ABB Ability™ Smart Sensor
User guide for Smart Sensor Platform app and web portal
JUNE 2020
Outline

1. ABB account registration
2. Organization management
3. Sensor activation – mobile app
4. Sensor commissioning – mobile app
5. Mobile app functionality
6. Web portal
7. On demand load measurement & raw data
8. Data visualization and interpretation
9. ABB Ability™ Digital Powertrain portal
10. ABB Ability™ Smart Sensor subscriptions
LINKS AND MANUALS
PLEASE NOTE INSTRUCTIONAL VIDEOS AND INSTALLATION MANUALS
Links

General information and documentation:

ABB Ability™ Smart Sensor:
https://new.abb.com/motors-generators/service/advanced-services/smart-sensor

For motors:
https://new.abb.com/motors-generators/service/advanced-services/smart-sensor/smart-sensor-for-motors

For pumps:

For mounted bearings:
https://new.abb.com/mechanical-power-transmission/smart-sensor-for-mechanical-products

Cloud Interface API:

Videos

Introduction Smart Sensor:
https://www.youtube.com/watch?v=AgUVl63mY3g

First time user guide: https://www.youtube.com/watch?v=TE14gDsEM4Q

User / asset / organization management:
https://www.youtube.com/watch?v=TgBZlyX_hLw

Activation and commissioning:
https://youtu.be/rcOWbXf55ec?list=PLFwq1JTSL1fh7Xv2q2Y1le83EZi0SLVFH

Data visualization on app:
https://www.youtube.com/watch?v=49wgY6nX5Ls

Data visualization on portal:
https://www.youtube.com/watch?v=lcBttlARko

Gateway installation manuals:
https://youtu.be/4KTmrBtfgEo
https://youtu.be/BXB6nuUI8-g
https://youtu.be/P8Bj0-VtqRA
1. ABB account registration

https://www.youtube.com/watch?v=TE14gDsEM4Q
ABB account registration – mobile app

Register new account in ABB system via the mobile app or web portal

1) **Install** “Smart Sensor Platform” on mobile device (iOS or android)

2) **Click** “Sign Up” on initial screen

3) **Follow steps to create account**

   - Alternative: web portal (next slide)
ABB account registration – web portal

Register new account in ABB system via mobile app or web portal

1) Open link in web browser: https://smartsensor.abb.com
   *Google Chrome recommended

2) Click “Register now”

3) Follow steps to create account

Want to learn more about the SmartSensor?
Visit our FAQ
2. Organization management

https://www.youtube.com/watch?v=TgBZlyX_hLw
ABB Ability™ Smart Sensor virtual organization management

Virtual environment for sensor data access configuration

Users are bundled into “User Groups” consisting of admins and normal users

- User 1
- User 2
- User 3
- User 4
- User 5

User Group 1

User Group 2

User Group 3

Sensors are bundled into “Asset Groups”

- Sensor 1
- Sensor 2
- Sensor 3
- Sensor 4
- Sensor 5
- Sensor 6

Asset Group 1

Asset Group 2

Asset Group 3

Membership

Access
Example case for OEMs: you decide what your end customers see
ABB Ability™ Smart Sensor app architecture - notes

Organisation and user/asset groups: trade-offs

Notes:
1) **Only one “layer”** of user groups and asset groups available, i.e. subgroups are **not** possible.
2) You can have as many “organizations” as you want.
3) An “organization” can represent, for example:
   - **Your whole company**:
     - Advantage: one-stop solution for all your end customers/plants and sensors (full benchmarking).
     - Disadvantage: keeping track of all sensors gets harder as the number of user and asset groups increases.
   - **A specific end-customer**:
     - Advantage: balance between number of organizations and complexity of user and asset group structure.
     - Disadvantage: decreased benchmarking capability, since only one organization can be viewed at a time.
   - **A specific plant/location**:
     - Advantage: complex group/access structures are easier to manage if isolated in one organization.
     - Disadvantage: too many organizations make benchmarking harder and may also be hard to keep track of.
Create or join organization on the mobile app

First use: create or join organization

1) Log in to the app using ABB credentials
2) Click “Create or join organization”
   - Admins of an organization must grant access
3) If the organization does not exist, type desired name and confirm to create a new one
   - This can also appear due to typos when trying to join an existing organization.
   - Organization names are case sensitive!
   - If you create an organization, an asset group called “[Name]Master” is automatically created, where [Name] is the name of the organization.
Switch organization on the app

Moving between organizations: membership is free, but access to motors requires explicit permission

1) Click “Change organization” on main menu (top left sandwich menu of main screen)

2) Enter one of the following:
   - The name of the organization,
   - The e-mail address of a member, or
   - Work without organization → not recommended!

3) Click “OK” on pop up.

   Organization switches automatically on web portal

Notes:
   - Sensor data is not visible until the User is added to a User Group with the correct access rights.
   - The asset group [OrganizationName]Master is created automatically with the organization.
Switch organization on the portal

Moving between organizations: membership is free, but access to motors requires explicit permission

1) Click on the **organization** in the main menu (top right)

2) **Select organization** by name from the drop-down list and click “OK”
   - *Organization switches automatically on the app*
Info about organization and app

Where to find the name of my current organization and other information

1) Click "About" on the main menu
   • Organization shown under user name

2) App, phone, back-end (cloud) API and EULA
   information displayed.
User management - role types
Access management within one organization in the Smart Sensor portal

Admin of the "Admin" User Group
(equivalent to Organization Admin)
- Can add members to the Admin User Group
- Can create new User Groups for the organization
- Can create new Asset Groups for the organization
- Can connect User Groups and Asset Groups

Admin User Group Member
- Can create new Asset Groups
- Can connect User Groups and Asset Groups

Normal User Group Moderator
- Can add users to that particular User Group

Normal User Group Member
- Can view asset data to which this User Group was granted access (by a member of Admin User Group)
Organization management
Managing Asset or User Groups in your organization, and more

In some browsers, menus are located in the upper right drop-down button.

