

Vibration-based diagnostics systems



www.ag-tech.kz

ABOUT THE SYSTEM

Vibration monitoring systems are widely used in industry and their effectiveness has been fully proven. However, until now, their implementation has been fraught with the complexity and high cost of deploying the associated cabling infrastructure required to enable continuous online collection of diagnostic data. With the recent development of telecommunications technology, wireless data collection and analysis systems for industrial applications have become increasingly common.

The technological implementation in this case is based on the application of big data processing techniques, which will be gathered from long, continuous observation of the equipment during the pilot implementation and its subsequent processing with the help of machine learning algorithms (Machine Learning)



SYSTEM CAPABILITIES



Tracking of trends in measurements to predict failure of the control unit



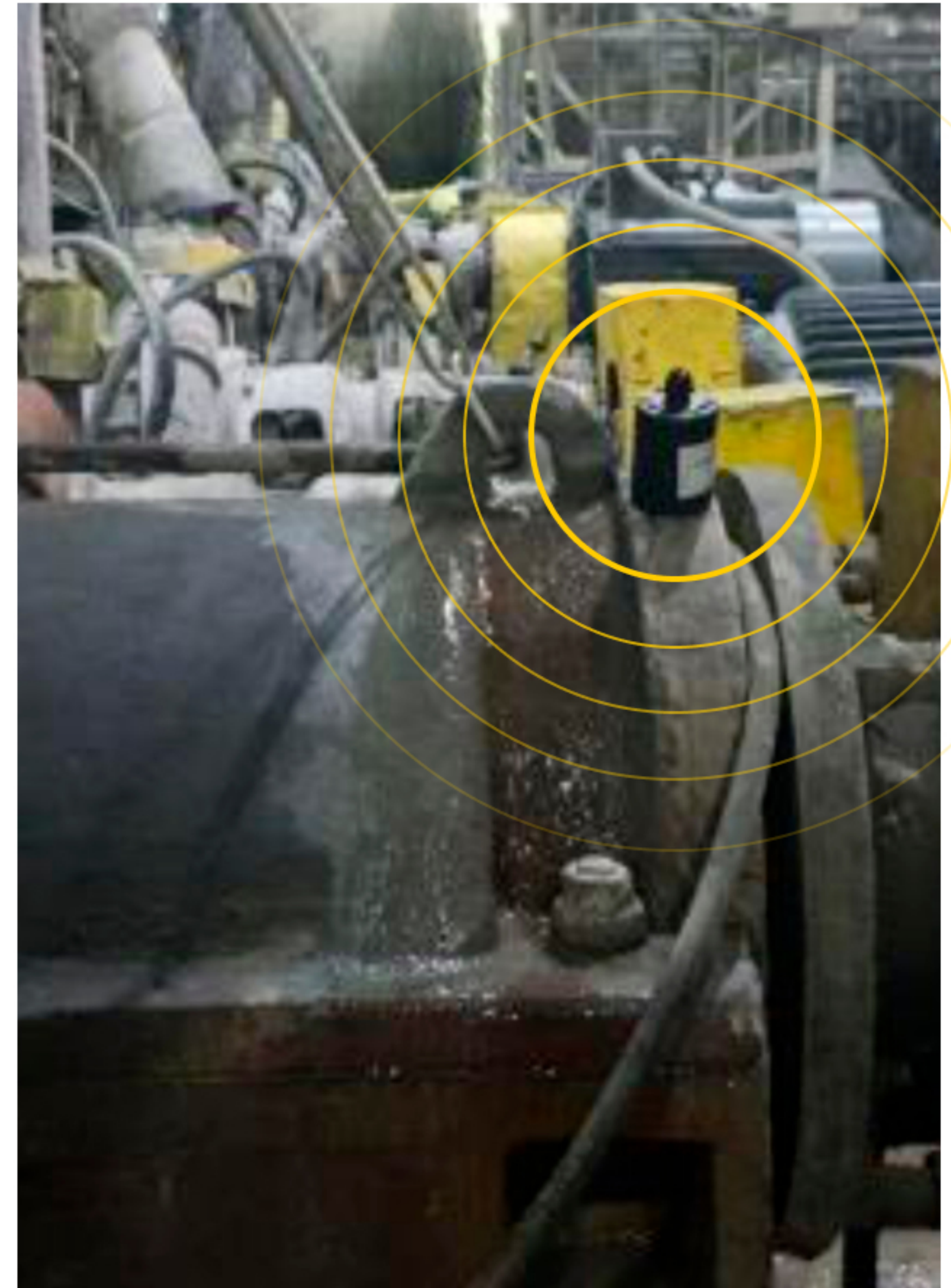
Automatic operator notification via e-mail, SMS, messenger and when pre-defined events occur (vibration threshold exceeded, etc.)



