

ABB MOTION SERVICES

## ABB Ability™ Digital Powertrain

### Condition monitoring of rotating equipment fitted with ABB Ability™ Smart Sensors



The ABB Ability Smart Sensor is a key element of the Digital Powertrain. It turns rotating equipment, such as motors, into smart, wirelessly connected assets. The sensors help detect potential asset disturbances and plan maintenance before reliability, productivity and safety are impacted.

#### ABB Ability Digital Powertrain

The ABB Ability Digital Powertrain is a suite of digital solutions that enables you to remotely monitor the health and performance of powertrains, including drives, motors and applications, such as pumps.

It combines data collected by the Smart Sensor with data from other connected equipment, such as variable-speed drives. This data can be accessed and analyzed remotely, providing a better understanding of the maintenance needs and energy efficiency of the entire process.

#### ABB Ability Smart Sensor

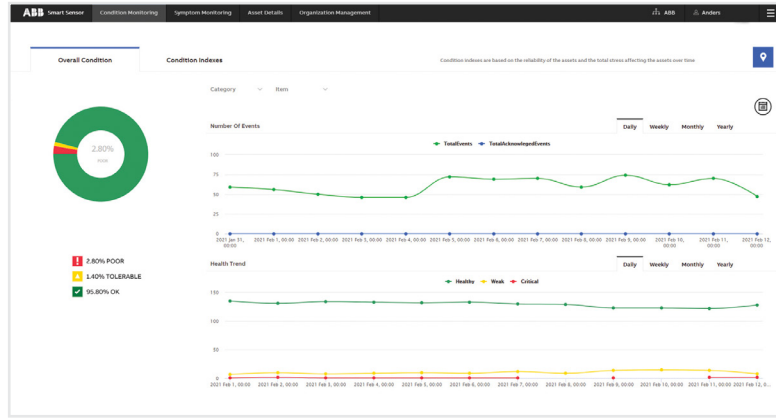
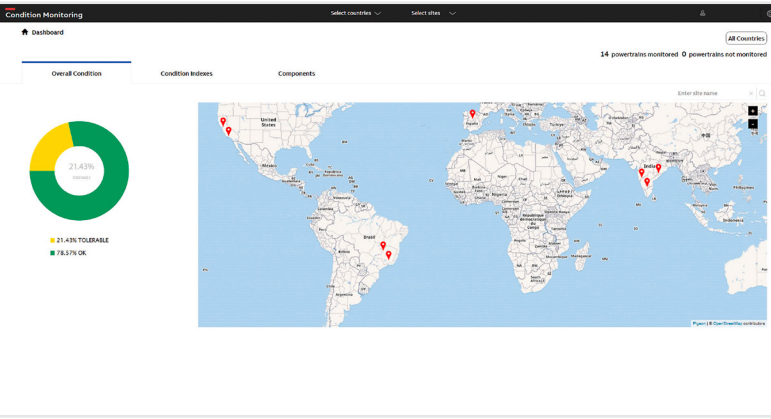
The ABB Ability Smart Sensor is a key element of the Digital Powertrain. It enables remote condition monitoring of a powertrain's rotating assets, such as motors and general machinery.

Easily fitted to the asset's surface, the Smart Sensor collects data and transmits it via a smartphone or gateway to a secure cloud service. Advanced algorithms analyze the data, providing deeper insights into the condition and performance of the monitored asset. Potential machine disturbances and energy

savings can be detected and actions taken to make operations more efficient, predictable and safe.

#### Benefits

- Early detection of potential problems minimizes downtime
- Condition-based maintenance lowers costs
- Process optimizations reduce operating and energy costs
- Remote condition monitoring increases personnel safety
- Compliant with strictest requirements for equipment operating in explosive atmospheres
- Easily retrofitted to ABB or third-party equipment



01

01 ABB Ability Digital Powertrain web portal

02 ABB Ability Digital Powertrain condition monitoring solution: The ABB Ability Smart Sensor transmits the data via a smartphone or gateway to a secure cloud service. Advanced algorithms analyze the data and convert it into meaningful information, which is sent to the user's smartphone and customer portal.