Organization you’re currently logged in to

The different tabs show available organization management functionality.
Organization management – Asset Groups

Manage assets in the «Asset Groups» page

Under “Asset Groups” tab of the “Organization Management” view,

Click on an Asset Group in the given Organization to view the data from sensors in that Asset Group. E.g. =LB3
After choosing an Asset Group in your Organization:

1) Click arrow to **download the measurement data of all the assets** in the Asset Group. Data will be sent by email.

2) You can transfer assets to other Asset Groups via the double-arrow icon.
Organization management – Asset Groups

Give access to each Asset Group by defining User Groups

After choosing an Asset Group:

1) Click bottom right button “Add User Group”

2) On the pop-up prompt, choose which User Group you want to give access. Data from all assets in this Asset Group are visible to the members of the User Groups that you, as an admin, can add to it.
Manage membership and access in the «User Groups» page

Under “User Groups” tab of the “Organization Management” view,

Click on an **User Group in the given organization**. 
E.g. = ABB Users
**Organization management – User Groups**

Manage membership and access in the «User Groups» page

<table>
<thead>
<tr>
<th>User name</th>
<th>Role</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>m</td>
<td>Member</td>
<td></td>
</tr>
<tr>
<td>andrea</td>
<td>Member</td>
<td></td>
</tr>
<tr>
<td>benjan</td>
<td>Member</td>
<td></td>
</tr>
<tr>
<td>bernd</td>
<td>Member</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In this view, you can see a list of users in that User Group on the left, and a list of Asset Groups on the right.

Users on the left, belonging to this particular User Group, can see data from assets belonging to the Asset Groups on the right.
Organization management – User Groups

Manage membership and access in the «User Groups» page

Press the “Grant access to asset group” button to include more Asset Groups in the access list of a particular User Group.
Add users to User Group

Give other people visibility of your sensors

If you have admin rights to a User Group, you can add users to grant them access to sensor data connected to that User Group.

1) If a user is already a member of your Organization, click “Add existing user“

2) For existing Organization members, choose the user and access level from the drop-down lists.

3) You can also delete users if you are an admin by clicking the trash bin next to a user.
Add users to User Group
Give other people visibility of your sensors

If you have admin rights to a User Group, you can add users to grant them access to sensor data connected to that User Group.

4) If the user is not in the organization, click “Invite new user”

5) Input e-mail address. New member will receive e-mail instructions to join the organization.

6) If you wish to change the access from “Member” to “Admin”, the user must be active in the organization.
   • Alternatively, delete the user from the Group and add to the User Group again, repeating step 4 and 5, setting admin rights from the start.
Give access to new members

E-mail invitation: Please join my group

1) If you already have an ABB account:
   - One link to accept the invitation
   - Only 1 organization access at a time
   - You can always switch organizations

   If you do not have an ABB account:
   - First: set up a user ID in ABB
   - Second: accept the invitation

2) Refresh your app to log into the new organization and see the sensors for which your initial User Group was given access (by the organization admin).
Plant management – add new plant
Add a new plant to your organization

Add a new plant to the organization

1) Go to Plant Management, under Organization Management

2) Click “Add plant”

3) Enter details in the pop-up prompt and save.

4) To enter a plant and manage the assets that are located at that plant, click one on the side the list. E.g.: “ABB Lenzburg”.

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July 2, 2020 | Slide 27
Plant management – transfer asset to other plants

Transfer sensor from plant to plant to change location on the map

<table>
<thead>
<tr>
<th>Sensor ID</th>
<th>Serial No.</th>
<th>Last Sync</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>123_567_890</td>
<td>ABC2</td>
<td>2020-05-12T23:59:01</td>
<td>![Icon]</td>
</tr>
<tr>
<td>123_567_891</td>
<td>3214567890</td>
<td>2020-05-14T12:34:56</td>
<td>![Icon]</td>
</tr>
</tbody>
</table>

Transfer asset to another plant:

In the “Plant Management” page, the “Plant List” is visible

1) Choose sensor from the plant to transfer, clicking on the arrows

2) In the pop up, choose plant from dropdown list and click “Save”. Your sensor will now be visible on the map at that new location.
Plant location
Location of the plants in the world map

Click on the landing page of the portal “Condition Monitoring (beta)” to see the location of the installed sensors.

The location is automatically saved at the moment the sensor is commissioned to a specific plant.

Address can also be input manually, but will not influence the location in the map.
Organization management – maintenance mode

Remote firmware updates through gateway – UNDER DEVELOPMENT

Attention! this new feature is still under testing, so it’s not working yet! Please don’t use it until advised.