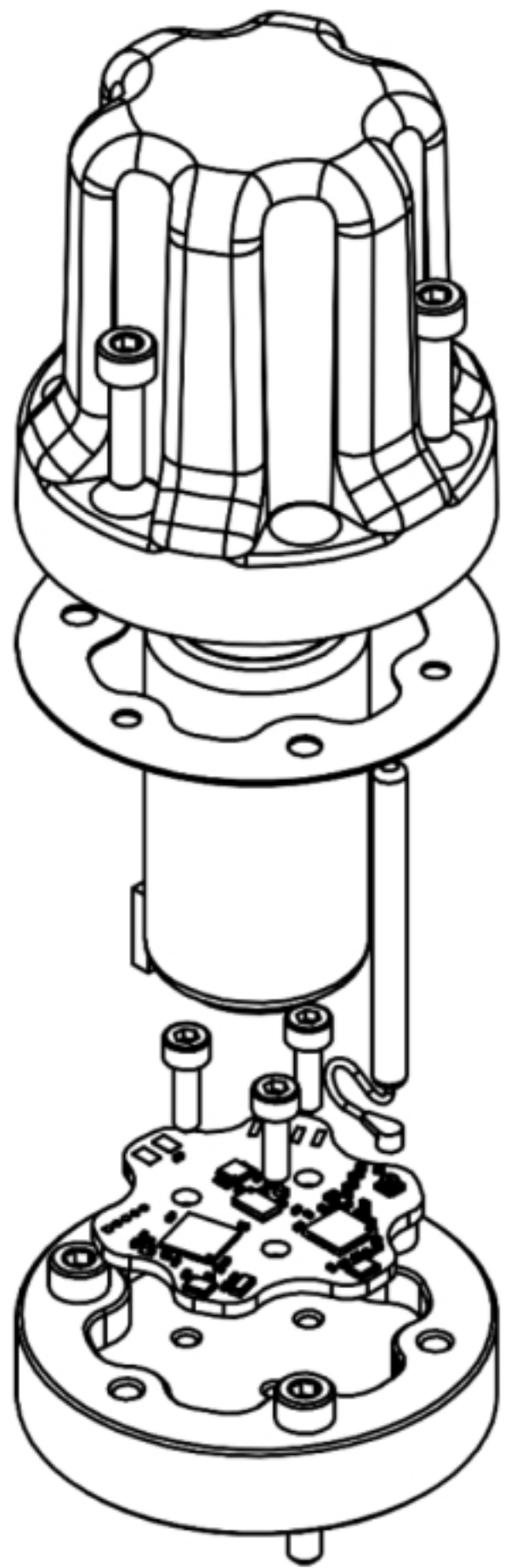
Learning from accumulated big data and deploying a neural network to further increase automation



Connection of any new sensors and other nodes without additional infrastructure costs



WIRELESS VIBRATION AND TEMPERATURE SENSOR DVT-19



Technical specifications



Vibration parameter to be measured

root-mean-square value vibration velocity according to GOST ISO 2954-2014 in three components (X, Y, Z)



Vibration velocity measuring range: 0 to 30 mm/s



Temperature measurement range: -40 °C to +100 °C



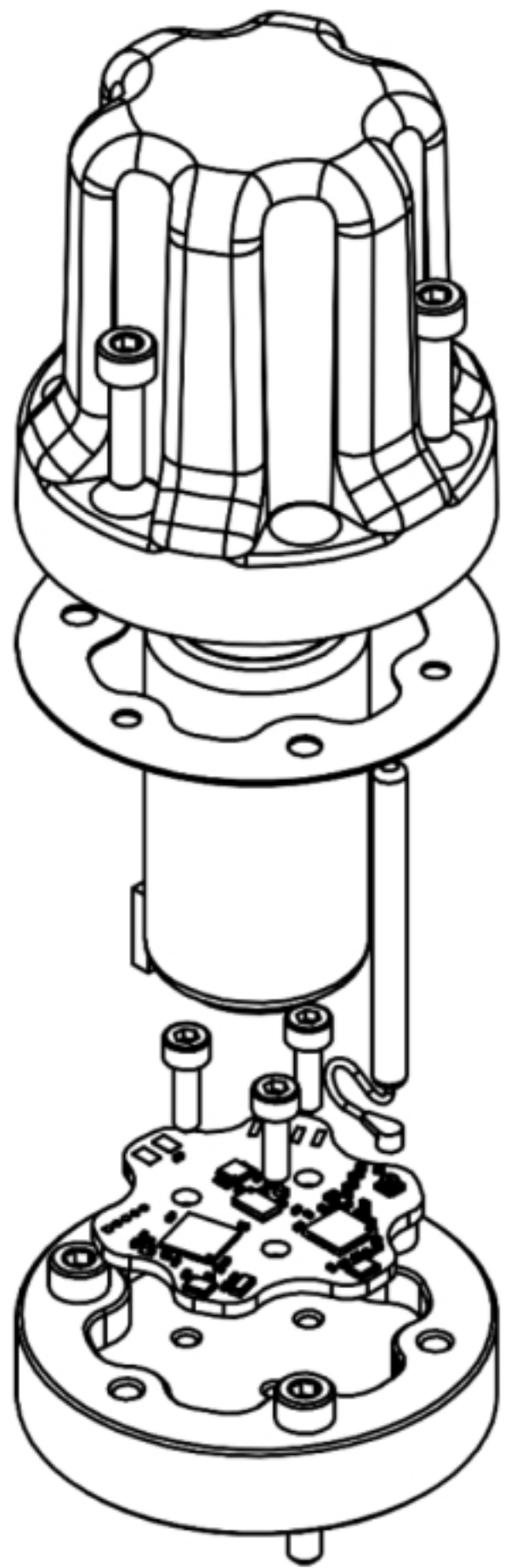
Measuring interval: 1 minute to 1 day (adjustable)



