Vibro-Center

ViPen

Multifunctional Compact Vibrometer

Manual

12.11.2021

Content

Description

"ViPen" is a portable vibration measurement instrument (hereinafter referred to as "Instrument") with the ability to assess the condition of rolling bearings also.

This Instrument can be used to measure vibration of rotating equipment and structures in terms of vibration acceleration (A, acceleration, Peak, m/s^2) and vibration velocity (V, velocity, RMS, mm/s), as well as in terms of temperature (digits with degrees Celsius units).

Measurement of vibration velocity, in accordance with the ISO standards, is carried out in the frequency range from 10 to 1000 Hz.

Based on the vibration acceleration signal, kurtosis is calculated, and it evaluates the bearing condition.

The Bluetooth (optional) version of the instrument can transmit vibration values wirelessly to the Android app. Application "Wireless DIMRUS sensors" can be downloaded from the Google Play Store:

https://play.google.com/store/apps/details?id=com.dimrus.sensormanager

Specifications

Measurement range:

Vibration Acceleration (Peak, Amplitude)	1 to 50 m/s^2
Vibration velocity (RMS)	1 to 70 mm/s

Basic accuracies at frequency 79.6 Hz:

Vibration acceleration	from 1 to 5 m/s^2	± 10%
	over 5 to 50 m/s^2	± 5%
Vibration velocity	from 1 to 5 mm/s	± 10%
	over 5 to 70 mm/s	± 5%

Note: Measurement values may have variations at frequencies in lower range of 10-30Hz and 690-1000Hz (for velocity only).

Kit Contents

- Vibrometer "ViPen"
- Leather Case
- Feeler gauge with M5 thread
- Magnet with M5 thread (not included in the standard kit)
- Power supply with micro USB cable
- Charging platform (for Instrument with a plastic case)
- Carrying case
- Manual
- Test Certificate
- Calibration Certificate

Operating Instructions

Vibrometer "ViPen" is a device for individual use. Its use should be carried out by persons who know the rules for the operation of electrical equipment, who have studied the operation manual, certified and approved by the order of the administration to work with the specified product.

The components of the "ViPen" vibration analyzer during operation must be protected against falls and impacts by foreign objects that may affect the integrity of the body of the instrument. It is not recommended to operate the instrument with damaged part/cases.
During operation, the instrument must be calibrated as per policy of the user. Periodic verification at least once every two years also after each repair must be carried out.
Calibration & repair of the equipment must be carried out by service center designated by company supplying the instrument.

Battery Charging

The micro USB connector is used to charge the internal battery of the instrument (a non-removable lithium-ion battery). These connectors are also used for charging cellphones, it is permissible to use widely used cellphone chargers or to connect the Instrument for charging to any computer.

Attention! The Instrument gets charged faster when turned off. To fully charge the instrument's rechargeable batteries, connect it to the power supply and leave it in this state for 8 hours. The time to fully charge the instrument from a computer is longer than from a power supply.

The wireless charging version is charged using the charging platform supplied with the instrument. During charging, the green LED on the top panel is “on”.

Connectors and Sensors

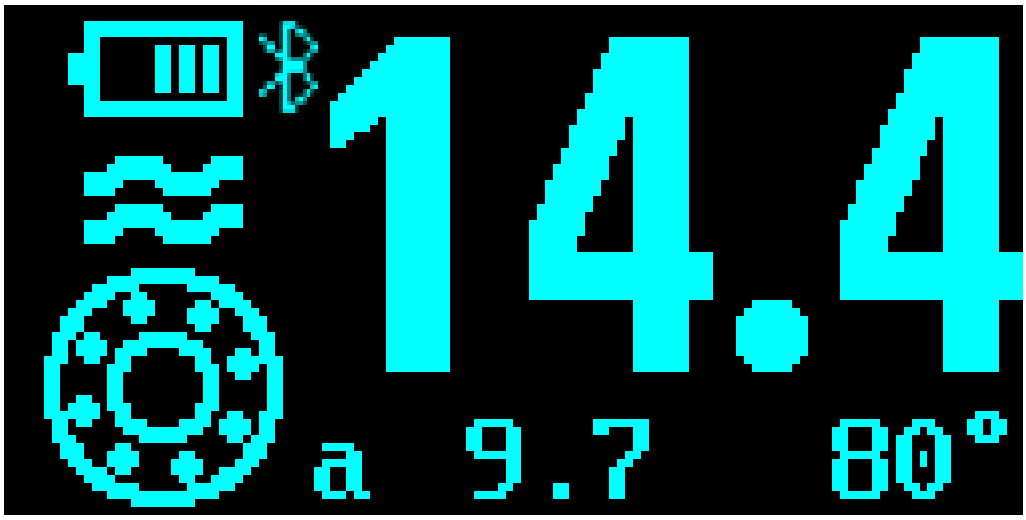
The "ViPen" is enclosed in an aluminum milled or plastic case, has a liquid crystal display with a resolution of 128x64 pixels and a touch control button.