The solution can also be integrated into your own systems.

### Accessing information

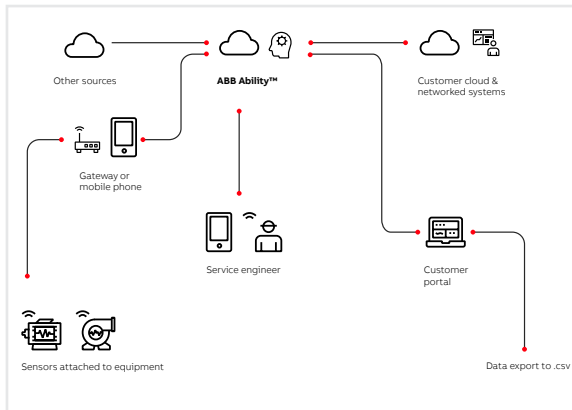
Details on the asset's status can be accessed through:

- **Web portal** – dashboard for operators to view condition and performance trends, access historical data, manage user access rights and set alerts and alarm.
- **App** – interface to the asset's status for technicians on the factory floor. A 'traffic light' display gives an easy overview of the condition of all monitored assets.
- **Other systems** – the Smart Sensor data can be easily integrated via API into other systems, such as ERP and SCADA systems or the plant level monitoring system ABB Ability™ Genix.

### Expert advice

While the data is always at your disposal, ABB can provide support to analyze the data and define the steps for improving your operations.

02



### Smart Sensor features

#### Certified for hazardous areas

The second generation ABB Ability Smart Sensor is designed for hazardous areas and harsh environments. Its enclosure withstands high vibration levels and protects the sensor from total dust ingress (IP66/67). The sensor is certified for ATEX, IECEx and NEC 500.

#### Pinpoint detection accuracy

The Smart Sensor features the latest technology including accelerometers, magnetometer and ultrasonic microphone. Even slight anomalies in the asset's condition can be detected at a very early stage. The sensor's mechanical design allows the transducers to pick up the true vibrations independent of sensor's eigenfrequencies.

#### Long battery life

The Smart Sensor is available with two battery sizes. The lifetime of the high performance sensor is up to 15 years under normal operating conditions and that of the standard performance sensor up to five years.

#### Same hardware for different assets

The same sensor can be used for different assets, saving time and reducing stock holding. The asset to be monitored is chosen during commissioning.



## Intended use

The ABB Ability Smart Sensor can be used for industrial motors and general machinery, such as pumps and fans.

### Motor specifications

- Industrial AC motors, induction or synchronous
- Continuous duty or intermittent duty with duty cycle durations of more than 20 minutes
- Frame sizes
  - IEC: 56 - 500
  - NEMA: 42 - 449, above NEMA: 5000 - 6800
- Fixed speed or variable speed
- New or existing motors from ABB or other manufacturers

### Monitored motor health parameters

- Overall condition
- Overall vibration (velocity RMS)
- Bearing condition
- Skin temperature (degrees)

### Monitored motor operating parameters

- Vibration in 3 axis
  - velocity RMS
  - acceleration RMS
  - acceleration peak to peak
- Speed (rpm)
- Total running time
- Total number of starts
- Supply frequency (Hz)
- Output power (hp/kW)
- Regreasing count-down

### General machinery specifications

- Assets, such as pumps and fans, in which only temperature and vibration need to be measured and monitored

### Monitored general machinery health parameters

- Overall vibration (velocity RMS)
- Overall acceleration RMS
- Skin temperature (degrees)

### Monitored general machinery operating parameters

- Vibration in 3 axis
  - velocity RMS
  - acceleration RMS
  - acceleration peak to peak