Wireless interfaces: LoRaWAN

(measurement transmission), NFC (identification)

WIRELESS VIBRATION AND TEMPERATURE SENSOR DVT-19



Technical specifications



Maximum transmission range: 0.5 to 5 km
(depending on the environment)



Galvanic battery capacity: 9000 mAh (replaceable battery)



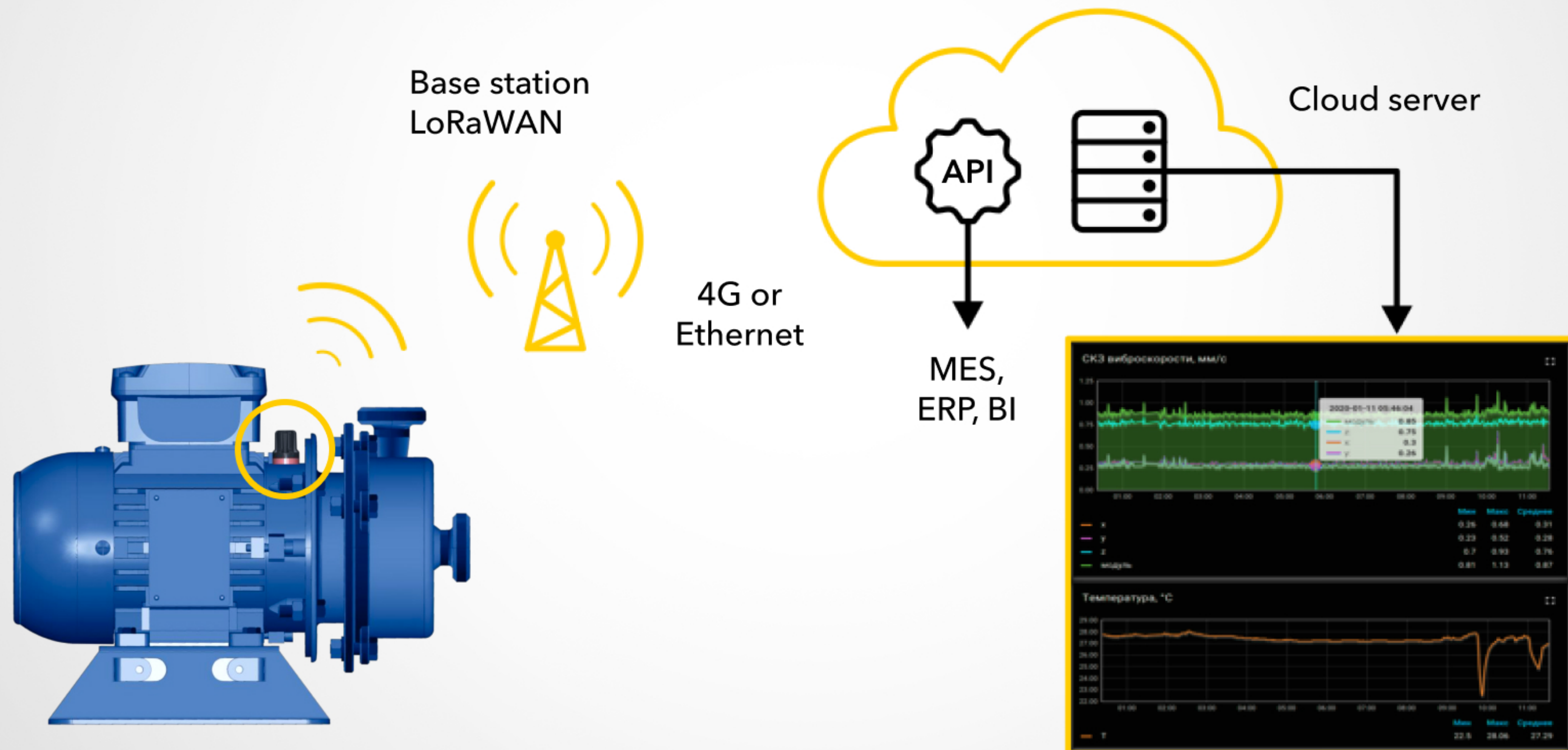
Battery life: 2 to 5 years



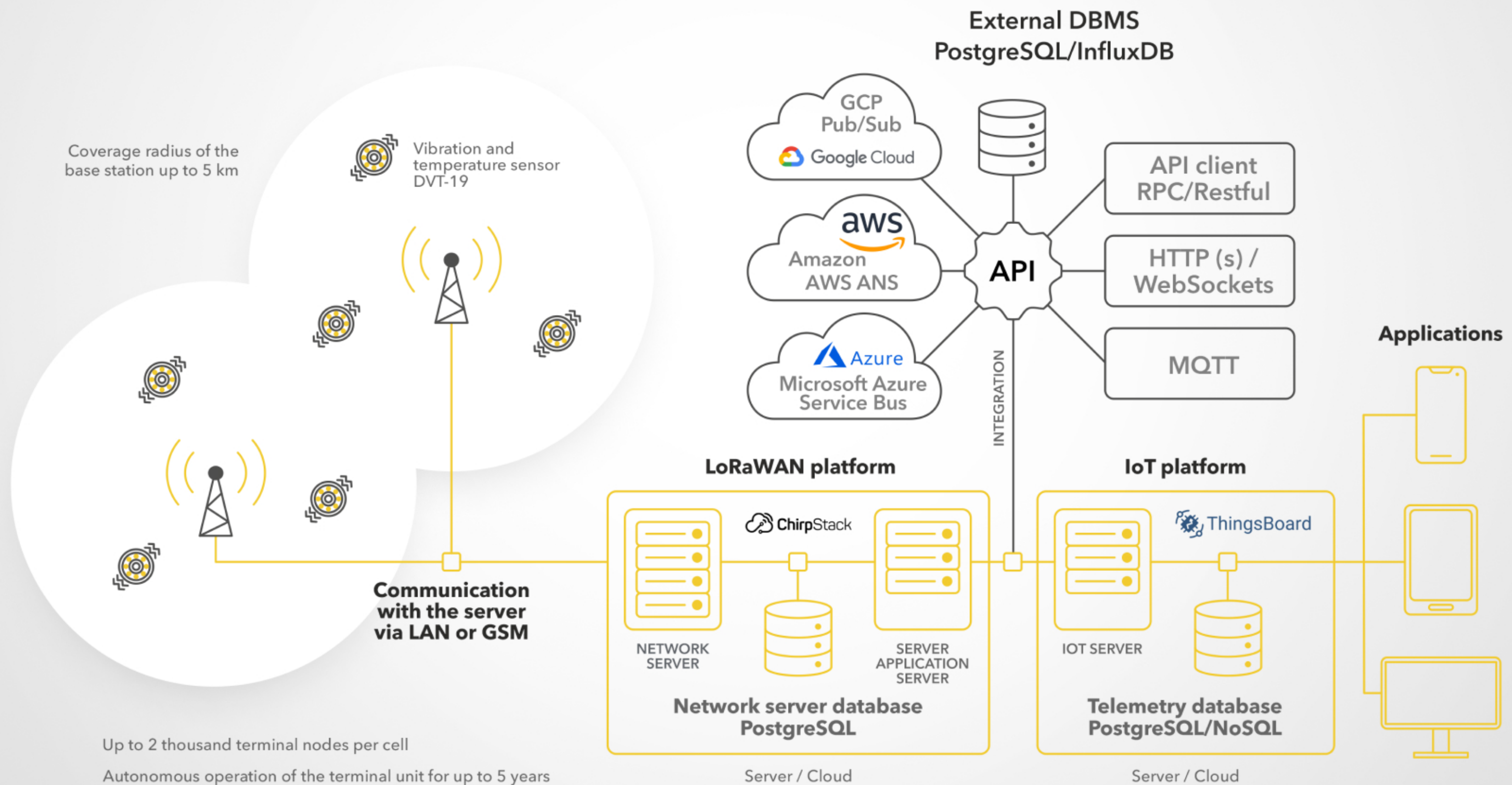
Degree of protection against external influences: IP67