Maintenance mode enables sensor firmware updates remotely via gateway. During the configured update time, measurements will not be loaded.
Organization management – Trusted Organization

Share Asset Groups with Trusted Organization

Advantages:
- Easy access to multiple Organizations from one portal
- Powertrain capabilities from similar assets of different plants
- Ability to certify third-party support without adding as members of Organization
Terminology

- **Admin**: Person that creates Organization. The Admin role is called Moderator in the User Group context
- **Sharing Organization**: Organization deciding which Trusted Organization to trust and share data with
- **Trusted Organization**: a support group certified by ABB and chosen by the end user to have access to hand-picked Asset Groups
- **Trusted User**: Member of “Trusted User” user group of Trusted Organization

Notes

- User must be a Moderator from the “Admins” User Group in the Trustee Organization to view the Trusted Organization option and to “trust” their Asset Groups to the Trusted Organization.
- The user only has to be a User Group member in the “Trusted User” User Group within the Trusted Organization to view the Sharing Organization’s data (if the Sharing Organization picked that Trusted Organization to “trust”).
- Trusted User does not need to be a member in the Sharing Organization to see data from that organization, as long as the Sharing Organization Moderator has granted that access to the Trusted Organization.
**Trusted Organization**

Background info

A "Trusted Organization" needs to be certified as such by ABB and chosen by a Sharing Organization to have access to specified asset groups.

In the picture to the left, the Sharing Organization ABB can specify which asset groups are visible for which Trusted Organization.

Adding an Organization to “Trusted Organizations” automatically creates a “Trusted User Group”. Users must be added to this user group in order to view assets of organizations with trust relations.

The Trusted Organization feature allows trusted service providers or ABB personnel to view all organizations/customers they have been selected for within the same portal.

List of **Trusted Organizations**. The Sharing Organization Demo Corp can specify which asset groups are visible for which Trusted Organization.

List of Asset Groups in Demo Corp that are currently shared with ABB DIGITAL GLOBAL.

List of Asset Groups in Demo Corp that are currently not shared with ABB DIGITAL GLOBAL at the moment. A click on the + symbols makes the asset groups visible to ABB DIGITAL GLOBAL.
Trusted Organization
How to Create

1. Create Organization (will appear as normal organization)
2. Follow specific procedure to certify created organization as ‘Trusted’ → please refer to your local Smart Sensor contact or support
3. Once the organization has been trusted, a ‘Trusted User’ user group is automatically created.
4. The Admin of the trusted organization must manually add each user individually to the ‘Trusted User’ user group.
5. Request the trustee organization Admin to trust the created ‘Trusted Organization’.
How to “trust” a Trusted Organization

Organization Admin of the Sharing Organization will select the desired “Trusted Organization” to which they want to grant access.

Please note that not all available trusted organizations will be visible in this list. You may have to know the name in advance and type it into the name field to choose it.

Organization Admin of Sharing Organization will select the Asset Groups that shall be shared with the ‘Trusted Organization’
Trusted Organization
How to “trust” a Trusted Organization

Once Asset Groups have been added they will appear here and the ‘Trusted Organization’ will have access to them.
How to view assets from sharing organizations while on the portal of the Trusted Organization

All Asset Groups that the sharing organization chosen to be accessible for the Trusted Organization will appear here.

All of the Sharing Organizations (here ABB) that have selected the Trusted Organization ABB DIGITAL GLOBAL and added their asset groups will appear here.
3. Activation – mobile app

https://youtu.be/rcOWbXf55ec?list=PLFwq1JTL1fh7Xv2q2YIle83EZi0SLVFH
Smart Sensor for hazardous areas
Special Ex certified Smart Sensor hardware for hazardous environments

1) The same app and portal are used, with practically unchanged user interface.

2) The set-up of the gateway for Ex environments needs a special enclosure.
   → Please contact your local sales unit for details on installations in Ex environments
Activate sensor

How to activate a sensor and make it visible to the app

Attention: sensor must be in Bluetooth range

There are different activation methods for the standard Smart Sensor and the high performance Ex-certified Smart Sensor.

For the standard Smart Sensor, use the vibration or flipping method.

For the Ex sensor, use the NFC antenna method. Please check your device’s documentation for information on the NFC antenna location.

For activation of sensors located in a Ex zone, an Ex certified Smartphone is needed. Alternatively, the sensor must be activated in a safe area, before installation in the Ex zone.

If you have trouble reading the QR code, please activate your camera’s flash with the icon in the top left corner of the corresponding screen.
Activate the high performance Ex Smart Sensor

How to activate a high performance Ex Smart Sensor

1) Click “Activate Sensor” (main menu).
2) Read the QR code with the camera.
3) Move your NFC antenna close to the indicated area for 5 seconds.

After successful activation, the sensor identifier is visible via Bluetooth and the sensor is ready for commissioning.

Attention: NFC and Bluetooth on your mobile phone must be turned on.
Activate the standard Smart Sensor
How to activate a standard sensor and make it visible to the app

1. Make sure your mobile device’s Bluetooth and Internet connections are on
2. Click “Activate Sensor“ (main menu).
3. Read the QR code with the camera
4. Use one of the following methods:
   a) Method 1: vibration*
   b) Method 2: flipping

*Back plate of sensor has to be in direct contact with the mobile phone

After activation, sensor is ready for commissioning to an organization.
4. Commissioning – mobile app

https://youtu.be/rcOWbXf55ec?list=PLFwq1JTLSL1fh7Xv2q2YIlle83EZi0SLVFH
Commissioning - add sensor to organization

Adding activated sensors to asset groups via the app

1) Default starting screen: “All Assets“
   • This initial screen shows you all assets in the organization

2) Access “My Groups” view:
   • All authorized asset groups are shown in drop-down
   • Initially, the only group is “My Assets”
     *This group is private, every user has one and no assets should be here, please transfer all assets to another asset group

3) Add a sensor to commission it by clicking + or add it from the main menu (next slide)

Attention: sensor must be in Bluetooth range
Commissioning: add sensor

Viewing your sensor on the app

1) Click “Commission new asset” on the main menu

2) Choose sensor according to serial number (SN) by clicking on the + next to it. You find the SN in the sticker of the sensor.

Sensor must be activated first! If the sensor is not found, make sure you are in Bluetooth range and try again.
Commissioning: nameplate configuration

Enter initial settings

1) Configure initial settings
   Asset name, description and serial number
   → Attention: not the sensor serial number
   Optional: add a picture of the asset

2) Enter plant by selecting from dropdown or create a new plant:
   • To create a new plant, tap on the “+“
   • Turn on GPS in your mobile device
   • Tap on “Done” in the upper right corner

Attention: sensor must be in Bluetooth range

Important: accurately configuring your asset’s nameplate on the sensor is necessary for correct operation.
Commissioning: Physical configuration

Mandatory information about the physical configuration of motor and sensor

1) Motor Mounting
2) Terminal Box Position
3) Sensor Orientation

Attention: sensor must be in Bluetooth range
Commissioning: nameplate configuration

Mandatory nameplate details, example: motor sensor

1) Motor standard
   For LV motors either NEMA or IEC

2) Nominal motor speed
   rated full load motor speed in rpm

Attention: sensor must be in Bluetooth range
Commissioning: nameplate configuration

Mandatory nameplate details, example: motor sensor

3) Speed Control
   - Either Fixed Speed or variable speed drive

4) Motor voltage
   - Rated motor voltage

5) Motor current
   - Nominal current at the rated voltage

Attention: sensor must be in Bluetooth range
Commissioning: nameplate configuration
Mandatory nameplate details, example: motor sensor

Rated nameplate quantities:
6) Motor nominal power
   • Power rating on nameplate in kW
7) Line frequency
   • Input frequency on nameplate
8) Power factor
   • Power factor on nameplate

Attention: sensor must be in Bluetooth range
Commissioning: nameplate configuration

Bearing information option 1: Open field input

9) Drive-End (DE) Bearing
   - Select if Sealed/Non sealed
   - Choose Manufacturer from drop down ▼
   - Enter bearing number (no prefixes or suffixes)

10) Non Drive-End (NDE) Bearing
    - Same as 9)

Attention: sensor must be in Bluetooth range
Commissioning: nameplate configuration

Bearing information option 2: Bearing selection tool

11) Bearing code input

• Bearing code has to be in SKF format
• Input basic designation (no prefixes or suffixes)
  1. Bearing type
  2. Radial width / thrust height
  3. Diameter series
  4. Bore diameter size (d/5)
• E.g. accepted codes: 6303, NU2224

If your bearing code is not accepted, please contact support.smartsensor@abb.com

Attention: sensor must be in Bluetooth range
Optional inputs (recommended for data labeling and future advanced analytics):

11) Motor load
   - Application being driven by the motor

12) Shaft height
   - According to IEC / NEMA standard

Attention: sensor must be in Bluetooth range
1) Configure **initial settings**
   Asset name, description and serial number
   Optional: add a picture of the asset

2) Enter plant by selecting from dropdown or create a new plant:
   - To create a new plant, tap on the “+“
   - Turn on GPS in your mobile device
   - Tap on “**Done**“ in the upper right corner

**Attention:** sensor must be in Bluetooth range

**Important:** accurately configuring your asset’s nameplate on the sensor is necessary for correct operation.
Commissioning: nameplate configuration
Mandatory nameplate details, example: pump sensor

1) **Pump type**
   Currently supported: centrifugal or vortex

2) **Pump model**
   Any name to identify pump model

**Attention:** sensor must be in Bluetooth range
Commissioning: nameplate configuration
Mandatory nameplate details, example: pump sensor

3) Motor voltage
   • According to how motor is supplied

4) Motor frequency
   • According to supply frequency

5) Motor current
   • Nominal current at the rated voltage

Attention: sensor must be in Bluetooth range
Commissioning: nameplate configuration
Mandatory nameplate details, example: pump sensor

6) Motor power
   - Rated nameplate motor power

7) Number of blades
   - Number of pump impeller blades

8) Speed control
   - Fixed (DOL-driven pump)
   - Variable (VSD-driven pump)

Attention: sensor must be in Bluetooth range
Commissioning: adding an activated sensor to an organization

Optional nameplate details, example: pump sensor

1) Rated flow
2) Maximum pressure
3) Maximum fluid temperature
4) Head pressure

Optional information: not necessary for KPI calculation

Attention: sensor must be in Bluetooth range
Commissioning: nameplate configuration

Bearing sensor case

1) Select sensor with bearing icon

2) Select bearing profile to commission sensor as a bearing sensor

Attention: sensor must be in Bluetooth range
1) Configure initial settings
   Asset name and description
   Optional: add a picture of the asset

2) Enter plant by selecting from dropdown or create a new plant:
   - To create a new plant, tap on the “+”
   - Turn on GPS in your mobile device
   - Tap on “Done” in the upper right corner

Attention: sensor must be in Bluetooth range

Important: accurately configuring your asset’s nameplate on the sensor is necessary for correct operation.
Commissioning: nameplate configuration

Mandatory nameplate details, example: bearing sensor

1) Bearing part number
   Typically 6-digit number found in motor- or ideally bearing data sheet.

