

ABB Ability™ Smart Sensor

Smart pumps and digital powertrains

Bernd Heisterkamp, Digital Leader for Motors and Generators



Addressing challenges faced by manufacturers



Ensuring uptime

Aging infrastructure poses a high risk on sudden equipment failures



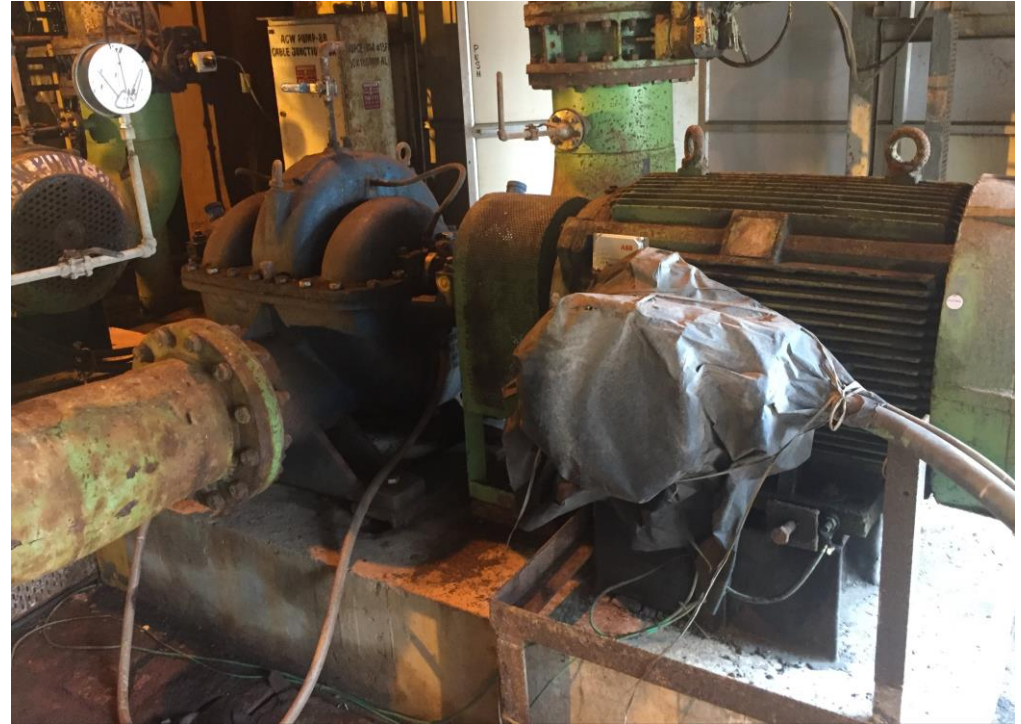
Managing costs

Lower end-user prices force suppliers to reduce costs in order to maintain profitability



Reducing safety hazards

Assuring properly trained workforce and intuitive operation



Addressing challenges faced by manufacturers



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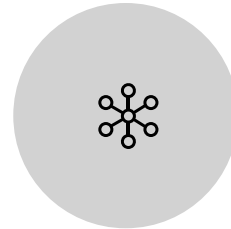
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Assuring properly trained workforce and intuitive operation



Asset health

- Monitoring of key parameters
- Getting reliable early warnings
- Recommendations for maintenance



Energy optimization

- Analyzing Fleet performance and usage
- Highlighting energy-saving potential



Remote assistance

- Get supported by experts wherever and whenever needed
 - Access to technical documentation and maintenance history



ABB Ability™ Smart Sensor for motors

Smart Sensor Video:

<https://youtu.be/iSR80gkbvCg>

ABB Ability™ Smart Sensor for Pumps

The logic evolution

Solution for pump monitoring

- A fitness tracker for pumps
- Complete wireless installation
- No PC software installation
- Intuitive operation

Monitoring of

- pump speed
- total vibrations
- temperature

Indicators for

- unbalance
- misalignment
- blade problems
- looseness
- bearing condition

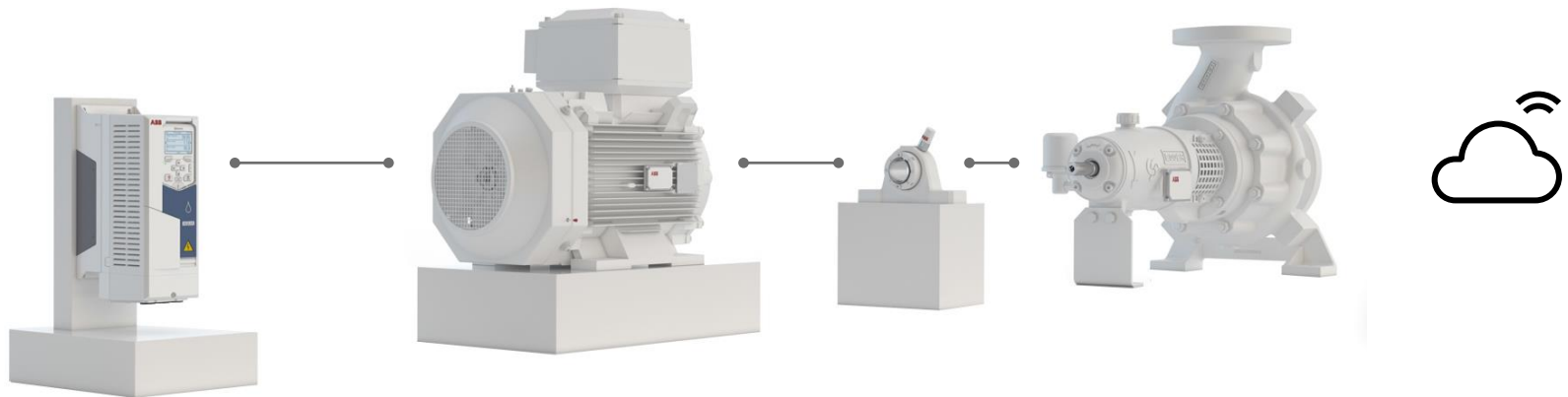


We support your service business !

ABB Ability™ Condition Monitoring for powertrains

Moving beyond a single asset

- Now it is possible to monitor your entire application in a single portal
- Components covered include drives, motors, bearings, & pumps
- Link the data to your own system or use the dedicated Powertrain portal



