

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

- 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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Machinery health monitoring

- 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**

Why choose vibration data

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

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

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

- Wilcoxon Loop Powered (LPS[®]) 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

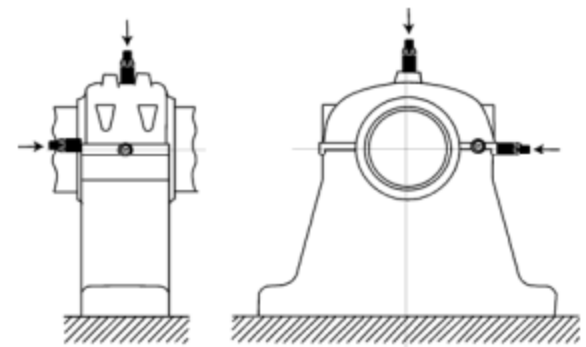
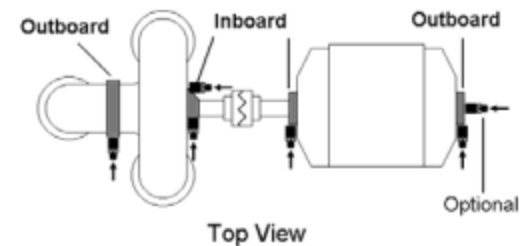


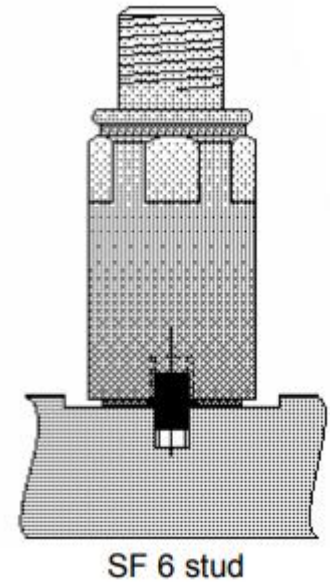
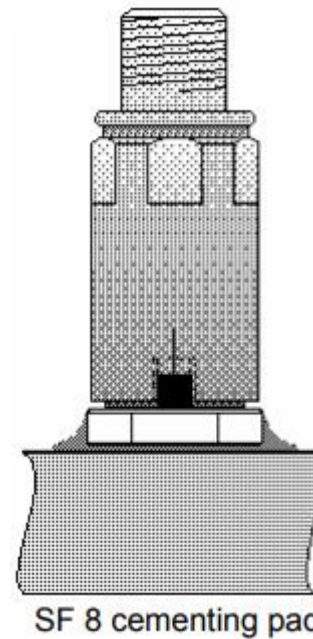
Figure 1 - Measuring points for pedestal bearings



How do the sensors mount

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

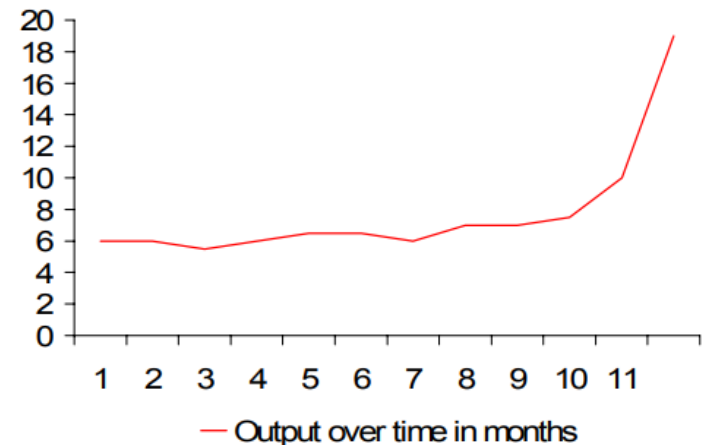
- Cementing pad on machine surface
- Drill and tap on machine surface



Who analyzes the data

Sample trended data from a 4-20 mA LPS®

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

Simplified condition monitoring

- 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

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

Can LPS sensors[®] withstand harsh plant environments

- 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

- 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

- 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

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