2) Nominal speed
   Nominal speed of drive shaft.

3) Done

Attention: sensor must be in Bluetooth range
Commissioning: transfer asset
Transferring an asset to specific asset group

1) Upper right corner menu or immediately after commissioning: "Transfer Asset"
   You must have admin rights to give access

2) Define access to the sensor/asset
   a) Tick “Asset Group” to choose one, or
   b) Tick “User” and enter an e-mail address

   In step 2b), granting access to a user would cause only that user to have access to the sensor in their “My Assets” group.

   Attention: sensor must be in Bluetooth range

• Note: It is not possible to transfer assets outside of the current organization. If you need to do this, delete the asset and re-commission it while active in the new desired organization.
Configuration and commissioning

Summary

Create account

– Become part of the Smart Sensor user base and enable predictive maintenance for your assets.

Create your organization

– Create organization via app.
– Create User and Asset Groups via the Portal.
– Connect User/Asset Groups.
– Invite users to an Organization.
– Add users to User Groups.

You now have access to the Smart Sensor Platform app and to the Digital Powertrain and Smart Sensor portals.

You are ready to activate and commission your sensors.

Activate your sensor

– Activate the Sensor using the mobile app.

Recommendations:
1. Do not commission sensor before previous steps.
2. Gather nameplate information beforehand to commission your sensors from the comfort of your office.

You can now add sensors to Asset Groups.

Configure and deploy!

– Find sensor with mobile app.
– Add sensor to the desired Asset Group.
– Enter nameplate data for the monitored asset.
– Transfer to an Asset Group.
– Mount sensor on the asset.

Load measurements with the app or wait for the gateway, and view trend data online!
5. Smart Sensor app general functionalities

Download app to tablet or cellphone with iOS or Android

Back to table of contents
Landing page of the app
Organization, Asset Group and Asset views

1) Active organization visible on top-left sandwich menu under your user name.

2) Landing page where you can choose to filter the asset list by asset group and by other filters.

3) Clicking on an asset shows the detailed view for that particular asset.

4) Functionalities available for an asset are visible by clicking the top-right menu button.
Landing page of the app
Organization, Asset Group and Asset views

1) Description of pictograms of asset

2) Upper right menu button from the asset's detailed view shows functionalities.

3) Several functionalities available:
   a) Load measurements
   b) Edit nameplate data
   c) Update sensor firmware
   d) Replace sensor
   e) Configure regreasing
   f) Calibrate the current to improve speed and power estimation
   g) …
Add maintenance event

Add maintenance event in the app

1) In the event log of the asset, click + to add new maintenance event
2) Write a description
3) Choose type of maintenance from the dropdown list and Save

*This feature is currently only possible from the app.*
Other functionalities – regreasing event

Smart Sensor Platform mobile app: dashboard

To configure regreasing:

1) Upper right menu button from the asset’s detailed view

2) From the asset menu’s "Configure regreasing" button.

3) Set the last regreasing event
Other functionalities – regreasing event

To finish configuring regreasing:

4) Set the rated temperature
5) Set the relubrication interval

Example of regreasing instructions on ABB motor nameplate:

<table>
<thead>
<tr>
<th>Rated Temperature</th>
<th>Relubrication Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 °C</td>
<td>5000 h</td>
</tr>
</tbody>
</table>

Example of regreasing instructions on ABB motor nameplate:
Update firmware
How to keep your sensor up-to-date

1) If your sensor needs a firmware update, you will see the “microchip” pictogram under the given name.
   • Click sensor to go into detailed view.

2) Open the sandwich menu at the top right corner and click “Update firmware”.
   • Follow the instructions on the screen
   • Update might take about 10 min and sensor has to be in bluetooth range

Attention: sensor must be in Bluetooth range

Important: Firmware can now be updated without commissioning the sensor first!
Measurement interval
Adjust the measurement interval

The sampling interval is 1 h by default. Memory capacity: 720 measurements. Estimated battery life: 5 years.
The interval can be changed to a minimum of 5 minutes from the asset menu’s "Set measurement interval" button.

Shortening the interval decreases the battery life and the length of internal history proportionately.
E.g. 1h interval:
• 720 / 24h = 30 days in memory
E.g. 30min interval:
• Battery life est. 2.5 years and 15 days in memory

Attention: sensor must be in Bluetooth range
Load measurement
Smart Sensor Platform mobile app

Two options to load measurements:

1) From the asset detail view of an asset click on “load measurement” from menu to load sensor’s memory.

2) From the “operational parameters” screen of an asset, click on gauge button to trigger a new measurement on-demand. Measurements are loaded to the cloud (app and portal)

The measurement is triggered immediately, outside of the automatic schedule.

Attention: sensor must be in Bluetooth range

Without internet connection, put phone in flight mode (except Bluetooth) to load data, and turn flight mode off later when a connection is available:

- Data is transferred from sensor to smartphone over Bluetooth
- Data uploads automatically to portal when internet is available
- → see next slide
Load measurement offline (weak or no mobile internet)

→ Log in to the Smart Sensor app
→ Place mobile device in offline mode.
→ Turn on Bluetooth.

→ NR. 3: Load measurement. Data stored on mobile device.
→ Move towards area with good connectivity.
→ NR. 4 and 5: swipe down to refresh and upload data to server.

