

# You don't have to know vibration to benefit your process

Even if you aren't a vibration expert, you can monitor critical machinery vibration levels using sensors and transmitters that run on common 4-20 mA loops

# Machinery health monitoring

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- Critical to every plant's reliability program, **regardless of your process**
  - Pharmaceutical
  - Food and beverage
  - Brewing
  - Water and wastewater
  - Petrochemical
  - Pulp and paper
  - Power generation

**Wilcoxon has experience working with manufacturers in these businesses**

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- Machine monitoring is a vital part of maintenance programs that **reduce costs and downtime**

Using preventative and predictive maintenance technologies to track machine health is a proven industry best practice. By monitoring machinery health, outages and downtime are reduced, **and you save money**

Maintenance indicators can be examined through **vibration analysis, oil analysis, infrared (thermal) monitoring, motor circuit evaluation, and ultrasonic monitoring**

Maintenance indicators are used to examine machines while they are running. Without interfering with a machine's normal operation, **you can effectively estimate the machine health**

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# Why choose vibration data

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**Vibration monitoring has been one of the anchors of predictive maintenance technologies, because it can detect several causes of machinery fault**

- You can use vibration monitoring to detect
  - Shaft misalignment
  - Rotor imbalance
  - Gear failure
  - Bearing faults

**Trending vibration data allows you to monitor machinery and detect these faults, even if you aren't a vibration expert**



# Benefits of vibration trending

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**Trended data is obtained during loop-powered monitoring and provides 4-20 mA output that indicates overall machine health with no analysis required**

- Provides converted output of raw vibration data into 4-20 mA data which can be integrated with your plant DCS/PLC
- This pre-processing allows operators to focus on trends in the data
- Trended data can give useful advanced warning (1 month to 3 months) of equipment failures
- Simple alarm limits can be set
- Spectral data is usually available as well, and can be accessed to diagnose problems

## 4-20 mA data addresses your needs

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You already have PLC / DCS network installed. You are already taking data points on pressure, temperature or maybe flow. Now you can also get vibration data.

- Budgets continue to be squeezed
- “Do more with less” = mantra of today’s business environment
- Minimize complex analysis – operators can focus on trends in the data, you don’t need to be a vibration expert
- Variety of options
  - Loop powered sensors can output 4-20 mA data and also make dynamic vibration data available
  - Vibration transmitters can use your existing sensor infrastructure to trend raw vibration data
  - Sensors and transmitters interface with vibration alarms or your existing PLC or DCS for immediate notification of extreme vibrations



## What's needed – starting new vibration trending program

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- Wilcoxon Loop Powered (LPS<sup>®</sup>) are available in configurations for virtually every use
- Our dedicated team will help you determine which sensors are best for your application
- Mount sensors to machines at
- Use simple shielded, twisted pair cable – similar wiring for other 4-20 mA devices – to wire sensors to a PLC or DCS analog input
- LPS output is based on overall vibration, you don't have to be a vibration expert to interpret the data





# Where do the sensors mount

## 4-20 mA Loop Powered Sensors for vibration trending mount at the bearing location

- Horizontal mounting is preferred for pedestal supports
- Axial mounting may be used at the thrust bearing location
- Wilcoxon application guides offer detailed mounting information

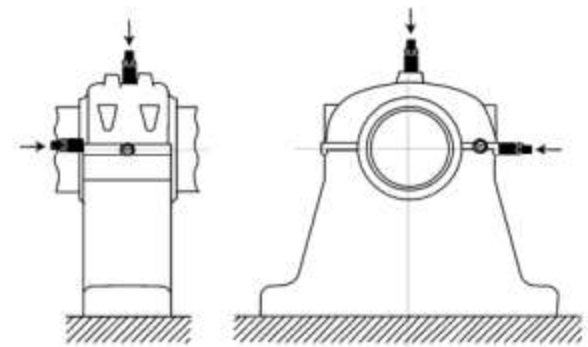
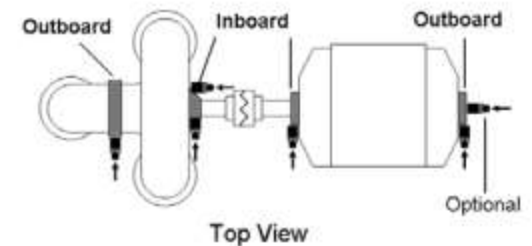