Measurement of other parameters (voltage, current, pressure, etc.)
is possible according to customer requirements

ARCHITECTURE OF THE VIBRODIAGNOSTIC SYSTEM



LORAWAN-BASED INDUSTRIAL INTERNET OF THINGS



SYSTEM COMPOSITION

The temperature and vibration monitoring system based on the LoRaWAN Wireless Data Acquisition Network consists of the following functional units:



Vibration and temperature sensor DVT-19



LoRaWAN base station Vega-1.2 - designed to receive data from sensors DVT-19, as well as other LoRaWAN end nodes



LoRaWAN server "ChirpStack" - designed to organise a data collection network according to the specifications of the LoRaWAN protocol v1.0.3, register devices and store encryption keys.



The "ThingsBoard" application server is designed to store information from LoRaWAN devices, process data and display data via a WEB interface, as well as organize APIs for interaction with other



OPC-UA server systems

PRINCIPLE OF THE SYSTEM



The system implements a LoRaWAN wireless data collection network in monitored areas of the plant site, as well as a data storage, processing and display platform.



The wireless network is divided into base station coverage areas within which the DVT-19 sensors are located. The LoRaWAN server "ChirpStack" manages the wireless network and the devices connected to it, as well as primary data collection and storage



The vibration sensors are registered in the network, measure and, via base stations, send scheduled or event-driven vibration and temperature data to the LoRaWAN server. Subsequent data processing and display is performed by the ThingsBoard application server.



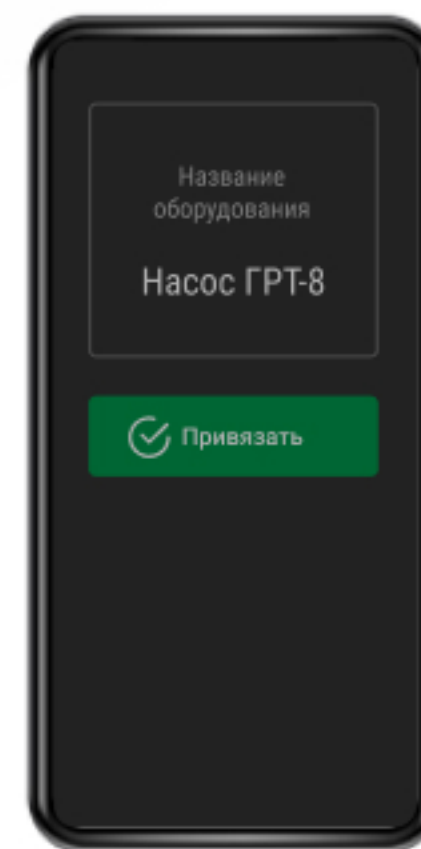
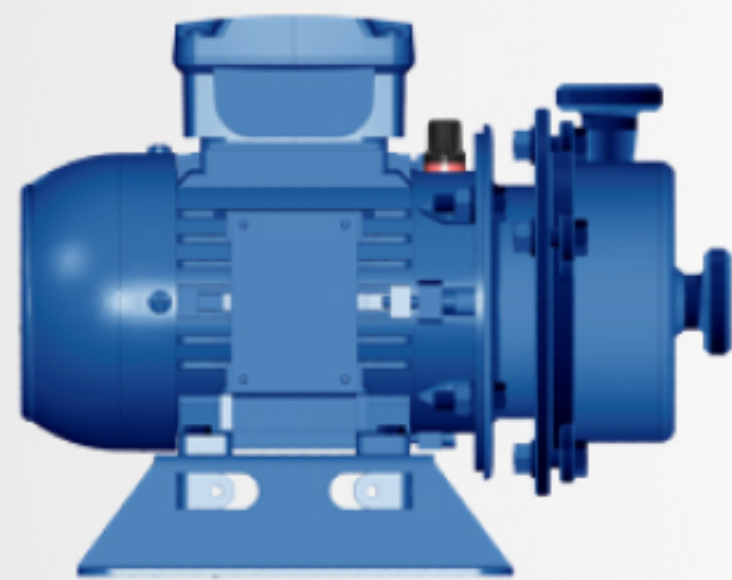
The application server can perform statistical processing, data aggregation, calculation of characteristic anomalies, exceeding thresholds and perform various scenarios (indication, notification via different communication channels) based on the processing results.



Data visualisation is possible in real time or in history. The application server also provides an interface for integration with machine learning and neural network processing tools for in-depth data analysis and predictive assessment of equipment status.

