

## 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, mounted bearings, gearing 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

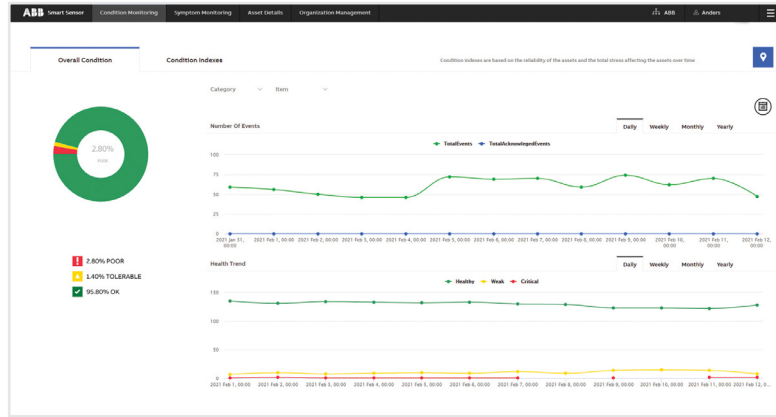
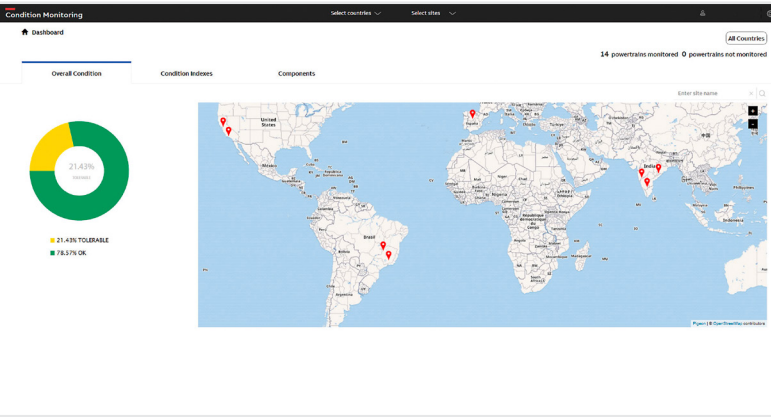
The ABB Ability Smart Sensor is a key element of the Digital Powertrain. It enables remote condition monitoring of a powertrain's rotating assets, such as motors, pumps and general machinery.

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.
- **User's own system** – the Smart Sensor data can be integrated into your own system via the Digital Powertrain Cloud Interface.

### 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.

### 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.

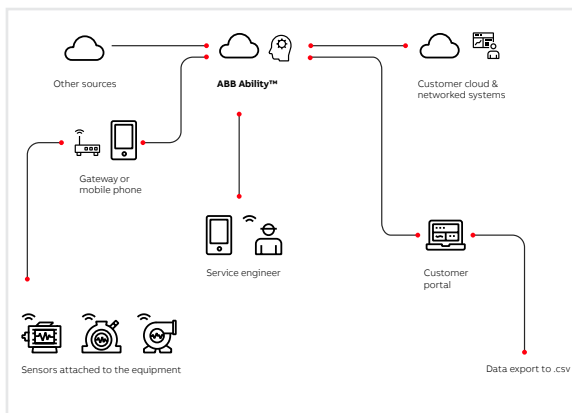
#### Pinpoint detection accuracy

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.

02





### Intended use

The ABB Ability Smart Sensor can be used for industrial motors and their driven equipment, such as pumps and fans.

### Motor specifications

- Industrial AC motors, induction or synchronous
- Continuous or intermittent duty
- 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

- Radial vibration (velocity rms)
- Tangential vibration (velocity rms)
- Axial vibration (velocity rms)
- Speed (rpm)
- Operating hours
- Number of starts
- Supply frequency (Hz)
- Output power (hp/kW)
- Regreasing count-down

### 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

|                 |                                                                                   |
|-----------------|-----------------------------------------------------------------------------------|
| Type            | Cassia X1000, with ABB customization                                              |
| Range           | Approx. 50 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<br>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                                                                                                                                                                                                                                                                                                                | 0.1 Hz – 1.5 kHz                                                                                                                                                                                                                      |                                                                 |
| Acceleration, high frequency (z direction)                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                       |                                                                 |
| Amplitude range                                                                                                                                                                                                                                                                                                                    | 0.1 - 490 m/s <sup>2</sup> (50g)                                                                                                                                                                                                      | N/A                                                             |
| Frequency bandwidth                                                                                                                                                                                                                                                                                                                | 100 Hz – 20 kHz                                                                                                                                                                                                                       | N/A                                                             |
| <b>Magnetic field measurement</b>                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                       |                                                                 |
| Magnetic field (x, y, z direction)                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                       |                                                                 |
| Amplitude range                                                                                                                                                                                                                                                                                                                    | 1 – 1600 µT                                                                                                                                                                                                                           |                                                                 |
| Frequency bandwidth                                                                                                                                                                                                                                                                                                                | 0.1 – 250 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<br>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)<br>Ex ia IIC T4 Ga -40 °C ≤ Tamb ≤ +85 °C (Gas)<br>Ex ia IIIC T157 Da -40 °C ≤ Tamb ≤ +85 °C (Dust)<br>CI I, Div 1, Gr A, B, C and D T4<br>CI II, Div 1, Gr E, F and G T4<br>CI III, Div 1 |                                                                 |
| Radio                                                                                                                                                                                                                                                                                                                              | EN 300 328 v.2.1.1, EN 301 330 v.2.1.1<br>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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