

BROCHURE

# ABB Ability™ Smart Sensor

## Condition monitoring for powertrain



# ABB Ability™ Smart Sensor

## for motors and general machinery

Changes in temperature and vibration can indicate potential problems in equipment. Yet monitoring rotating equipment is considered expensive and often overlooked, leaving problems unnoticed until a failure occurs. ABB now makes it easier and safer to know how your equipment is performing.

ABB Ability™ connects you to the power of industrial IoT. ABB offers a unique digital advantage by combining connectivity and data analytics with our expertise to make your operations efficient, predictable and safe.

The ABB Ability™ Smart Sensor converts rotating equipment, such as motors and general machinery, into smart, wirelessly connected assets. It enables users to monitor the health of their equipment and to plan maintenance in advance. Unplanned downtime can be avoided, efficiency optimized and safety improved.

- Increased safety** ●—————●
- Increased productivity** ●—————●
- Reduced maintenance** ●—————●
- Eliminated unplanned stops** ●—————●
- Easy to use** ●—————●



# Do you know how your assets feel?

## This is why you should



### Traditional way



Routine maintenance introduces safety hazards as employees are working around rotating equipment or trying to reach motors that are difficult or dangerous to access.

Not knowing the health of your assets leaves you at risk for untimely equipment failure, which can lead to process interruption, unplanned downtime, and lost revenue.

Maintenance is a routine schedule based on a combination of experience, training and "this is how we always do it".

The user has little visibility of when component failure may occur.

### With ABB Ability™ Smart Sensor



#### Increased safety

The ability to monitor assets remotely allows maintenance and other relevant personnel to safely get a health check without touching equipment.

#### Increased productivity

Trending data helps to develop patterns for monitoring of performance and ability to predict replacement.

#### Reduced maintenance

Maintenance can now be planned according to actual needs rather than based on generic schedules.

#### Eliminate unplanned stops

Warnings on decreasing health status allow you to plan maintenance before there is a problem and the system is down.

# Easy to use

## Wireless

The ABB Ability™ Smart Sensor is designed for quick and easy installation and activation. The sensor is battery operated, no wiring, special tools or special software required.

## Easy installation

The ABB Ability™ Smart Sensor is easily attached to assets without the need for wiring. Mounting and configuring the sensors takes only a few minutes. With the M6 (1/4"-28UNF) type mounting, the sensor can be mounted on any surface.

## Easy activation

The sensor is easily activated using NFC\* protocol.

## ABB Ability™ cloud access

ABB Ability™ can combine data collected by the sensor with data from other connected equipment, such as variable-speed drives and pumps. This data can be accessed and analyzed remotely, providing deeper insight into the health of the entire process.



\*NFC - Near Field Communication which is available in many smart phones such as iPhones

# Easy to use

No matter where you are

Machinery is working even when you are not. Advanced conditional monitoring is now hand held through the Smart Sensor App. Designed with ease in mind, the app allows you to get up to date information on all assets at any time, no matter where you are. Simply download ABB Ability™ Smart Sensor App for any iOS or Android based device.



#### Intuitive interface

The simple, graphical interface is easy to use and understand.



#### Traffic light system

Asset health is displayed with a traffic light icon to quickly show users the state of that motor.



#### Push notifications

When conditions change, you want to be the first to know. ABB Ability™ allows you to get notifications based on your preferences.



#### Event log

All maintenance performed on assets can be scheduled and recorded in the app, providing an easy to access record of service for each asset.



#### Access in remote locations

For locations with remote access, or out of mobile device range, sensor data can be automatically sent thru Bluetooth Low Energy to the ABB Ability™ platform using a Gateway.



#### Bearing condition

Ultrasonic acoustic sensors to accurately assess bearing condition



#### Energy saving guide

Estimation of output power to help guide any energy saving measures

# Safe to use

## Cyber security

ABB understands the importance of protecting your data, and we take this responsibility seriously. The ABB Ability™ Smart Sensor adheres to strict security measures to ensure that the health of your assets is all you need to worry about.

### Data ownership

- You own all of your data.
- Your data cannot be accessed by anyone outside your company unless you have authorized them in the portal.