Figure 1 - Measuring points for pedestal bearings

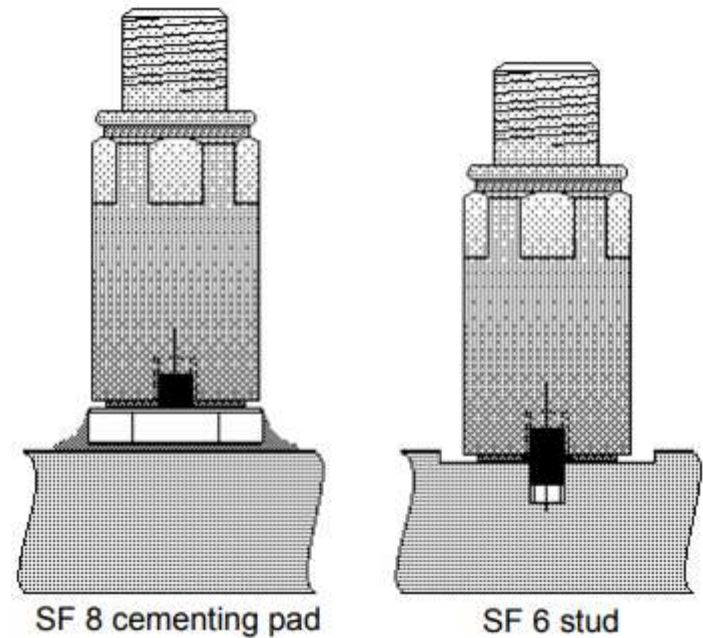


## How do the sensors mount

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**Loop Powered Sensors require a permanent mount on the machine to generate consistent measurements and provide data for trending**

- Cementing pad on machine surface
- Drill and tap on machine surface

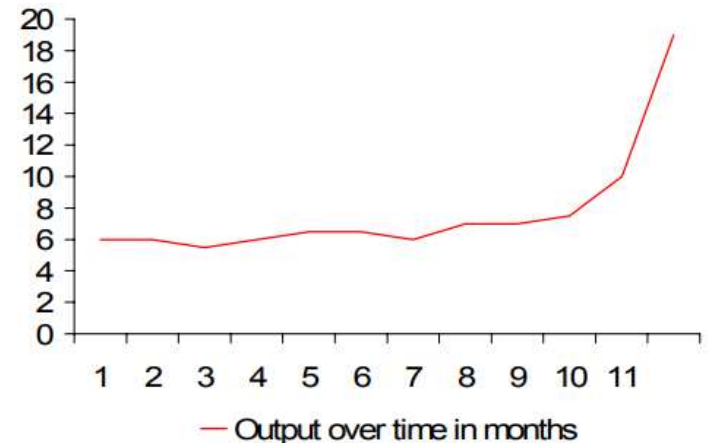


## Who analyzes the data

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### Sample trended data from a 4-20 mA LPS<sup>®</sup>

- Data “analysis” is not necessary
- Trend of vibration provides guidance for millwrights or mechanics
- Vibration changes indicate machines requiring attention
- Contact Wilcoxon to discuss your needs and application, and to also determine if detailed vibration analysis is necessary



# When is maintenance required

Since 4-20 mA data does not have to be analyzed by an expert, there are general guidelines on when maintenance should be performed