Integrate data in your own system

Example for cloud to cloud interface with our partner

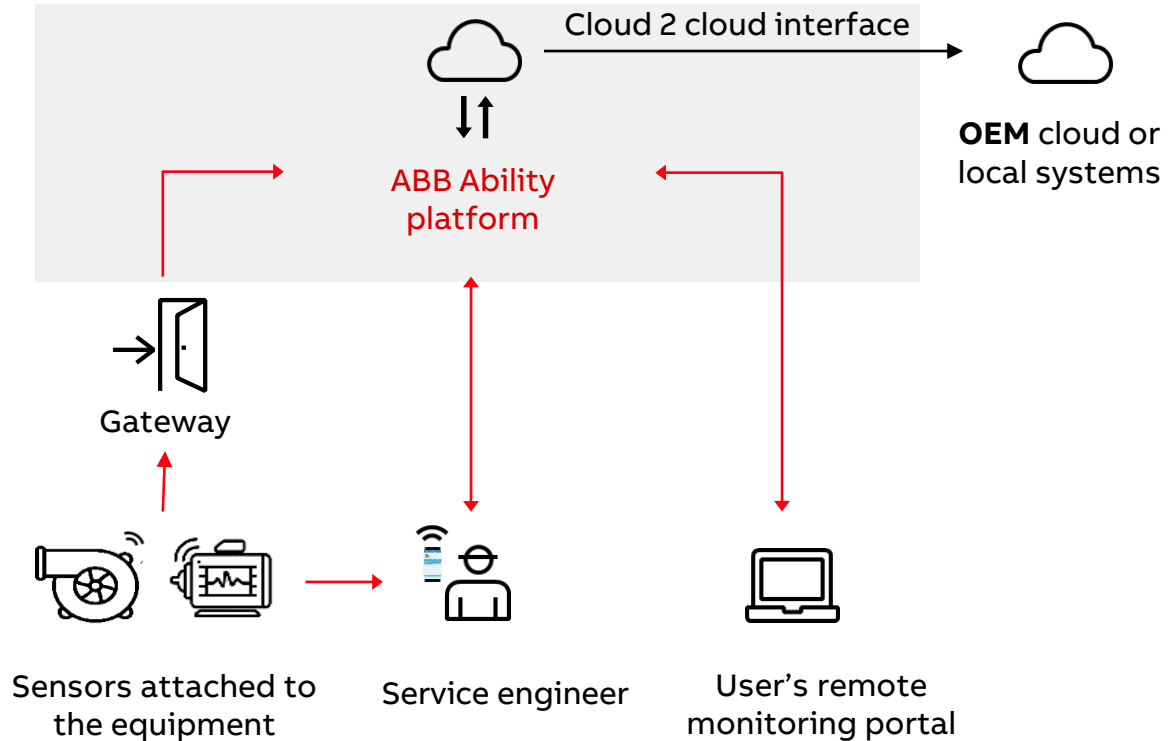


ABB Ability™ Condition Monitoring for powertrains

Simple system overview

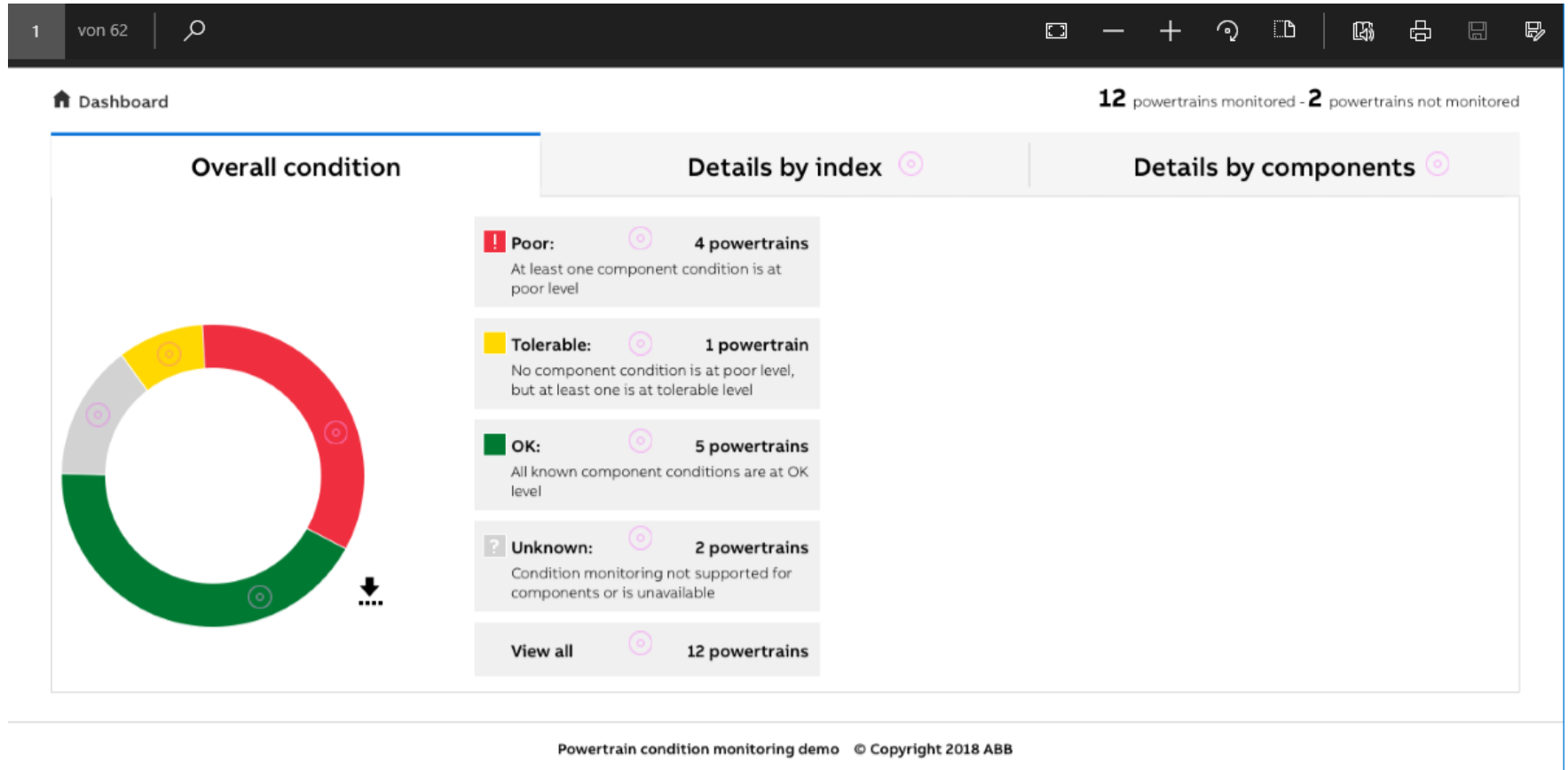


ABB Ability™ Condition Monitoring for powertrains

Simple system overview

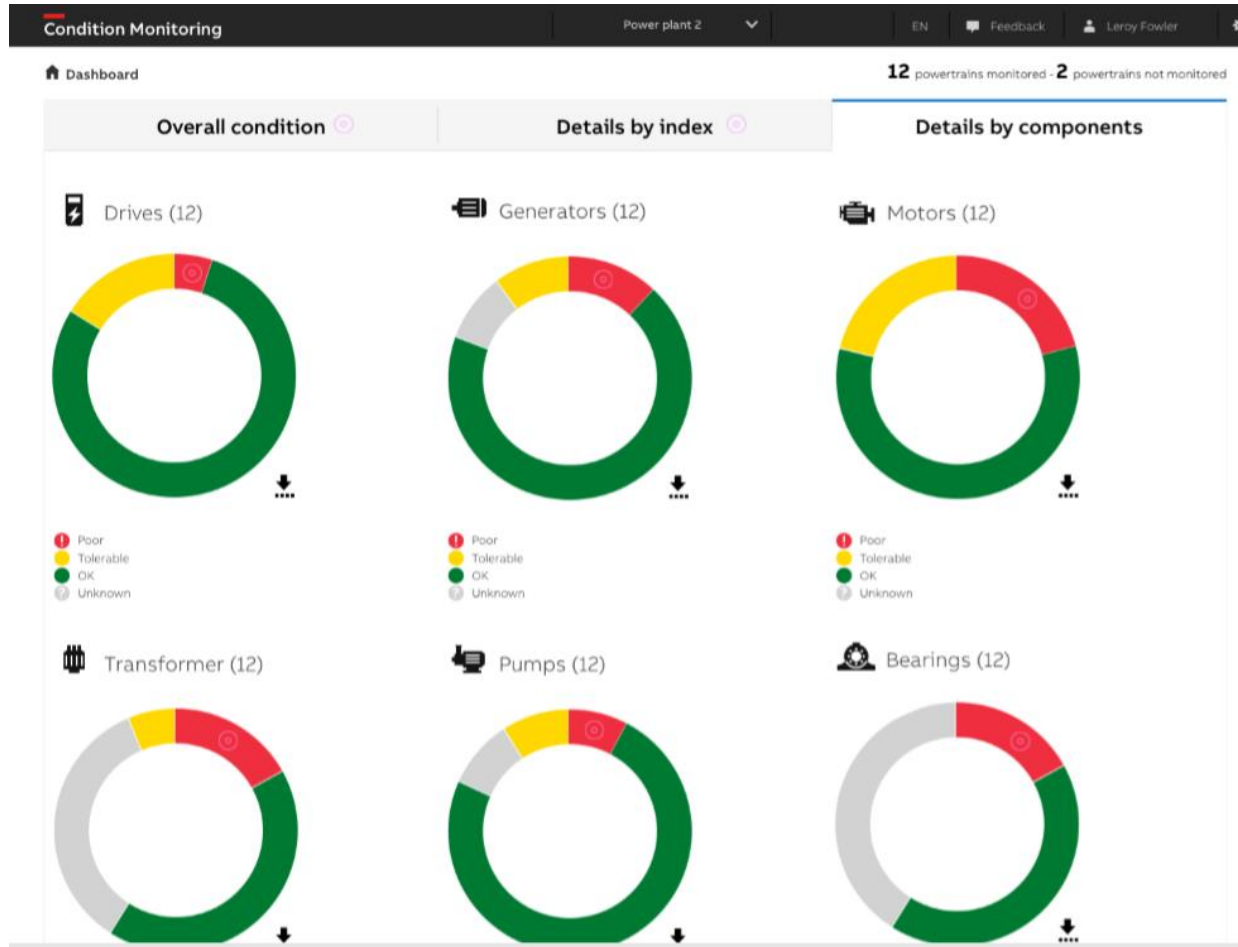


ABB Ability™ Condition Monitoring for powertrains

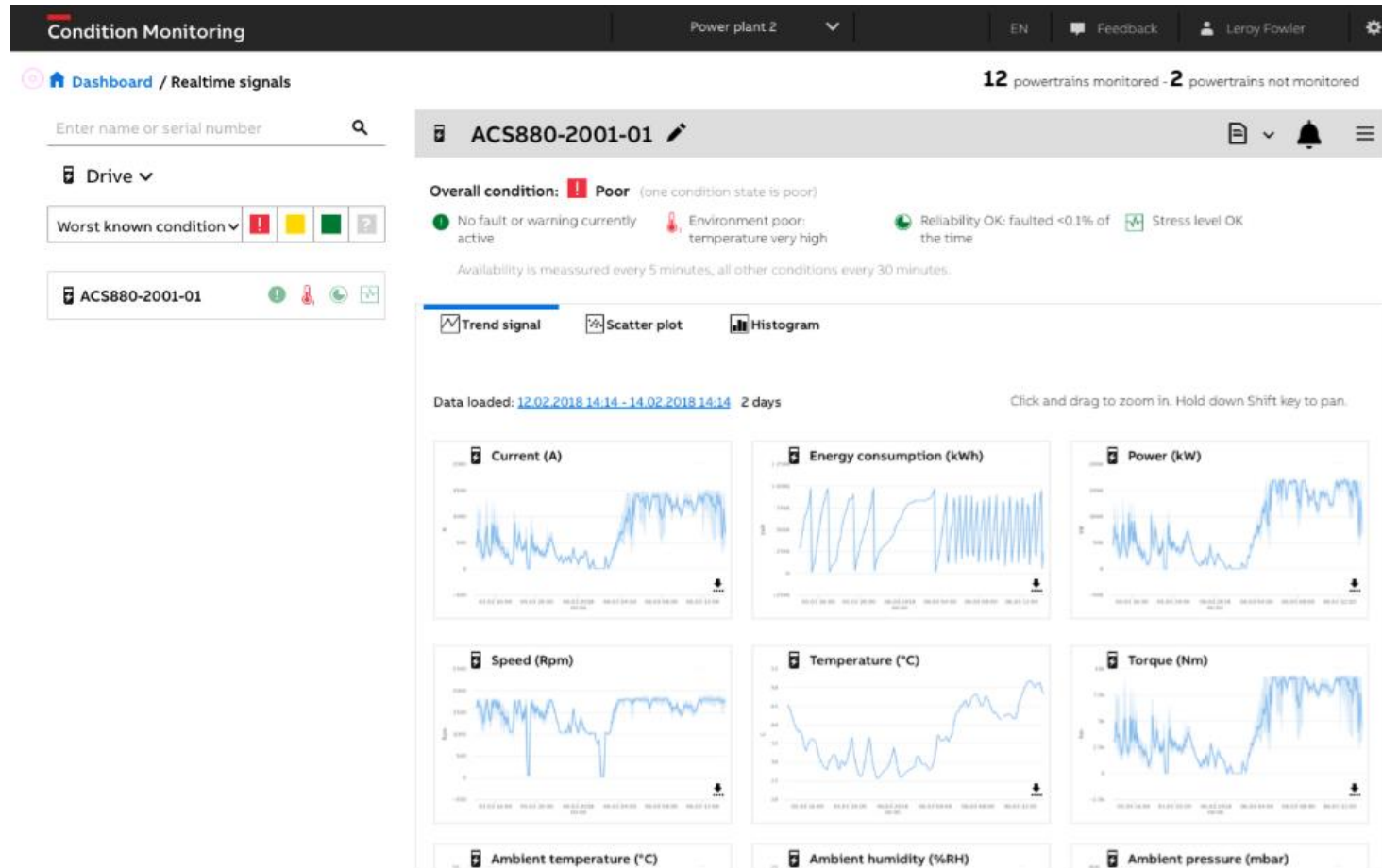
Simple system overview

The screenshot displays the ABB Ability Condition Monitoring interface. At the top, a dark navigation bar contains the title 'Condition Monitoring', a dropdown menu for 'Power plant 2', and user information 'EN', 'Feedback', and 'Leroy Fowler'. Below this, a breadcrumb trail shows 'Dashboard / Condition listing'. A summary bar indicates '12 powertrains monitored - 2 powertrains not monitored'. The main area features two filter dropdowns: 'Powertrain' and 'Environment'. A search bar is labeled 'Enter name or serial number'. Below the filters, the text 'Listing 2 powertrains' is shown. Two powertrain cards are displayed under the heading 'Poor 2'. The first card, 'Baldor...plant2-PT01', shows 'Drive' as 'Good' (green circle), 'Generator' as 'Good' (green bar), and 'Transformer' as 'Warning' (red exclamation mark). The second card, 'PT30...2002-01', shows 'Drive' as 'Warning' (red exclamation mark), 'Generator' as 'Warning' (red exclamation mark), and 'Transformer' as 'Warning' (red exclamation mark).

Powertrain condition monitoring demo © Copyright 2018 ABB

ABB Ability™ Condition Monitoring for powertrains

Simple system overview



Conclusion

- Condition monitoring has become affordable where it was cost-prohibitive before
- We enable our partners to improve their service business
- Powertrain monitoring assures the uptime of the customers application rather than only looking at a single asset
- Visit us here in Hannover and ask for a Powertrain introduction: Hall XXX, Stand XXX
- Check our website at <https://new.abb.com/drives/digital-powertrain-monitoring>

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Smart Sensor for motors



Parameters	Description	Availability
Measured parameters		
Vibration: axial, radial, tangential	mm/s or inch/sec, rms	•
Skin temperature	°C or °F	•
Magnetic field	(Data not shown; used in calculations)	•
Acoustic signals	(Data not shown; used in calculations)	•
Time	MM:dd:hh:mm:ss	•
Vibration fft and time waveform	Special report	•
Calculated health parameters		
Overall motor condition	Traffic light for consolidated status	•
Overall vibration	Traffic light, mm/s or inch/sec, rms	•
Bearing condition	Traffic light, integer value	•
Misalignment	Traffic light, %	•
Unbalance	Traffic light	•
Bent shaft	Traffic light	•
Rotor winding health	Traffic light	•
Calculated operating parameters		
Output power	kw	•
Operating hours	Hours	•
Number of starts	Integer value	•
Speed	Revolutions per minute (rpm)	•
Motor supply frequency	Hz	•
Loading	% of name plate full load power	•
Torque	Nm	•
Direction of rotation	Clockwise / counterclockwise	•
Maintenance advice		
Alerts, alarms, reminders	In app, per e-mail, push, webhook	•
Regreasing	Remaining hours until next regreasing	•
Sensor unit and battery status		•
Certifications		
IP 66		•
CE		•
FCC, UL, C-UL		•
NEC Intrinsically Safe	Class 1, Div. 2	•
IECEx Intrinsically Safe	Ex iB IIB T4 Gb, -40 °C to +80 °C	•
Compatibility		
Induction motors	Frame sizes: 140-440 (NEMA), 56-450 (IEC)	•
Permanent magnet/synchronous reluctance motors		•
Safe area motors		•
Hazardous area motors		•
Continuous and intermittent duty		•
Fixed speed and variable speed		•
Old and new motors		•
ABB and non-ABB motors		•