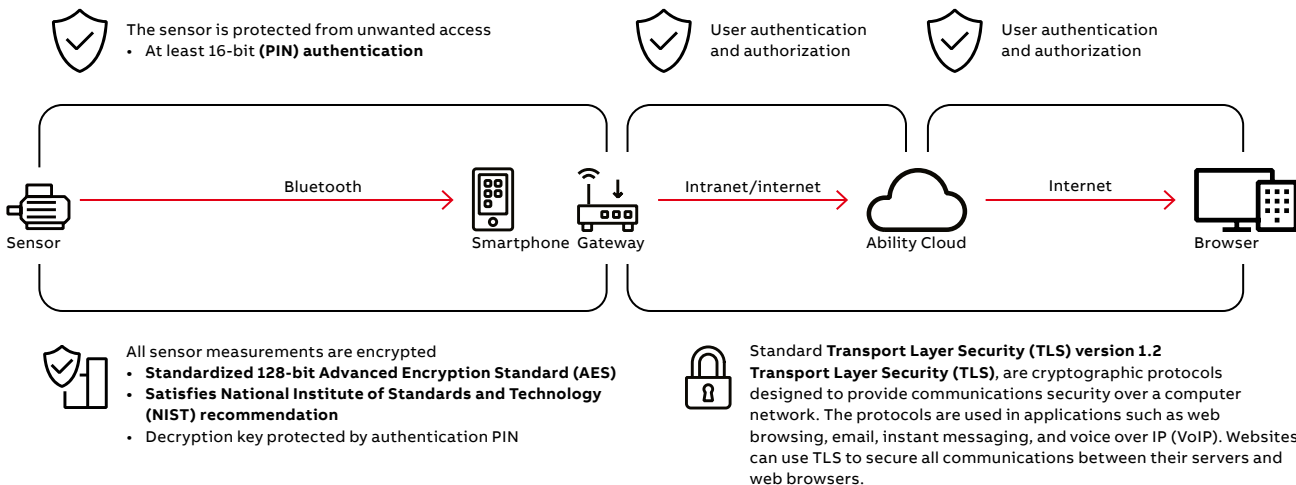
### The sensor is protected from unwanted access

- 16-bit Personal Identification Number (PIN) authentication
- PIN is changeable during commissioning as well as during normal sensor usage (Default PIN is 0000)
- PIN throttling prevents brute-force attacks

### All sensor measurements are encrypted

- By recommendation of National Institute of Standards and Technology (NIST)
- Decryption key is protected by authentication PIN

### Secure communication system overview



# Safe to use

## Hazardous duty certificates

### Third-party hazardous location certified (intrinsically safe)

When it comes to applications in hazardous environments, there's no reason for customers to assume any risk by using a product which is self certified. That's why both the ABB Ability™ Standard and High Performance Smart Sensors are third party NEC certified for worry-free use in hazardous environments. All required product markings and documentation are included with each sensor at no additional charge. When it comes to hazardous environments, you can trust ABB Ability™ Smart Sensors.

EX. ATEX, IECEx	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)
NEC	CI I, Zn 0, AEx ia I Ma
	CI I, Zn 0, AEx ia IIC T4 Ga
	Zn 20, AEx ia IIIC T157oC Da
	CI I, Div I Gr A, B, C and D T4
	CI II, Div I Gr E, F and G T4
Radio	CI III, Div I -40oC ≤ Tamb ≤ +85oC
	EN 300 328 v.2.1.1
	EN 301 330 v.2.1.1
	FCC/IC



# ABB Ability™ portal



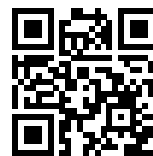
ABB Ability™ Smart Sensors include access to the ABB Ability™ digital platform. This portal allows you to monitor asset function and analyze data trends, leading to better uptime and ensuring that critical operations run smoothly and consistently.

The sensor uses Bluetooth Low Energy to wirelessly communicate information about the assets operational health via your smartphone or Bluetooth-gateway to a secure server. Data from the sensor can be displayed graphically on a smart phone, tablet or the ABB Ability™ web portal.

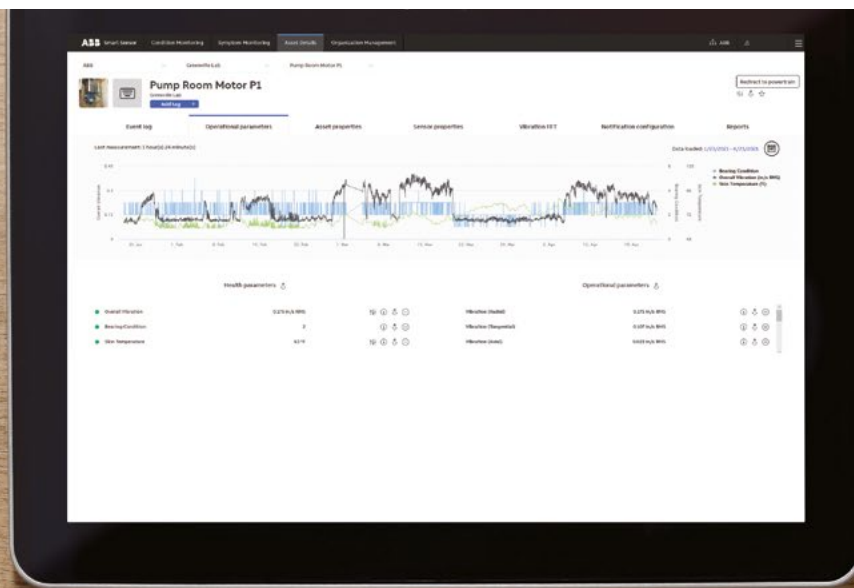
## Trending data

Allows users the ability to zoom in and pinpoint certain events. Users can customize preferences and plot data relevant to them. This data is available to download to Microsoft Excel.

