



Predictive Maintenance

Buyer's Guide

How to choose the right monitoring device for your machines, in plain language

You do not need to be a vibration engineer to make a confident choice. This guide walks you from "I know one of my machines will fail eventually" to "I know exactly which device to put on it, why, and what it will cost." Read it start to finish, or jump to the two minute answer in Section 1 and come back for the detail.

By the end you will know:

- which of your machines to protect first
- which signal (vibration, temperature, or current) actually warns you about your problem
- which of the five IoTize devices fits
- where your data lives and what it will cost to start

1. The two minute answer

If you only have two minutes, find the row that sounds most like you.

If this sounds like you	Start with	Price
I want the cheapest way to catch overheating on one machine	Machine Temperature Monitor	\$59
I want full early warning on one important machine, on a budget	Smart Machine Health Monitor (vibration, temperature and current in one)	\$99
Vibration is my main worry on a critical	Vibration Monitoring Device	Request a Quote

rotating machine and I want deep diagnostics		
I mainly want to watch electrical load and current on single-phase equipment	Current Monitor (single-phase)	Request a Quote
I have a critical or variable-speed machine that must feed SCADA or MES, or I need two measurement points on one machine	Enterprise Smart Machine Health Monitor (SMH-100)	Request a Quote

Still unsure? Keep reading. The rest of this guide makes the choice obvious.

2. Machines almost always warn you before they fail

The single most useful idea in predictive maintenance is this: failures are rarely instant. A bearing, motor, pump, or gearbox usually gives off warning signs for days or weeks before it actually stops. Reliability engineers call the window between the first detectable warning and the final failure the "**P to F interval**", the time from the Potential failure (the first measurable symptom) to the Functional failure (the machine stops).

The whole point of condition monitoring is to live inside that window. If you are only doing reactive maintenance, you find out at the moment of failure, when it is most expensive. If you do scheduled inspections, you might catch it, but only if your walk-around happens to land in the window. Continuous monitoring listens all the time, so you catch the trend early and act on your schedule instead of the machine's.

According to the **U.S. Department of Energy's Operations and Maintenance Best Practices Guide**, a working predictive maintenance program typically delivers around **35 to 45% less unplanned downtime**, **70 to 75% fewer unexpected breakdowns**, and roughly a **tenfold return on investment**. Those are industry averages rather than a promise, but the direction is consistent everywhere: catching faults early is dramatically cheaper than reacting to them.

3. The three signals, and what each one tells you

Every IoTize device watches one or more of three signals. Choosing well starts with understanding what each signal is good at.

Vibration: the richest early warning on rotating machines

Vibration is the first place most mechanical faults show up. Imbalance, misalignment, looseness, resonance, and especially bearing wear all change how a machine vibrates, often long before you can hear or feel anything.

There is even an international yardstick for it. **ISO 20816** (the modern standard, formerly ISO 10816) grades a machine's overall vibration into four zones: Zone A is a healthy new machine, Zone B is fine for long-term running, Zone C means "plan a fix," and Zone D means "stop before it breaks." For a typical medium-sized motor or pump on a solid foundation, vibration up to roughly 1.4 mm/s RMS sits in the healthy zone, up to about 2.8 mm/s is still acceptable, and above about 7.1 mm/s is the danger zone. Rising vibration is a machine telling you it is getting sick, and a vibration sensor reads that message continuously.

Vibration is your signal if: you run motors, pumps, fans, compressors, gearboxes, or any rotating machinery and you want the earliest possible warning.

Temperature: the quiet symptom of friction and overload

Heat is the second great early warning. Lost lubrication, increased friction, electrical overload, and cooling failures all show up as a rising temperature at a specific spot. A contact temperature sensor placed on that hot spot flags a climbing trend before the heat does real damage.

Temperature is your signal if: you have a known hot spot to watch, or you want the simplest, lowest-cost way to protect a machine.

Current: the non-invasive window into electrical load

A machine's electrical current tells you how hard it is working. Abnormal or rising current can reveal overload, mechanical binding, and developing electrical faults. The big advantage is that current can be measured non-invasively by clamping around a conductor, with no need to cut into wiring.

Current is your signal if: you want to watch electrical load and catch overload conditions, particularly on single-phase equipment.

