. In this case no calibration can be performed.

When the maximum weight of the test object is exceeded, instead of the percent value, an error message “OVERL” will appear and the shaker will be switched off. To proceed with calibration, first switch the calibrator off. Then reduce the weight of the test object and switch the calibrator back on . The admissible weight is up to 500 grams, depending on the selected frequency. The overload message can also be eliminated by lowering the vibration magnitude.

In the lower display line the date of the last calibration of your VC20 is displayed. This entry can only be modified during factory calibration. Please read also section 5 for details about calibration.

The VC20 can be switched off by depressing the “ON/OFF” key for at least one second. Should this be omitted, a timer is provided which switches the calibrator off after 10 minutes.

**Caution:** The vibration calibrator is not to be used in dirty and dusty environments. Particular care should be taken that no ferromagnetic particles get inside of the instrument. They may damage it within short time. Defects due to dirt and dust are not covered by the warranty.

### 3.3. Charging the Accumulator

The battery indicator is located in the upper left hand corner of the display. A full bargraph is displayed when the battery is fully charged. Even if the bargraph is empty the instrument can still be used within its specifications for a certain period of time. When the battery voltage drops under a critical value, the VC20 is switched off automatically.

The instrument is equipped with a NiMH accumulator providing power for approximately 5 hours of operation.

To charge the battery, connect the supplied mains plug adapter (15 VDC) to the DIN socket at the side of the case. The unit should preferably be switched off during charging. Charging will take about 3 hours. During the charging process the battery indicator will be continuously moving (3).



Press OK to switch on.

Figure 3: Charge indication

During the charging process the VC20 can be used for calibration. However, this will extend the necessary charging time.

The accumulator should be charged at room temperature. At higher temperatures charging can be stopped before reaching the full capacity because of the built-in temperature sensor.

The battery has no memory effect. Partial charging is permissible.

Permanent connection of the mains adapter is not recommended. This may lead to premature wear of the battery. In order to avoid overcharging the battery, it is not recommended that you disconnect and connect the mains adapter again immediately after charging is finished.

When the unit is not in use, the battery should be charged at least once a year.

The built-in battery is maintenance-free. Like all accumulators it has a limited number of charging cycles. If the operating time with a fully charged battery becomes insufficient, the battery should be replaced. In this case, the calibrator should then be returned to the manufacturer. In addition to replacing the battery, the manufacturer will also test the accuracy of the calibrator.

### 3.4. Reset

In the unlikely event that your VC20 cannot be switched on by the "On/Off" key, it may be necessary to press the Reset button. This button is found on the bottom side of the case near the key pad. Use a thin non-metallic object, such as a toothpick, to press the button inside the hole. This will start the instrument. Pressing the Reset button has no effect on accuracy.

## 4. Calibration

The vibration characteristics of the VC20 are very stable even after intensive use. Typical changes are below 1 % per year. We recommend annual re-calibration. In case of shock load, dropping the instrument, etc. immediate re-calibration is advised.

The instrument shall be calibrated in accordance with ISO 16063-44.

## 5. Technical Data

Vibration magnitude (RMS values):

Vibration acceleration:	10 m/s <sup>2</sup>	± 3% at 0 to 40 °C
Vibration velocity:	10 mm/s	± 3% at 0 to 40 °C
Vibration displacement:	10 µm	± 3% at 0 to 40 °C
Vibration frequency:	159.15 Hz	±0.05% at -10 to 55 °C
Radian frequency:	1000 /s	±0.05% at -10 to 55 °C
Level indication:	Percent display, above ± 3 % beep tone	
Settling time:	< 10 s	
Maximum weight of test object for stated accuracy:	600 g	
Vibration exciter:		
Dynamic force:	10 N	
Max. torque:	2 Nm	
Nominal torque:	1 Nm	
Max. transverse force:	20 Nm	
Transverse vibration:	< 10 % of main axis, measured 14 mm above shaker	
Mounting of test object:	M5 tapped hole, 7 mm deep clamping magnet adhesive	
Operating temperature ranges for:		
3% accuracy	0 to 40 °C	
5% accuracy	-10 to 55 °C	



Humidity:	< 90 % at 30 °C, no condensation
Magnetic scatter field at shaker:	< 0.2 mT
Power supply:	built-in NiMH accumulator, 7.2 V / 1.6 Ah
Battery operating time:	approx. 5 h with m = 100 g
Automatic shut-off time:	10 min
Charge time of accumulator:	3 h
Charge socket:	DIN 45323 (5.5 / 2.1) positive terminal at center pin
Charge voltage:	11 to 18 V DC
Charge current	< 1 A
Dimensions (length x width x height):	100 x 100 x 120 mm <sup>3</sup>
Weight:	2.2 kg

## 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 invoice.

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

According to EMC Directive 2014/30/EC and  
UK Electromagnetic Compatibility Regulations 2016

Product: Vibration Calibrator  
Type: VC20 (from Ser. no. 160000)

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

DIN / BS EN 61326-1: 2013  
DIN / BS EN 61010-1: 2011  
DIN 45669-1: 2010

The producer is responsible for this declaration

Metra Mess- und Frequenztechnik  
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Meißner Str. 58, D-01445 Radebeul

declared by



Michael Weber  
Radebeul, November 21, 2022