**Attention:** sensor must be in Bluetooth range
Replace sensor
Replacing a sensor for the same asset

When exchanging the sensor for an asset and replacing it with a new sensor, follow the steps:

1) Activate new sensor in Bluetooth range
2) Select asset and click on “Replace Sensor”
3) Click “PROCEED”
4) Select new sensor from the list
5) Commissioning happens automatically

From now on, historical data as well as nameplate details and picture are carried over to continue with the new sensor’s data.
**Calibrate current/power**

Calibrating current for more exact speed and power calculation

---

1) With this feature, rms line current in one phase of the motor can be measured and inputed into the respective field.

2) The sensor will then recalibrate the rated speed and rated power.

3) The recalibrated rated speed and power will lead to a more exact speed and power calculation at any operating point.

---

**Note on power estimation:** If line frequency and speed are changing too fast (especially during measurement), the power estimation is not reliable.
Set rotation direction
Configuring sensor to detect direction of rotation

1) You can configure your sensor to detect the rotation direction by tapping „set rotation direction“
2) Read the instructions
3) Visual observation of the rotation speed
4) You can toggle the direction by tapping „switch direction“
Take responsibility
Assigning responsibility for an asset to user

1) By tapping “take responsibility” the sensor will be assigned to the user.

2) It will be shown in the portal who the responsible user is such that he can be available for questions regarding the respective sensor.
Other functionalities - mobile app main menu

Smart Sensor Platform mobile app: main menu

Feedback page:

- Report an issue
- Send

Message

We want to fix your problem! Please describe it in detail above and consider attaching the application report so that we can better help you.

Attach application report

Services available

Activate and commission assets
Geographical location of your assets’ plants
Refresh configuration to refresh backend data

Support

Settings: Define measurement units, language etc.
About: App information
FAQ: Frequently Asked Questions (link to the web page)
Feedback: Report an issue directly to the Support Team
Tutorial: Asset activation instructions

Application report contains important backend data for our Support Team.

Attaching application report helps us to fix your problem.
6. Smart Sensor web portal

Back to table of contents
Overall condition «donut»: calculated from separate Condition Indexes over a period of time.

The overall condition represented by the donut is calculated over a longer period of time, with several measurements/KPIs.

The first graph shows how many events you have received for the fleet (see next slide for explanation on events).

The second graph shows the history of overall health status of each asset in your fleet (see next few slides for differentiation of health status and condition index).

The line graphs do not correspond to the donuts; this page will be redesigned.

* Unknown assets indicate outdated firmware or no measurements loaded in the past days.
Introduction – events
The three types of events

Types of events

- Alarms
  Triggered automatically when trespassing thresholds. Alarms and alerts can be acknowledged and closed.

- Alerts

- Maintenance
  Entered manually in the app.
Dashboard – number of events (demo)
The three types of events

History of alarms and alerts summed up for all assets → green line in landing page
Alarms and alerts can be acknowledged and closed → blue line in landing page
Choose timeline and data frequency (daily/weekly/monthly/yearly)

Go to «Event Log» slide for more information on events.
Dashboard – Health trend (demo)

Health trend graph

**Health trend**: history of the health status of each asset

[same as thumbnail indicator on app; next to asset name on portal]:

- Represents status summarized from last measurement
- Choose timeline and data frequency (daily/weekly/monthly/yearly)

Shows for a given day, how many of total assets were:

- **Green** healthy
- **Yellow** weak
- **Red** critical

* Does not match “donut” of overall condition or condition index. The status on this graph represents only the latest measurements at the end of the day

Go to next slides for more information on health status vs. condition index
Dashboard – Condition Indexes

Indicators calculated over long periods of time from several KPIs

This shows the condition indexes of each asset. It can be filtered by index, state or asset type.

The condition indices are calculated over several weeks and aggregated out of the factors below:

- **Environmental stress**
  - Vibration and temperatures while stopped
- **Operational stress**
  - Vibration and temperatures while running
- **Total stress**
  - Operational and environmental stresses
- **Reliability**
  - Bearing condition, other KPIs
- **Overall health**
  - Total stress, reliability
Health Status vs. Condition Index

Difference between indicators

Health Status

Present next to asset name on portal in «Asset Details»:
• Worst-case health KPI at last measurement point.

Condition Indexes:
“Donuts” on landing page of portal, and
Asset picture thumbnail bottom right indicator on the app
• Asset condition calculated over time out of several KPIs.
The Event Log is a list of events:

- **Alarms**
- **Alerts**
- **Maintenance**

You can see a history of when events of what kind happened within the defined timeframe, *for the asset visible on the top 3 drop-down lists under the black bar.*

Alerts and alarms can be filtered for display and also closed through the portal; maintenance events can be manually entered in the app (see slide in previous section)
Asset Details view – Event Log

Events on the portal

The Event Log is a list of events:

- Alarms
- Alerts
- Maintenance

When you close an event, please select a reason and add a comment.
Asset Details view – Operational parameters

View the data trends of your assets

This view shows you your asset’s data trends. Pick one from the lists to add it to the graph overlay.

The asset in question is shown in the 3 drop-down lists below the top black menu bar.

HEALTH PARAMETERS: influences condition indexes

OPERATING PARAMETERS: operational information
Parameters in Asset Details view

Health vs. operating parameters and operations on the data

HEALTH PARAMETERS: influence on the health of the asset

- Overall Vibration: 0.460 mm/s RMS
- Bearing Condition: 1
- Simple Misalignment: -

OPERATING PARAMETERS: for information

- Vibration (Radial): 0.268 mm/s RMS
- Vibration (Tangential): 0.383 mm/s RMS
- Vibration (Axial): 0.460 mm/s RMS

Add a parameter to the trend graph by clicking the "plus" button.
Click arrows to download measurements. A file will be sent by email.
Click on the info button for more information about each parameter.
For some KPIs, thresholds can be adjusted by pressing the "knobs" pictogram.
How to determine the right alert/alarm thresholds

Thresholds can be modified for skin temperature and overall vibration.

Other KPIs are calculated based on scaled proportional energy values and have no unit, and no threshold adjustment possibility.

Click the "knobs" pictogram and adjust alert and alarm levels along with e-mail notifications for each.
How to determine the right alert/alarm thresholds

In order to determine optimal thresholds:
1. Using the mobile app (see previous section), manually trigger measurement from an asset under smooth operating conditions.
2. Note the [mm/s RMS] vibration and the [°C] temperature values.
3. Ensure thresholds are above those values.
   a) If necessary, perform step 1 again under operating conditions recognized as a desired «alert» or «alarm» state.
   b) Note those values and use them to set the specific thresholds.
Asset Details view - Asset and Sensor Properties

Information about your machine and the sensor monitoring it

Your asset’s nameplate and rating information are visible under "Asset Properties".

For sensor-related information (e.g. for troubleshooting and support), use the "Sensor Properties" tab.
Asset Details view - Notifications

Turn on different kinds of notifications for selected assets

Select each asset and configure the desired notification mode.

Attention: this applies only for the user currently logged in the portal.

Click the “info” button for more details about each notification type.
7. On Demand Load Measurement & Raw Data

Back to table of contents
On Demand Raw Data Collection

Request a raw data measurement from a specific sensor

1) Navigate to Asset Details on the main menu bar on top.
2) Select asset group
3) Choose sensor
4) Click Raw data collection
5) Read the notification. Raw data measurements affect the battery life. Click Request.
On Demand Load Measurement

Request a trend / KPI measurement manually

1) Navigate to Asset Details on the main menu bar on top.
2) Select asset group
3) Choose sensor
4) Click Load measurement
5) Read the notification. It can take up to 30 min until the requested load measurement is visible on the portal. Click Request.
7. Visualization and interpretation of data

App: https://www.youtube.com/watch?v=49wgY6nX5Ls
Portal: https://www.youtube.com/watch?v=IacBttlARko
Data visualization on the mobile app

Viewing data on the mobile app

1) On “Event Logs” screen, view momentary events Event logs: individual, momentary limit violations.
   - Switch panels by swiping the screen with your finger.

2) Health Parameters are KPIs that influence the health condition indicator in the lower right corner of the thumbnails in an overall manner, which is why that status indicator does not change necessarily when a single KPI changes status.
The **Condition Index** indicator at the bottom right corner of the asset thumbnail aggregates all KPIs over a 7-day period.

- **Green** when everything is fine
- **Yellow** when some KPIs have been occasionally above their thresholds in the 7-day period.
- **Red** when alarm limits have lately been violated more often than recommended and equipment condition is deteriorating.

**Other panels include:**

- Latest operational parameters
- Asset nameplate data
Trend data monitoring on the mobile app

Viewing data on the mobile app

1) On the “Operational Parameters” screen, click the trend button on the lower right corner
2) Choose the time period and up to two KPIs to superimpose on the graph view
Trend data monitoring on the portal

Portal view “Asset Detail”

In this view, you can see **individual KPIs over time** for each individual asset being monitored by a Smart Sensor.
Trend data monitoring on the portal

Portal view “Asset Detail”

The evolution of data trends over time, which may indicate a deterioration in the equipment condition, may cause alarms temporarily, but the “donuts”, i.e. Condition Indexes on the landing page, indicate your asset's health taking into consideration several KPIs over time.
Trend data monitoring on the portal

Portal view “Asset Detail”

For a closer analysis of your asset’s condition, use the «Asset Details» view.

For decisions on maintenance actions, please refer to the landing page of the portal and to the Condition Index «donuts».

These measurements are more important as a trend that is becoming worse over time than as individual statements! This is why the Condition Indexes exist.
8. Digital Powertrain portal

Back to table of contents
System architecture
Interfaces of the Digital Powertrain portal

- Users own the sensors that they commission themselves.
- For other sensors, access rights must be manually granted to a user before data can be accessed.
What is a Digital Powertrain?

An intelligent powertrain equipped with **sensors** and **cloud connectivity**. It can include motors, drives, mechanical components including bearings, couplings and gearboxes, and applications like pumps, fans and compressors.

It is a combination of 2 existing web interfaces:

- **Smart Sensor** portal for motors, pumps and mounted bearings;
- **RCM** portal for **drives**.

The only additional step is to build up a digital powertrain by combining multiple monitored assets in the Powertrain portal.
Why Digital Powertrain?

So that the customers can monitor their entire process / powertrain or benchmark performance across multiple similarly rated assets, e.g. motors rated for the same power or speed. Not just a drive, a motor or a pump, but everything in an integrated visualization and with logical connections. Soon, joint analytics with different sensors will also be possible.

Our digital powertrain combines connectivity and data analytics with our expertise to make your operations efficient, predictable and safe.
Creating a powertrain step by step

Preparation steps

0) The Powertrain Portal puts together the following assets:

- From the Drives portal:
  - Drives
- From the Smart Sensor Portal:
  - Motors
  - Pumps
  - Mounted bearings
  - ...