- When vibration changes are gradual, maintaining a more frequent watch over the machine will usually suffice
- Use a sensor so that the baseline is ~15% of full scale. An increase by 2.5x the baseline requires immediate attention
- ISO 10816, *Mechanical vibration – evaluation of machine vibration by measurements on non-rotating parts, is a guideline that advises typically acceptable vibration levels*

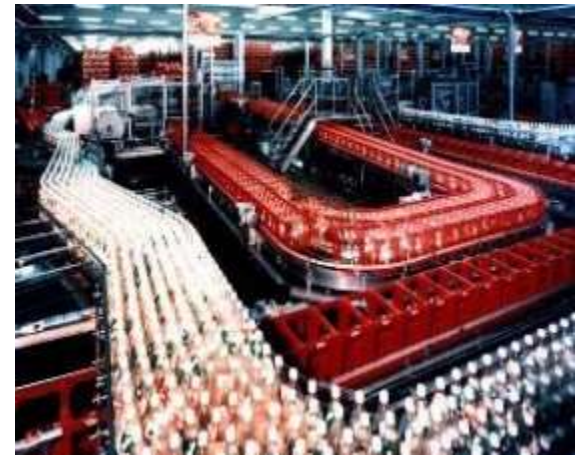
Example of ISO 10816 vibration recommendations

| Vibration Velocity<br>in/sec. peak<br>(mm/sec. r.m.s.) | Class I | Class II | Class III | Class IV |
|--|---------|----------|-----------|----------|
| 2.5 (45)   |         |          | D         | D        |
| 1.6 (20)   |         | D        |           |          |
| 1.0 (18)   | D       |          |           | C        |
| 0.63 (11.2)  |         |          | C         |          |
| 0.4 (7.1)  |         | C        |           | B        |
| 0.25 (4.5)   |         |          | B         |          |
| 0.16 (2.8)   | C       |          |           |          |
| 0.1 (1.8)  |         | B        |           |          |
| 0.063 (1.12)   | B       |          |           |          |
| 0.04 (0.71)  |         | A        | A         | A        |
| 0.025 (0.45)   | A       |          |           |          |
| 0.016 (0.112)  |         |          |           |          |

## Simplified condition monitoring

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- Trended data can be used for critical assets when no vibration monitoring program exists, or for the balance of plant machinery that is not currently being monitored
- The ability to trend data on motors, pumps, fans and gearboxes allows you to maximize your resources
- It's not a new concept, but it's a very practical and cost-effective approach



## What's the cost impact

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**Depending on your needs and specific application, your cost per monitoring point – including a 4-20 mA LPS<sup>®</sup> sensor with a 64-foot cable and sensor connector, may be as low as \$363**

## Can LPS sensors<sup>®</sup> withstand harsh plant environments

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- Wilcoxon's LPS sensors are hermetically sealed and use cases machines from 316L stainless steel
- Cables and connectors recommended for use with LPS sensors use materials with superior chemical resistance
- All LPS sensors are rated for continuous use up to 85°C (185°F)
- All LPS sensors are Helium Leak Tested to ensure a true hermetic seal, providing you excellent MTBF

## What about special applications

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- FM, CSA, SIMTARS and ATEX certification are available
- LPS sensors are available with intrinsically safe and explosion proof ratings
- Top exit, side exit, integral cable, stainless steel braid are just some of the many options available with the LPS series
- Dual-output of temperature and vibration data is offered
- If you have a special application which requires special certification, let us know the details you need





# Control your process with simple vibration monitoring


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- Wilcoxon's TLC (Total Lower Cost of Ownership) offers you a way to monitor your process with vibration monitoring, even if you aren't a vibration expert
- Wilcoxon has a global reputation for providing the best industrial sensors on the market
- Some of our customers are the leaders in their market – you know them by name



## Wilcoxon Sensing Technologies

For more information, please contact us:

 +1 (301) 330 8811

 [info@wilcoxon.com](mailto:info@wilcoxon.com)

 [www.wilcoxon.com](http://www.wilcoxon.com)

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