



## ViPen-2 – Vibration Signals Collector and Analyzer with Functions of Temperature Measurement and Rolling Bearing Diagnostics with Bluetooth Interface

The ViPen-2 portable device is a compact multi-functional vibration signals' collector (analyzer), controlled through a smartphone or a tablet.



The main purpose of the ViPen-2 device is the prompt and most automated data collection and adaptation for further processing by the modern operation and maintenance managing software implemented at the enterprise.

### The ViPen-2 Device Design

For the convenience of vibration measurements in hard working conditions, the ViPen-2 device has a rugged design:

- On the ViPen-2 device metal body, there are no external controls.
- The device does not have a screen, a keyboard or an on/off button; there is only one signal LED.
- The device has only built-in sensors for vibration and temperature measuring, so there are no external connectors.
- To protect the pyrometer from external influences, it is covered with special glass.
- The internal battery is charged by a wireless charger used to charge smartphone batteries.

The ViPen-2 device is controlled remotely from a smartphone via standard Bluetooth wireless interface. All the measured and converted vibration signals are displayed on the smartphone screen.

The data received from the ViPen-2 via the smartphone software can be transferred to SCADA database, with the Operation and Maintenance managing software installed in it.

### The ViPen-2 Device Measurement Frequency Ranges

The standard working frequency range verified for the ViPen-2 device is from 10 to 1000 Hz.

The actual operating frequency range of the ViPen-2 device is much wider; it includes two additional frequency ranges:

- Low frequency range from 0.5 Hz to 50 Hz. Measurements in this frequency range allow monitoring the condition and diagnosing low-speed units, starting from 30 rpm.
- High frequency range from 500 Hz to 10000 Hz. Measurements in this frequency range make it possible to monitor high-frequency mechanical and electromechanical processes in equipment.

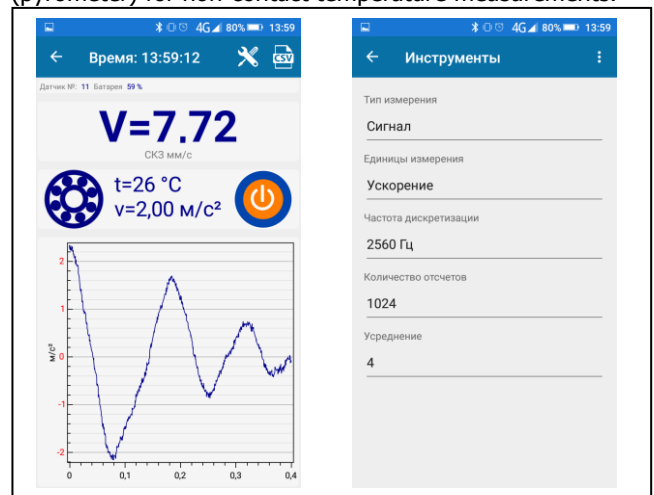
### The ViPen-2 Device Functions

The ViPen-2 portable device performs the full cycle of vibration signal collection, processing and analysis in standard and extended frequency ranges:

- Waveform measurement by the built-in accelerometer.
- Representation and analysis of the measured waveforms in terms of vibration acceleration, vibration velocity and vibration displacement.
- Calculation of the main integral parameters of all the waveform representations, such as amplitude, peak-to-peak, average value, RMS.
- Calculation and analysis of the waveform spectrum with a maximum resolution of up to 3200 spectrum lines.

The ViPen-2 device software also includes automated algorithms for on-line rolling bearings condition assessment and defect diagnostics.

To expand the possibilities of on-line diagnostics, especially rolling bearings condition assessment, the ViPen-2 device is equipped with a built-in temperature sensor (pyrometer) for non-contact temperature measurements.



### Rolling Bearing Diagnostics

The ViPen-2 device automatically assesses the rolling bearings condition. The bearing condition is indicated by the graphic symbol of a rotating rolling bearing on the smartphone screen.



According to the results of diagnostics, the bearing belongs to one of three condition categories:

- Good condition of the bearing, in this case the bearing symbol in the screen rotates rapidly.
- Warning condition, defects are found, the bearing symbol in the screen rotates slowly.
- Alarm condition, the bearing symbol in the screen flashes and does not rotate.

The results of the rolling bearing vibration diagnostics in the ViPen-2 device are supplemented by the built-in pyrometer data.

An increase in bearing temperature is almost always associated with lubrication problems or serious defects on the rolling surfaces inside the bearing.

**Using the ViPen-2 Device as an Intelligent Sensor for Equipment Operation and Maintenance Management**

The ViPen-2 can be used as a multipurpose vibration signal analyzer; in the terms of price in this function the device is much cheaper than its analogues.

It is most effective to use ViPen-2 as an intelligent sensor in complex equipment operation and maintenance management systems. In this case, the measurements are done in the standard frequency range of 10÷1000Hz or in additional frequency ranges, depending on the type of equipment monitored.

It is possible to transfer information about the equipment condition to operation and maintenance management system server.

**Vibration Measurement**

Vibration measurement with the ViPen-2 device is carried out using a contact probe or a magnetic fastening block designed for use on flat and curved surfaces. The probe and the magnetic fastening block are fixed on the device body using a threaded hole.



The device is controlled from a smartphone, for which special software is supplied together with the device.

The device is well-protected, marked IEx ib IIA T3 Gb X and can be used in severe environment.

**The ViPen-2 Device Specifications**

Frequency range, Hz	0,5÷10000
Standard frequency range, Hz	10÷1000
RMS measurement range, mm/sec	1÷100
Vibroacceleration measurement range, peak, m/s <sup>2</sup>	1÷100
Displacement measurement range, peak-to-peak, um	10 ÷ 500
Temperature measurement range, °C	-50÷300
Operation temperature range, °C	-40 ÷ +50
The ViPen-2 device dimensions, mm	22*54*128
Weigh without the magnetic fastening block, g	220