The honest summary

- **One machine, one known risk:** pick the single signal that matches it.
- **One important machine, full picture:** watch all three together.
- **Many machines:** start with the most critical one, prove the value, then expand.

4. Which machines should you monitor first?

You do not need to instrument the whole plant on day one. The smartest programs start with one or two machines, prove the savings, and scale from there. Score each candidate machine on two questions:

1. **How critical is it?** If this machine stops, does the whole line stop, or is there a backup?
2. **How expensive is its downtime?** Lost production per hour, scrapped material, overtime, late orders, and any safety or compliance risk.

Rank your machines by criticality multiplied by downtime cost. The machine at the top of that list is where predictive maintenance earns the most, fastest. That is your first install.

A quick gut check: if losing a machine for a day would cost you many times the price of a sensor, monitoring it is almost certainly worth it.

5. Match the signal to the machine

Your asset	What tends to fail	Signal that warns first	IoTize fit
Electric motors and bearings	Bearing wear, misalignment, lubrication loss	Vibration plus temperature	Vibration Device, Machine Health Monitor, or SMH-100
Pumps and compressors	Overheating under load, imbalance, overload	Vibration and temperature	Machine Health Monitor or SMH-100
Gearboxes	Rising heat, looseness, wear	Temperature and vibration	Temperature Monitor, Vibration Device, or SMH-100
Fans and blowers	Imbalance, resonance	Vibration	Vibration Device or SMH-100
Electrical panels and single-phase equipment	Failing cooling, electrical overload	Temperature and current	Temperature Monitor or Current Monitor
Variable-speed or VFD machines	Faults that shift with changing RPM	Vibration with a speed reference	SMH-100 (optional speed input)
Marine and heavy industry	Shaft misalignment, bearing degradation, electrical load	All three, in a rugged build	SMH-100

6. The five IoTize devices, in detail

All five install in minutes, read the machine non-invasively, and let you keep your data wherever you want it.

Device 1: Machine Temperature Monitor, \$59

- **What it is:** the lowest-cost way to bring one machine into predictive maintenance.

- **Monitors:** temperature at one contact point.
- **Connectivity:** Wi-Fi with MQTT and HTTP.
- **Best for:** a single known hot spot where overheating is the failure you fear most.
- **Consider another device if:** your real risk is mechanical wear or imbalance, in which case you want vibration too.

Device 2: Smart Machine Health Monitor, \$99

- **What it is:** the best-value all-rounder, three signals in one affordable bolt-on unit.
- **Monitors:** vibration, temperature, and current together on one machine.
- **Connectivity:** Wi-Fi with MQTT and HTTP.
- **Best for:** getting the complete early warning picture on a single important machine without buying three separate sensors. For most small and mid-sized factories, this is the smartest first purchase.
- **Consider another device if:** you need deep vibration diagnostics, dual measurement points, or direct SCADA integration. Then look at the Vibration Device or the SMH-100.

Device 3: Vibration Monitoring Device, Request a Quote

- **What it is:** the vibration specialist.
- **Monitors:** vibration in depth, with RMS, peak, and a full FFT spectrum to pinpoint the cause of a fault.
- **Connectivity:** MQTT and HTTP.
- **Best for:** a critical rotating machine where vibration is the signal that matters and you want diagnostic detail, not just an overall number.
- **Consider another device if:** you also need temperature and current on the same machine, in which case the Machine Health Monitor or SMH-100 gives you all three.

Device 4: Current Monitor (single-phase), Request a Quote

- **What it is:** a single-phase smart energy and current sensor.
- **Monitors:** voltage, current, power, and power factor, with runtime and idle tracking.
- **Connectivity:** HTTP, MQTT, and Modbus TCP, making it SCADA-ready.
- **Best for:** watching electrical load on single-phase machines and tying energy and current data into your systems.
- **Consider another device if:** your concern is mechanical health (bearings, balance), where vibration and temperature lead.

Device 5: Enterprise Smart Machine Health Monitor (SMH-100), Request a Quote

- **What it is:** the flagship, built for critical assets and serious integration.

- **Monitors:** vibration, temperature, and current across two points on the same machine (dual-point), with an optional speed input for variable-speed and VFD machines.
- **Connectivity:** HTTP, MQTT, and Modbus TCP with Ethernet and Wi-Fi, for direct SCADA, MES, and cloud integration. Rugged DIN-rail build.
- **Best for:** your most important or most demanding machines, anything variable-speed, and any plant that needs data to land straight in SCADA or MES.
- **Consider another device if:** you are protecting a single straightforward machine on a budget, where the \$99 Machine Health Monitor already does the job.