At the front end of the device there is a vibration sensor, into which a probe with an M5 thread and a temperature sensor (pyrometer) are screwed. Instead of a probe, magnet or a clip may also be screwed.

In the version with a plastic housing, the temperature sensor is covered with a germanium glass for tightness. A green LED is located next to the power button, signaling the battery charging process.

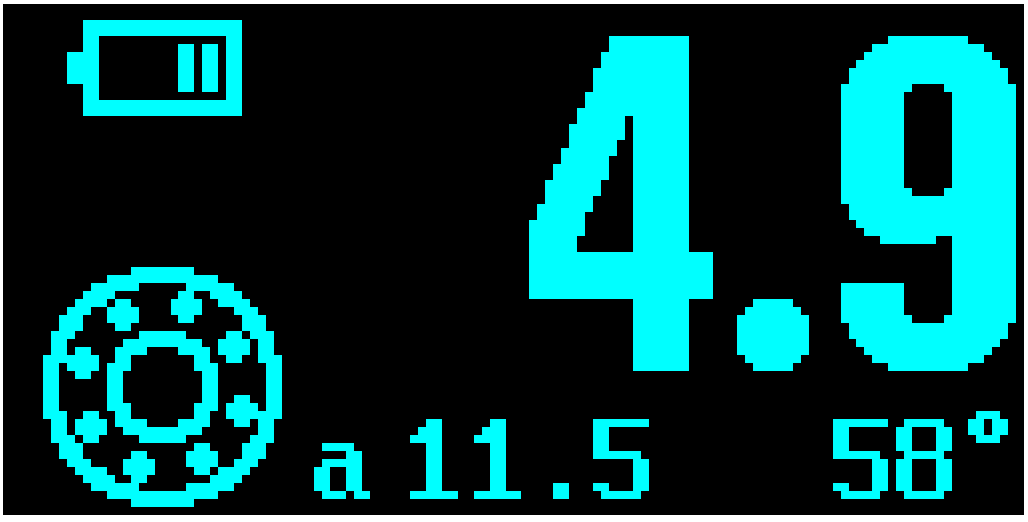
In the version with a metal case, there is a micro-USB connector on the side of the instrument. Through it, the instrument is charged. The connector itself is closed with a magnetic lid. The ring at the back accepts a hand strap or lanyard

Display Schemes



The device displays:

Battery symbol. It shows the remaining battery charge by vertical bars. During charging, the bars run from right to left.
Bluetooth Symbol - For instrument with Bluetooth data transfer capability
Wavy lines are displayed during measurement when the button is pressed. When the button is released, the measurement stops, and the symbol disappears.



Rolling bearing symbol - shows an assessment of the condition of the bearing:
- Good - the bearing spins quickly,
- Satisfactory - the bearing rotates slowly,
- Pre-failure - bearing blinks.

Large Digital Display - RMS vibration velocity in the range of 10 ÷ 1000 Hz in mm/s.
Bottom digit display (with "a" symbol) – Vibration Acceleration (Peak) in m/s^2.
Right-bottom digit display (with degree symbol) - temperature in degrees Celsius.

Operations

Vibration measurements are most often carried out on the bearings of the equipment. When measuring vibration, it is necessary to place the sensor close to the center line of the bearing being assessed. Usually this place is a bearing housing. Do not install the sensor on flexible parts of the unit or covers.

The sensor is pressed firmly against the surface ensuring continued contact with it without any movement. The results will be more reliable when a magnet or a rigid stud is used to fix the sensor.

The measurement is carried out in three directions:
• Vertical (V) - the sensor is placed vertically, usually from top to bottom

• Transverse, Horizontal (H) - the sensor is placed horizontally, parallel to the ground

• Axial (A) - the sensor is placed along the axis of rotation of the unit, along the shaft

These measurements can be made for each bearing. Bearings can be numbered in some scheme which may follow direction along the motion. For example Non Drive End (NDE) Motor bearing can be point 1 & Drive End (DE), motor bearing, near the coupling - Point 2, the Drive End (DE) pump bearing near the coupling could be - Point 3, the non drive end (NDE) could be pump bearing - Point 4. If it is not possible to measure at some point, then it can be skipped.

Measurements are made in pre decided periodically for good trending with time, for example, after a month. This gives a forecast for the development of vibration and allows planning the repair of the equipment in advance. However periodically decision is to be made by plant engineers based on vibration levels present on machine to be monitored. This should change if any defect develops or levels.

In this case, the sensor must be placed at the same location for every point to ensure comparability of locational condition for different time vibration levels.

Press the probe of the instrument sensor to the point of measurement, press and hold the button. Even if the device was turned off, it turns on and starts

measuring. When the value on the screen does not change much, release the button. The value is fixed on the screen and can be viewed or written into a notepad. Place the instrument sensor at the next point and press the button for the next measurement.

To assess vibration, the RMS value of the vibration velocity, measured in mm/s is used. These are the largest digits on the screen of the instrument. We recommend that the values be written in the order of measurement:

Pump-1

1V	5,3
1H	3,4
1A	2,3
2V	3,6

Or into a table:

Pump-1

	Point 1	**Point 2**	**Point 3**	**Point 4**
V	5,3	3,6	3,4	2,1
H	3,4	3,1	4.1	2,3
A	2,3	1,9	3,2	1,7

Aurora-2000 program can be used to assess the condition of the equipment, on defects, and on planning repairs.

Auto Shut off Instrument : The Instrument will turn off automatically if the button is not pressed for 60 seconds.

Express Diagnostics of Mechanical System Defects

(vibration is measured on bearing units)

Vibration level	Bearing symbol on screen	Diagnostic Assessment	
		Bearing condition	Other Problems with Machine **
Norm* V <4.5 mm/s	Fast rotation	The bearing is free from defects	No defects
	Slow rotation	Weak bearing defect	No defects
	Emergency flashing	Accidental bearing defect	No defects
Anxiety * 4.5 <V <11.2 mm/s	Fast rotation	The bearing is free from defects	Defects Present
	Slow rotation	Weak bearing defect	Defects Likely
	Emergency flashing	Accidental bearing defect	Defects due to continued use in defective state.
Pre-emergency condition * V> 11.2 mm/s	Fast rotation	The bearing is free from defects	Significant Defects
	Slow rotation	Weak bearing defect	Defects Confirmed
	Emergency flashing	Accidental bearing defect	Defects Likely

*) The given vibration standards are applicable for pumps and fans of small and medium power. To improve diagnostic confidence, use manufacturer-specific vibration ratings for each machine.

**) using a vibrating pen "ViPen" according to the attached table, the presence of the simplest, but common defects of the machine under assessment, such as misalignment, imbalance of the rotors, problems with the foundation, can be determined. It however is not possible to separate these defects among themselves using a tabulated indication.

Express Diagnostics of Electric System Defects

(Vibration is measured on the housings of electric motors and pumps)

Machine Type	Bearing symbol on screen *	Diagnostic conclusion	
		Possible defects in the electric motor or pump **	Note***
Electric Motor	Fast rotation	Defects possibility is not assessable	No bearing defects
	Slow rotation	The presence of electromagnetic defects in the stator	No bearing defects
	Emergency flashing	The presence of electromagnetic defects in the stator and in the rotor	No bearing defects
Pump	Fast rotation	Defects possibility is not assessable	No bearing defects
	Slow rotation	Cavitations, problems in the flow path of the pump	No bearing defects
	Emergency flashing	Problems in the flow path, or defects in blades	No bearing defects

*) a high level of vibration for diagnosis of this type of machines is not a sign of obvious defects. Vibration measurement is performed on the outer casing of the equipment, on which cover related resonance processes of large amplitude often occur. This can happen even when the equipment is in good condition.

**) with the "ViPen" vibrating pen, it is possible to determine the presence of only common defects in electric motors and pumps, which are accompanied by dynamic shocks.

***) before carrying out diagnostics of electric motors and pumps, make sure that all bearings of the concerned equipment are free from defects. Otherwise, such a diagnosis is misleading.

Brief information about the company:

Development and delivery of instruments and software for vibration diagnostics for various industries

LLC "VIBRO-CENTER" (Perm)
614513, Russia,
Perm, Vanyuki village,
Highway entrance, 1
+7 (342) 212-84-74
Website: vibrocenter.com
E-mail: vibrocenter@vibrocenter.com