

WP0302

Dodge® gearing: condition monitoring

Dodge Customer/Order Engineering

07-11-2019



Changes in temperature and vibration can indicate potential problems in enclosed gearing. Yet understanding the health of a gearbox is usually overlooked, leaving problems unnoticed until the gearbox fails. ABB now makes it easier and safer to monitor the overall health of a gearbox.

The ABB Ability Smart Sensor for enclosed gearing is an easy-to-use, wireless sensor which monitors the health of your ABB Dodge gearbox, allowing users to reduce downtime, improve reliability, and operate safely.

Installation: Dodge gearboxes manufactured after July 2019 include an adapter for the ABB Ability Smart Sensor pre-installed in the gearbox. The adapter location is identified by an ABB Smart Sensor nameplate. The adapter locations for each gearing product can be found in Appendix A. For gearboxes manufactured prior to July 2019, an adapter kit must be purchased along with the Smart Sensor.

Available ABB Ability Smart Sensor Adapter kits:

Adapter kit description	Adapter kit part number
3/8" Adapter	966905
1/2" Adapter	966906
3/4" Adapter	966907

Items included in the ABB Ability Smart Sensor kit:

1. ABB Ability Smart Sensor for enclosed gearing
2. Installation tool
3. Rubber cover (optional)

Additional Items Needed for Installation:

1. Smartphone (required)
2. Computer (required)
3. Gloves
4. Clean, soft cloth
5. Torque wrench
6. 7/8" (22mm) wrench
7. 7/16" (11mm) socket
8. Socket wrench

Step 1: Install ABB Ability Smart Sensor application

Note: In some countries these stores may not be accessible. For more information navigate to new.abb.com/motors-generators/service/advanced-services/smart-sensor.

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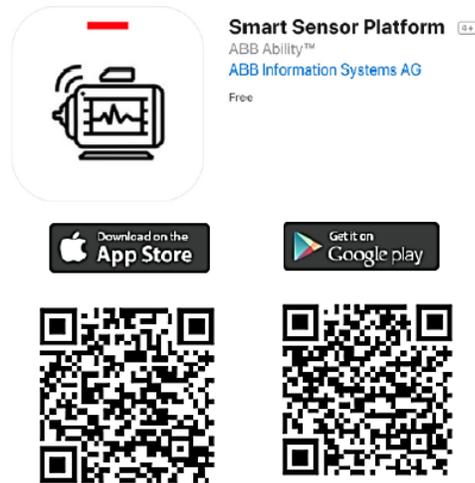
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Step 2: On your computer, register in the ABB Ability platform

smartsensor.abb.com/Login

Step 3A: Mounting sensor on the gearbox (for gearboxes manufactured beginning in July 2019)

- Step 3A.1:** Clean gearbox surface to be free of dirt and debris.
- Step 3A.2:** Locate Smart Sensor adapter nameplate.
- Step 3A.3:** Remove the red push-in plug.
- Step 3A.4:** Thread sensor by hand and tighten using the installation tool. If desired, tighten sensor using a torque wrench, applying 7-12 in-lbs (0.8-1.4 Nm) of torque.

Note: Smart Sensor adapter may be moved based on specific application requirements.

Step 3B: Mounting sensor on the gearbox (for gearboxes manufactured prior to July 2019)

- Step 3B.1:** Determine Smart Sensor mounting location.
- Step 3B.2:** Clean gearbox surface to be free of dirt and debris.
- Step 3B.3:** Remove drain plug and thread the Smart Sensor adapter by hand.
- Step 3B.4:** Thread sensor by hand and tighten using the installation tool. If desired, tighten sensor using a torque wrench, applying 7-12 in-lbs (0.8-1.4 Nm) of torque.

Note: For specific factory installed sensor mounting locations, reference Appendix A.

Step 4: Begin activation

Press the silicone button located on the sensor to begin activation. The LED light will blink once.

Step 5: Commission sensor

Log in to ABB Ability Smart Sensor application with the myABB account created in Step 2. Follow the on-screen instructions.

In the ABB Ability Smart Sensor application, assign the sensor to the gearbox by adding the following information:

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Required

1. Asset name
2. Description
3. Plant
4. Gearbox part number/description
5. Output shaft nominal speed

After completing the installation process, the application should function properly. If there are any problems, please contact support at us-mptsensortechsupport@abb.com for assistance.

Operation: Once commissioning is complete, operation is simply viewing the condition of your gearbox either on the mobile app or through ABB Ability's web interface. The smart sensor will collect a measurement of temperature and vibration every hour and plot these measurements over time. When using the mobile app, the data will need to be downloaded manually; however, if a gateway is used, the data will automatically load to the mobile app and the web portal.

The ABB Ability software also uses a traffic light system to easily display the overall health of the gearbox. The traffic light system displays a green, yellow, or red light, shown in **Figure 1**. A green light indicates that all known component conditions are at an OK level. A yellow light indicates that at least one component condition is at a tolerable level. A red light indicates that at least one component condition is at a poor level. Tolerance levels are provided by the user, which sets the alert (yellow light) and alarm (red light) levels. The user may elect to receive notifications when a tolerance level is exceeded. Notifications may either be sent via email or as a push notification through the mobile app.