Smart Sensor for Mounted Bearings

Sensor parameters



Certification(s)	
	II 1 GD
	I M1
	Ex ia I Ma
	Ex ia IIC 150°C (T3) Ga
	Ex ia IIIC T146°C Da
EX (hazardous areas)	CI I, Zn 0, AEx ia IIC T150°C Ga
	CI I, Div.1, Grps ABCD
	CI II, Zn 20, AEx ia IIIC T146°C Da
	CI II, Div 1, Grps EFG
	CI III, Div 1
IP (Ingress Protection) class	IP 66
Temperature	
Measurement range	-22°F... +185°F (-30°C... +85°C)
Resolution	1°C
Accuracy	±2°C
Vibration	
Amplitude range	+/- 2g
Frequency range	1 Hz – 1.6 kHz
Detection type	RMS
wireless communication	
Network standard	Bluetooth Low Energy
Radio standard	IEEE 802.15.1C
Frequency	2402-2480 MHz
Range (nominal)	>26ft (8m) @ line-of-sight
Environmental	
Storage temperature	+14°F... +86°F (-10°C... +30°C)
Operating temperature	-22°F... +185°F (-30°C... +85°C)
Power	
Battery type	3.6V LiSOCl ₂ cells
	Lithium thionyl chloride cell battery is not replaceable
	-22°F... +122°F (-30°C... +50°C)
Estimated battery life*	2+ years with measurement taken once per hour and data collected once per day by mobile device.
	+123°F... +185°F (+51°C... +85°C)
	1+ year with measurement taken once per hour and data collected once per day by mobile device.
Physical	
Weight	60 grams
Case material	Stainless steel/thermoplastic/silicone
Dimension	60.5mm x 26.4mm
Mounting	Male 1/8" - 27 PTF SAE

Smart Sensor for Pumps

Sensor parameters



Intended use

- Centrifugal or vortex pumps
- Fluid type: water or wastewater
- The driving motor's frame size must be supported by the ABB Ability™ Smart Sensor, i.e. up to 450 mm (IEC) or equivalent
- Direct online or variable-speed driven

ABB Ability™ Smart Sensor gateway

Automatically collects data from a high number of Smart Sensors and transmits the data to the cloud for processing.

Gateway specifications

Range	Approx. 50 m (can vary in an industrial environment depending on facility layout)
Power supply	Power supply over ethernet port
Certifications	1879 FCC, CSA, CE
Radio frequency	ISM band, 2.402-2.480 GHz
Data transfer	WiFi, LAN 4G/LTE USB dongle
Environment	Operating temperature: -40 °C to +65 °C

Health parameters

- Overall condition
- Overall vibration (velocity rms)
- Bearing condition
- Misalignment
- Unbalance
- Looseness
- Blade problems
- Cavitation (under development)
- Flow turbulence (under development)
- Skin temperature (degrees)

Operating parameters

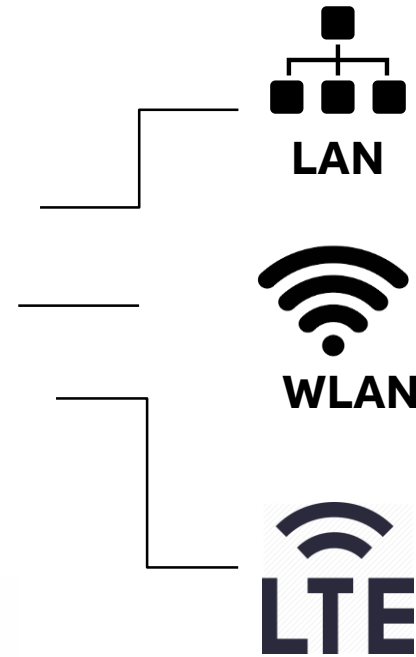
- Radial vibration (velocity rms)
- Tangential vibration (velocity rms)
- Axial vibration (velocity rms)
- Speed (rpm)
- Operating hours
- Number of starts

Introducing a long-range Bluetooth® gateway

Non ABB-branded product from Cassia Networks



50-60m range



Temperature: -40 to 65°C (-40 to 149°F)
Humidity: 0% to 90% non-condensing
IP ratings: IP65
Sales release: Q2 / 2018

ABB collaborates with innovative partners