## ABB Ability Smart Sensor gateway

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

### Gateway specifications

Manufacturer	Cassia, with ABB customization
Range	30 - 200 m (can vary in an industrial environment depending on facility layout)
Power supply	PoE (Power over Ethernet)
Certifications	1879 FCC, CSA, CE
Radio frequency	ISM band, 2.402-2.480 GHz
Data transfer	WiFi, LAN 4G/LTE USB dongle
IP rating	IP65 with cover caps
Environment	Operating temperature: -40 °C to +65 °C

SPECIFICATIONS	High performance sensor	Standard performance sensor
Lifetime	up to 15 years operation under standard conditions <sup>1)</sup>	up to 5 years operation under standard conditions <sup>1)</sup>
1) ABB indicates a maximum sensor lifetime which varies between sensor types and is based upon standard usage conditions. Standard conditions of operations are as follows: sensor measurement interval of 1 hour; raw data collection once per day; non-condensing environment; measured asset skin temperature: +15 °C to +50 °C		
<b>Vibration measurement</b>		
Acceleration, low frequency (x, y, z direction)		
Amplitude range	0.03 - 157 m/s <sup>2</sup> (16g)	
Frequency bandwidth	0.4 Hz – 3.3 kHz	
Acceleration, high frequency (z direction)		
Amplitude range	0.1 - 490 m/s <sup>2</sup> (50g)	N/A
Frequency bandwidth	2.4 Hz - 10 kHz	N/A
<b>Magnetic field measurement</b>		
Magnetic field (x, y, z direction)		
Amplitude range	1 - 1600 µT	
Frequency bandwidth	0.1 - 280 Hz	
<b>Ultrasonic sound measurement</b>		
Microphone		
Amplitude range	0.6 mN/m <sup>2</sup> - 20 N/m <sup>2</sup>	
Frequency bandwidth	100 Hz - 80 kHz	
<b>Temperature measurement (asset skin temperature)</b>		
Measurement range	-40 °C to +85 °C	
Resolution	0.1 °C	
Accuracy	+/-0.5 °C	
<b>Wireless communication</b>		
Communication standards	Bluetooth® 5.0, Bluetooth® Low Energy or WirelessHART (HART 7.4)	Bluetooth® 5.0, Bluetooth® Low Energy
Radio standard	IEEE 802.15.4	
Frequency	2.4 GHz, license free ISM band	
Range (nominal)	>200 m @ line of sight	
<b>Security</b>		
Encryption	128-bit AES encryption	
Authentication	IEC 62351 (role-based access control)	
<b>Power</b>		
Battery type	not replaceable	
<b>Environmental</b>		
Temperature	Operation: -40 °C to +85 °C Storage: : <30 °C	
IP class	IP66/67 (dust-tight and resistant to powerful water jetting and submersion)	
Chemical tolerance	See chemical tolerance sheet for PBT (Polybutylene terephthalate)	
<b>Certifications</b>		
Hazardous areas	Ex ia I Ma -40 °C ≤ Tamb ≤ +85 °C (Mining) Ex ia IIC T4 Ga -40 °C ≤ Tamb ≤ +85 °C (Gas) Ex ia IIIC T157 Da -40 °C ≤ Tamb ≤ +85 °C (Dust) CI I, Div 1, Gr A, B, C and D T4 CI II, Div 1, Gr E, F and G T4 CI III, Div 1	
Radio	EN 300 328 v.2.1.1, EN 301 330 v.2.1.1 FCC/IC	
<b>EMC</b>		
Immunity	EN/IEC 61000-6-2	
Emission	EN/IEC 61000-6-3	
<b>Physical</b>		
Dimensions (W x D x H)	82 mm x 69 mm x 45 mm	75 mm x 58 mm x 33 mm
Weight	185 g	130 g
Case material	Stainless steel/reinforced PBT	
Mounting	On equipment housing or frame. Please consult installation manuals.	

For more information, please contact your local ABB representative or visit:

[abb.com/smartsensor](http://abb.com/smartsensor)  
[solutions.abb/digital-powertrain](http://solutions.abb/digital-powertrain)

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