SIMPLE SYSTEM DEPLOYMENT

Install the sensor at the vibration and telemetry monitoring point



Monitor the condition

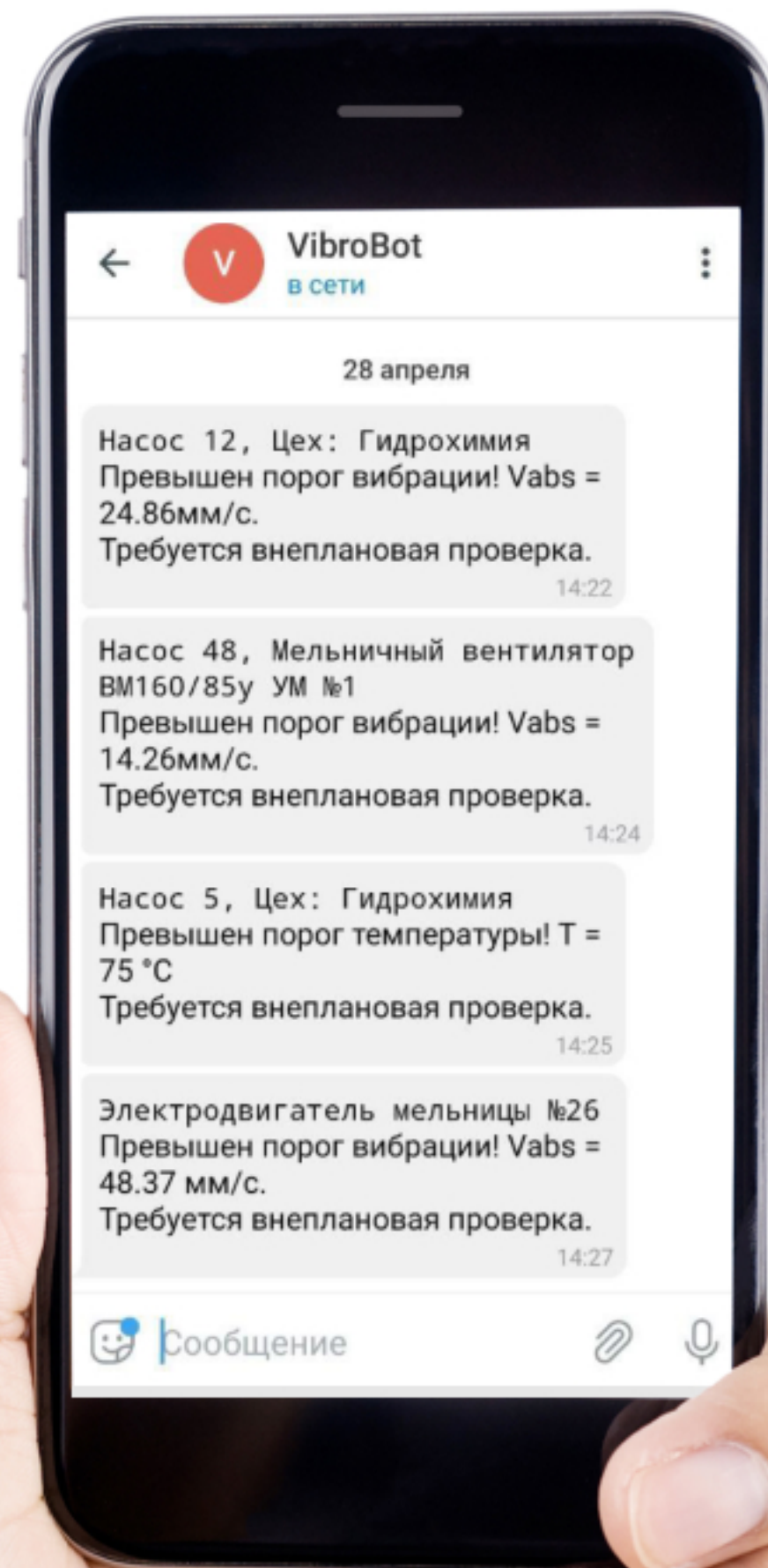
Насосы Исправны 55% Высокий износ 30% В ремонте 15%	Датчик 1 T 54.02 °C Vx 1.31 мм/с Vy 1.08 мм/с Vz 1.74 мм/с tnar 325 ч	Датчик 2 T - °C Vx - мм/с Vy - мм/с Vz - мм/с tnar 6757 ч	Датчик 3 T 26.81 °C Vx 2.02 мм/с Vy 2.23 мм/с Vz 4.47 мм/с tnar 2094 ч	Датчик 4 T 83.3 °C Vx 1.36 мм/с Vy 2.19 мм/с Vz 1.03 мм/с tnar 2226 ч
	Датчик 5 T 34.68 °C Vx 1.86 мм/с Vy 1.14 мм/с Vz 1.4 мм/с tnar 262 ч	Датчик 6 T 38.88 °C Vx 0.77 мм/с Vy 0.62 мм/с Vz 0.26 мм/с tnar 788 ч	Датчик 7 T 52.62 °C Vx 11.25 мм/с Vy 17.18 мм/с Vz 12.91 мм/с tnar 1734 ч	Датчик 8 T 53.12 °C Vx 0.3 мм/с Vy 2.89 мм/с Vz 4.6 мм/с tnar 2541 ч
	Датчик 9 T 43.41 °C Vx 0.78 мм/с Vy 0.16 мм/с Vz 0.59 мм/с tnar 1298 ч	Датчик 10 T 58.77 °C Vx 2.36 мм/с Vy 2.57 мм/с Vz 2.81 мм/с tnar 1356 ч	Датчик 11 T 28.8 °C Vx 0.62 мм/с Vy 1.09 мм/с Vz 1.18 мм/с tnar 323 ч	Насос ГРТ-8 T 27.05 °C Vx 0.3 мм/с Vy 0.26 мм/с Vz 0.75 мм/с tnar 249 ч
	Легенда Исправен Превышение параметров Опасность Не активен			