Therefore, access to both portals is a pre-requisite.

1) Log in to the portal:

0) Enter the following link in the web browser: https://powertrain.abb.com

1) Log in with the existing ABB account
Creating a powertrain step by step

Preliminary steps

2) When entering the dashboard, click on the gearwheel on the top right.

3) Click on “+ Add new Powertrain” to go to the Powertrain configurator.

*Note the organization in the top is the one the user is logged into.
Configuring a powertrain step by step

Three main steps

There are 3 main steps to add and configure a new powertrain:
- Location
- Components
- Naming

Step 1) Location
Choose a site from the dropdown list and click on next.
Configuring a powertrain step by step

Three main steps

**Step 2) Components**

- Select the **component type** from the dropdown list.
- Add the specific assets from the list of **available components** by clicking on the +.
- Repeat process to add the desired amount of assets.
- Click on next.
Configuring a powertrain step by step

Three main steps

Step 3) Naming
Enter a name for the powertrain and click on save.
KPI visualization of assets
A few clicks to creating a graph

0) When in the «Powertrain Designer» page, click on the home to go to the Dashboard, i.e. the «Condition Monitoring» page.

1) Click on «Condition Indexes» to see the condition of each powertrain. Then click on the graph of the powertrain.

* The hierarchy shows the details of the condition of the powertrains and their assets
KPI visualization of assets
A few clicks to creating a graph

2) When landing on the "Cross Asset KPI Visualization" page, add the desired KPIs for each asset from the dropdown lists by clicking +
Repeat process to add the desired amount of KPIs
Graph will automatically appear
3) Adjust the desired timeframe to be shown
4) Click on the KPIs below the graph to hide/show them
5) Save as template if desired
Scatter Plot

Instead of plotting data as a trend graph, it is also possible to plot it as a scatter plot.

1) Choose the type of graph from the drop down menu
2) Choose the asset from the list of available assets
3) By clicking on the «plus» icon you can add the selected data to the graph
4) To remove the data click the «x» next to the name or perform step 3) for a different dataset.
How to buy a new subscription voucher – as an end user or partner

The subscription vouchers can be purchased directly with your local ABB sales unit

1. **Contact your ABB sales unit or partner**
   They will provide you a list of subscription plans with different validity periods and prices.

2. **Choose your subscription**
   Talk to your local ABB sales unit about your needs if you need help deciding which subscription duration is best for your accounting needs.

3. **Purchase your subscription**
   After selecting your desired subscription, agree on purchasing terms with your local ABB sales contact.

4. **Activate subscription**
   You will receive a voucher with a code for the purchased subscription. To activate it, just scan the code from the voucher with the ABB Ability™ Smart Sensor Platform app.

5. **Start monitoring your motors and pumps**
   You can access the ABB Ability™ Digital Powertrain condition monitoring solution for motors and pumps via the ABB Ability™ Smart Sensor web portal (https://smartsensor.abb.com) or the ABB Ability™ Smart Sensor Platform app.

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July 2, 2020

For more information, please visit [marketplace.ability.abb](https://marketplace.ability.abb): The online store for ABB’s digital solutions and expertise.
How to buy a new subscription via ABB Ability™ Marketplace – as an end user

The subscription plans can be purchased in the ABB Ability Marketplace™

1. Access ABB Ability Marketplace™ and register
   Fill in the required information to log in (e.g. contact/business info).
   Please note that account validation can last up to 7 working days.
   Purchase is possible after your account is validated.

2. Choose your condition monitoring subscription plan
   Use the solution cluster menu to find the desired application under ‘Condition Monitoring’ and choose a subscription plan.

3. Purchase confirmation
   After selecting your desired subscription model, billing period, payment type (credit card or SEPA direct-debit) and accept the Terms and Conditions you will receive the purchase confirmation.

4. Activate subscription
   You will receive a voucher with a code for the purchased subscription plan. To activate it, just scan the code from the voucher with the ABB Ability™ Smart Sensor Platform app.
   Please note that the voucher(s) can only be downloaded by registered users in the ABB Ability™ Smart Sensor web portal.

5. Start monitoring your motors and pumps
   You can access the ABB Ability™ Digital Powertrain condition monitoring solution for motors and pumps via the ABB Ability™ Smart Sensor web portal (https://smartsensor.abb.com) or the ABB Ability™ Smart Sensor Platform app.
How to buy a new subscription via ABB Ability™ Marketplace – as a partner

The subscription plans can be purchased in the ABB Ability Marketplace™

1. **Register as partner**

   Afterwards, you will receive an invitation from Marketplace to register. You will need to fill in the required information (e.g. contact and business information).

   Please note that account validation can last up to 7 working days.

   Purchase is possible after your account is validated.

2. **Complete training process**

3. **Choose your condition monitoring subscription plan**
   Use the solution cluster menu to find the desired application under ‘Condition Monitoring’ and choose a subscription plan.

4. **Purchase confirmation**
   After selecting your desired subscription model and payment type, you will receive the purchase confirmation and the Condition Monitoring voucher.

5. **Sell your digital services**

For more information, please visit [marketplace.ability.abb](https://marketplace.ability.abb). The online store for ABB’s digital solutions and expertise
ABB Ability Marketplace™ is available in most OECD countries

Please contact your local sales unit if Marketplace is not available in your country

List of countries where the ABB Ability Marketplace™ is available:

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