Advanced algorithms are loaded into ABB Ability™ to help direct proper maintenance and decrease unexpected down time.



<https://smartsensor.abb.com/Login>





# Part information



## Standard performance Smart Sensors

Part number	Description	Application
EM5001A07SP	Standard performance Smart Sensor with aluminum bracket mounting kit. Does not include subscription	Finned/rib cooled motor
EM5001A08SP	Standard performance Smart Sensor with flat mount mounting kit. Does not include subscription	Finless/round steel motor/ General machinery
3AXD50000823741	Standard performance Smart Sensor without mounting hardware and subscription	-



## High performance Smart Sensors

Part number	Description	Application
3AFP9242910	High performance Smart Sensor with aluminum bracket mounting kit. Does not include subscription	Finned/rib cooled motor
3AFP9254388	High performance Smart Sensor with flat mount mounting kit. Does not include subscription	Finless/round steel motor/ General machinery
3AXD50000823765	High performance Smart Sensor without mounting tool and subscription	-

## Mounting hardware - Standard and high performance motor smart sensors

Part number	Description	Application
3AFP9253863	Aluminum bracket mounting hardware for finned/rib cooled motor	Finned/rib cooled motor
3AXD50000912643	Flat mounting hardware for rolled steel motor/general machinery	Finless/round steel motor/ General machinery

## Subscription - Standard and high performance Smart sensors

Part number	Description	Application
3AXD50000854493	3 year subscription	-
3AFP9191436	2 year subscription	-
3AFP9127707	1 year subscription	-

## Subscription - High performance smart sensors

Part number	Description	Application
3AFP9253864	5 year subscription	-

## Smart Sensor Gateway

Part number	Description	Application
EM5001GW	Smart Sensor Gateway (common for all smart sensors)	-
3AFP9247912	Smart Sensor Gateway for hazardous area	-

## Technical data

### Standard performance Smart Sensors

Specifications	Standard performance sensor
<b>Temperature measurement (machine skin temperature)</b>	
Measurement range	-40° C to +85° C
Resolution	0.1° C
Accuracy	+/-0.5° 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	N/A
Frequency bandwidth	N/A
<b>Magnetic field measurement</b>	
Magnetic field (x, y, z direction)	
Amplitude range	1 – 1600 µT
Frequency bandwidth	0.1 – 250 kHz
<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>Wireless communication</b>	
Communication standards	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)	AA-type
Battery design life	Up to 5 years operation under standard conditions
<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 oC ≤ Tamb ≤ +85 °C (Mining) Ex ia IIC T4 Ga -40 oC ≤ Tamb ≤ +85 oC (Gas) Ex ia IIIC T157 Da -40 oC ≤ Tamb ≤ +85 oC (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)	75 mm x 58 mm x 33 mm
Weight	130 g
Case material	Stainless steel/reinforced PBT
Mounting	On equipment housing or frame. Please consult installation manuals. M6 or UNF ¼" / 28 screw

## Technical data

### High performance Smart Sensors

Specifications	High performance sensor
<b>Temperature measurement (machine skin temperature)</b>	
Measurement range	-40° C to +85° C
Resolution	0.1° C
Accuracy	+/-0.5° 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 - 450 m/s <sup>2</sup> (50g)
Frequency bandwidth	100 Hz - 20 kHz
<b>Magnetic field measurement</b>	
Magnetic field (x, y, z direction)	
Amplitude range	1 – 1600 µT
Frequency bandwidth	0.1 – 250 kHz
<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>Wireless communication</b>	
Communication standards	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)	C-type
Battery design life	Up to 15 years operation under standard conditions
<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 oC ≤ Tamb ≤ +85 °C (Mining) Ex ia IIC T4 Ga -40 oC ≤ Tamb ≤ +85 oC (Gas) Ex ia IIIC T157 Da -40 oC ≤ Tamb ≤ +85 oC (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
Weight	185 g
Case material	Stainless steel/reinforced PBT
Mounting	On equipment housing or frame. Please consult installation manuals. M6 or UNF ¼" / 28 screw

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**ABB**

Services Information

[https://new.abb.com/service/motion/  
data-and-advisory-services/condi-  
tion-monitoring-for-rotating-equipment](https://new.abb.com/service/motion/data-and-advisory-services/condition-monitoring-for-rotating-equipment)