Tie the sensor to the equipment

Vibration



AUTOMATIC MESSENGER NOTIFICATION



Viber

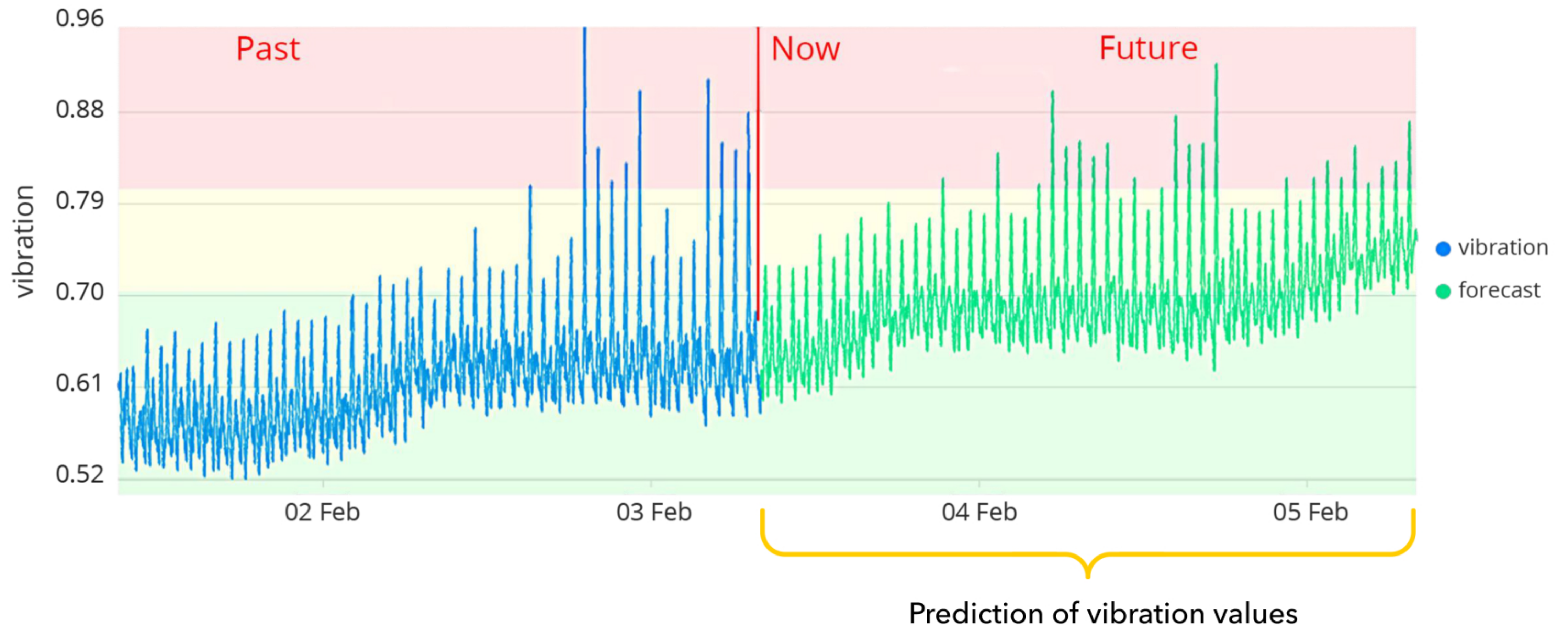


Telegram



WhatsApp

PREDICT ENGINE BREAKDOWNS AND DETERIORATION

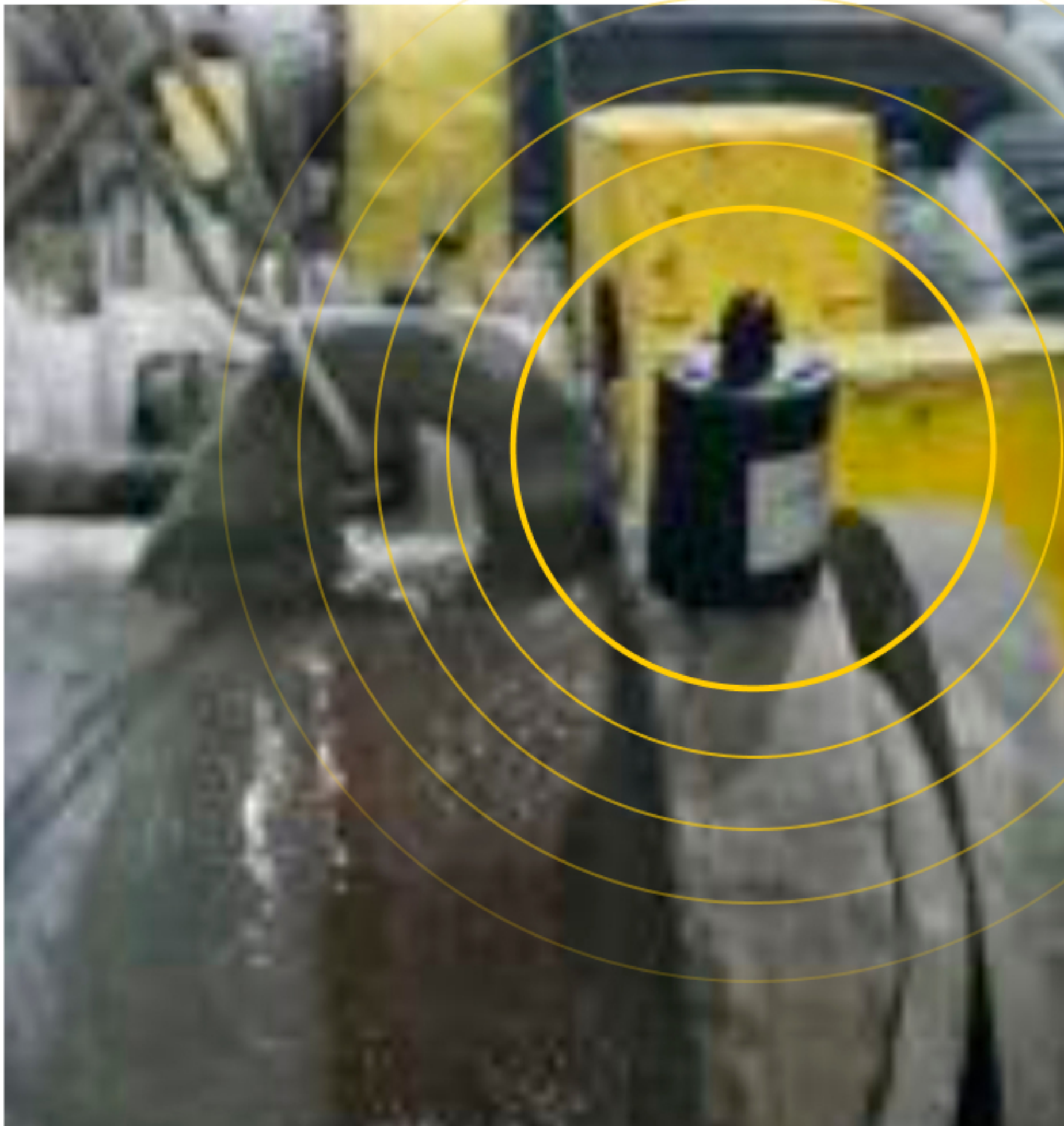


OPERATOR INTERFACE OF THE OPERATOR'S WORKSTATION



USE OF WIRELESS VIBRATION AND TEMPERATURE SENSORS

TEMPERATURE



Trial run results



A communication range of 500m has been achieved. During trial operation, increased vibration was immediately detected on pump 8 GRT-8 No.14, due to lack of quality pump cushion fixing

The pump has been commissioned on 19 AUG 2019.
No remarks on rounds

DEVELOP A WIRELESS SENSOR TO SUIT YOUR NEEDS



Voltage and current measurement



Equipment hour meter



Fume detector




Light sensor



THANK YOU FOR YOUR ATTENTION!



 www.ag-tech.kz

 info@ag-tech.kz

 +7 (7172) 47 28 46