7. The decision flow

Answer these in order and you will land on your device.

1	Is this a critical machine that must feed SCADA or MES, or do you need two measurement points on it, or is it variable-speed? Yes: choose the Enterprise SMH-100. No: continue.
2	Do you want all three signals (vibration, temperature, current) on one machine, affordably? Yes: choose the Smart Machine Health Monitor (\$99). No: continue.
3	Is vibration your main concern and do you want deep diagnostic detail? Yes: choose the Vibration Monitoring Device. No: continue.
4	Is your main concern electrical load or current on single-phase equipment? Yes: choose the Current Monitor (single-phase). No: continue.
5	Do you just want the cheapest way to catch overheating on one machine? Yes: choose the Machine Temperature Monitor (\$59).

If two answers fit, choose the device higher in the list. It covers more.

8. Where your data lives, your choice

Most IoT vendors push your data into their cloud and keep it there. IoTize is built on data freedom, so the same device connects the way your security and IT teams prefer, and you can change your mind later without changing hardware.

- **IoTize SaaS:** the device streams to a hosted dashboard. Nothing to set up or host, the fastest way to start. Best for small factories and pilots.
- **On-premise or private cloud:** the device sends data to your own local server or private cloud, so it never leaves your network. Best for security and compliance-sensitive plants.
- **Direct to SCADA or MES:** using Modbus TCP, MQTT, or HTTP, the device feeds your existing industrial systems directly. Best for smart factories and integrators.

Your machine data is always yours. That is predictive maintenance without vendor lock-in.

9. Budget and return on investment

You can start for very little. A single Machine Temperature Monitor is \$59 and the all-in-one Smart Machine Health Monitor is \$99. You do not need a plant-wide rollout to begin.

The payback math is lopsided. If a critical machine going down for a day costs you many times the price of a sensor, then catching even one failure early pays for the device many times over. Industry averages reported by the U.S. Department of Energy put the typical return on a working predictive maintenance program at roughly ten times the investment.

The low-risk way to prove it: put one device on your single most critical machine, watch it for a few weeks, and let the first avoided breakdown make the case for scaling up.

10. Installation, and what to expect

- **Non-invasive mounting:** sensors bolt on, stick on with adhesive, or clamp on. The current sensor clamps around a conductor with no rewiring.
- **Minutes, not days:** a typical install is fast and works on existing and legacy machines.
- **Set your limits:** you choose high and low alert thresholds, and the device sends an alert the moment a reading drifts out of range.
- **Then it just watches:** continuous monitoring runs in the background, turning a developing trend into an early warning your team can act on.

11. Frequently asked questions

Do I need a separate gateway?

No. The devices stream directly over Wi-Fi, and Ethernet on the enterprise unit, using MQTT and HTTP, so there is nothing extra to buy.

Will this work on my old machines?

Yes. The sensors are non-invasive and fit onto existing equipment without rewiring, so you can retrofit predictive maintenance onto older machines.

Can I keep all my data on-premises?

Yes. You can run everything on your own server or private cloud, so data never leaves your network. The IoTize SaaS option is just that, an option.

What is the difference between predictive and preventive maintenance?

Preventive maintenance services a machine on a fixed schedule whether it needs it or not. Predictive maintenance watches the machine's real condition and only acts when the data shows a developing fault, which means less downtime and fewer unnecessary part changes.

How many machines do I have to start with?

Just one. Start with your most critical machine, prove the savings, then scale.

Which device should most first-time buyers get?

For a single important machine, the \$99 Smart Machine Health Monitor is the most popular starting point because it covers all three signals in one affordable unit.

12. Your next step

Pick your single most critical machine. Match it to a device using the decision flow in Section 7. Install it, set your alert limits, and let it prove itself on that one machine before you scale across the floor.

When you are ready, talk to the IoTize team and we will help you confirm the right fit for your equipment.

- Browse the devices: <https://iotize.org/products/>
- Talk to our team: <https://iotize.org/contact/>

Start with one machine. Catch the early warning. Keep your line running.