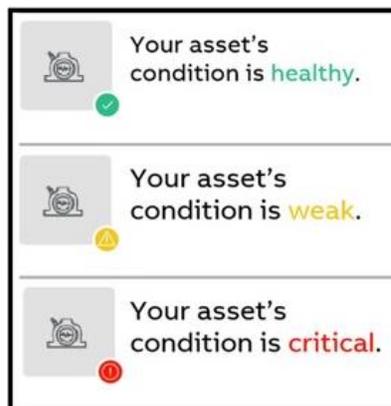


Figure 1. Traffic light system

When a condition's tolerance levels are exceeded, the user can create a maintenance event across their organization to describe the maintenance to be performed. When maintenance is complete, the event can be closed to inform all maintenance personnel that maintenance was performed.

Troubleshooting (FAQ): The following section includes frequently asked questions to help troubleshoot issues with the smart sensor. If issues cannot be solved using this section, contact the Smart Sensor Support Team at:

us-mptsensortechsupport@abb.com.

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I'm having connection problems with my Smart Sensor

The Bluetooth connection might be exposed to distractions generated by, for example, obstacles between the device and the Smart Sensor. Besides environment, the coverage area also depends on the Smart Sensor's and the smart device's Bluetooth capabilities. It may be necessary to clear obstructions to achieve a better signal.

I'm having problems with updating the Smart Sensor for mounted bearings' firmware.

The firmware updates are important for the Smart Sensor to utilize all of its features. During the update process, the smart device has to be constantly within the Smart Sensor's Bluetooth range. Please try a different smart device if the problem continues. Be aware that the update process can be safely repeated if it fails.

Why is my smart sensor trending data from 1970?

This error occurs when the silicone button on the Smart Sensor is pressed after activation is complete. To solve the error, manually load the measurement using the mobile app. At this point, the Smart Sensor clock will correctly sync.

What should I do to extend the battery life of my Smart Sensor?

Expected lifetime of the Smart Sensor's battery is 2+ years with measurement taken once per hour and data collected once per day by mobile device and with an operating temperature of -22°F...+122°F (-30°C...+50°C). At temperatures between +123°F...+185°F (+51°C...+85°C), the expected life is 1+ year with measurement taken once per hour and data collected once per day by mobile device. To extend the battery life, reduce the frequency of measurements taken and the amount of data collection events.

Does the Smart Sensor require an internet connection?

Gathering data from the asset to the Smart Sensor doesn't require internet connection. Internet connection is required for the data transfer from the Smart Sensor to the cloud server.

Where is the data stored and processed?

The data is stored and processed in the Smart Sensor, the user's smart device as well as on the server. Algorithms stored in the Smart Sensor perform the primary analysis, with further analysis and processing by algorithms stored on the ABB secure cloud server.

Is the data transmitted to the ABB server in an encrypted form?

ABB understands the importance of protecting your data and we take this responsibility seriously. The ABB Ability Smart Sensor for mounted bearings adheres to strict security measures to ensure that the health of your bearing is all you need to worry about. All measurements are encrypted using a 128-bit Advanced Encryption Standard (AES), which satisfies NIST recommendations.

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Alarm Investigation: The Smart Sensor monitors the gearbox skin temperature and overall vibration. An increase in either condition could indicate a problem in the system that affects the performance of a gearbox. For help understanding how temperature or vibration increases, contact Dodge application engineering at 864-284-5700 or email us at gearingtechsupport@us.abb.com

Gearbox Skin Temperature

An increase in gearbox skin temperature could indicate the following:

1. Low oil level
2. High oil level
3. Improper gearbox size
4. Excessive v-belt tension
5. Excessive operating speed
6. Located near heat source
7. Cooling method ineffective

Note: Normal gearbox operating temperature can be up to 200°F.

Overall Vibration

An increase in overall vibration could indicate the following:

1. Low oil level
2. Excessive gear wear
3. Driven shaft undersized/overloaded
4. Driven shaft not projecting through output bore
5. Driven shaft bent
6. Tapered bushings improperly tightened
7. Worn or cracked v-belts
8. System unbalance
9. Loose tie rod

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Appendix A: Mounting locations for ABB Dodge Smart Sensor on gearboxes.

Dodge heavy duty gearboxes manufactured beginning in July 2019, will include the following parts:

1. Smart Sensor adapter
2. Adapter nameplate
3. 1/8" push-in plug

Torque Arm II (TAII):



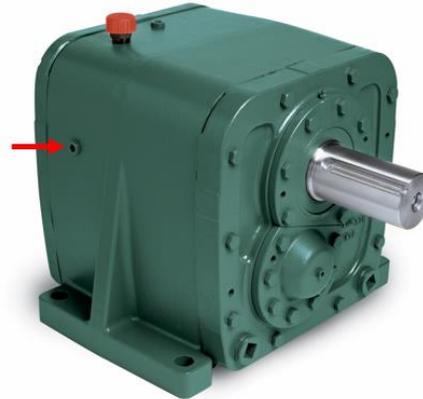
Motorized Torque Arm (MTA):



Torque Arm (TXT, SCXT, HXT):



Maxum XTR:



MagnaGear:

