WIKI SOURCE FOR API CLOUD INTERFACE - GITHUB

The open guide to Cloud Interface for ABB Ability™ Smart Sensors

1 What is a Cloud Interface for ABB Ability™ Smart Sensors?

The Cloud Interface enables the external integration with the Smart Sensor Platform of ABB Ability™ to set up a customized interface from the ABB Ability™ Smart Sensor Platform.

The Customer will have access to the data acquired by the ABB Ability™ Smart Sensor (Smart Sensor) from the Customer equipment without having to access the Smart Sensor web portal interface through an internet browser.

This feature is using Web APIs (Application Programming Interfaces), which enable secure and controlled remote access from the outside to valuable data in the cloud.

1.1 Is the Cloud Interface included in the standard Condition Monitoring for ABB Ability™ Smart Sensors?

Yes, the Customer can benefit from the Cloud Interface for those ABB Ability™ Smart Sensors (Smart Sensors) with a valid and active Condition Monitoring subscription.

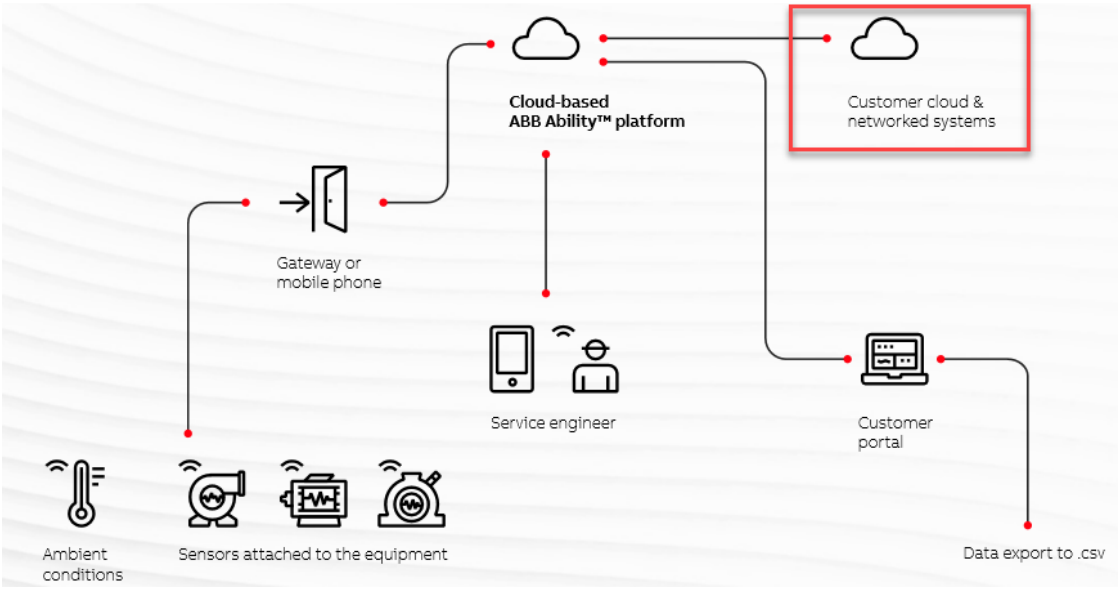

Figure 1: ABB Ability™ Smart Sensor solution diagram

2 Scope

- Open guide to learn how to use these Web APIs for ABB Ability™ Smart Sensors.
- Provide the Customer with a sample project as starting point to build up his/her own integration project(s).
- Create a community to share new developments, ask questions and propose suggestions for improvements based on real experience.

3 Steps to start creating your own integration project

1. Define the design requirements for your application, such as but not limited to integration scope, validation and data visualization.
2. Study and understand this development guide.
3. Use our sample python project located in this repository as starting point (add link).
4. Study the detailed services specification of the Smart Sensor cloud interface relevant for your application: https://api.smartsensor.abb.com/swagger/ui/index
5. The Customer shall perform the API implementation of their own system to successfully integrate the data into their software.

4 Development guide

4.1 Access authentication

For authentication, the Customer can use the same login credentials as for the Smart Sensor Portal or request a dedicated API Key in the Smart Sensor Portal.

Use the POST /Auth service to authenticate the User with name and password. At least one asset should be available for this user (the UID for this Asset can be provided optionally). Use the Device ID “string” for the external system to be integrated.

This service provides the authentication token to be used in all further Requests to the Backend: Add the Authentication Token value to the Request Header “Bearer”.

This service also provides refresh token to be used after expiration of the authentication token (valid 1 Day). To refresh the authentication token, use the PUT /Auth service with the refresh token and the optional UID of the Asset the user has access to.

An authenticated user can create Application Keys in the Profile Section of the Smart Sensor Portal to authenticate external Systems with the same authority as the authenticated user. The Application should use the POST /Auth/Key service to use application keys for authentication.

Visit our FAQ section for more information regarding access authentication and user management.

4.2 Operating services for API Cloud Interface:

The Cloud Interface API provides the following services:

- requesting the list of assets
- requesting plant data
- requesting detailed asset data
- receiving maintenance, alerts and alarm notifications
- requesting detailed notification data
- changing the threshold values for health parameters
- requesting condition indexes of the asset
- requesting historic measurement data of the asset
- receiving notifications about operational events.

4.2.1 Requesting the list of assets

Use the GET /Asset service to get a list of all assets available for the authenticated user with all asset, sensor and last measurement data.
Use the GET /Asset/List to get a simplified list of all assets including only asset information.

4.2.2 Requesting plant data

Use the GET /Plant service to get a list of the plants available for the Smart Sensor organization of the authenticated user.

4.2.3 Requesting detailed asset data

The example Use Case (UC) 1 to request asset details is shown as follows:

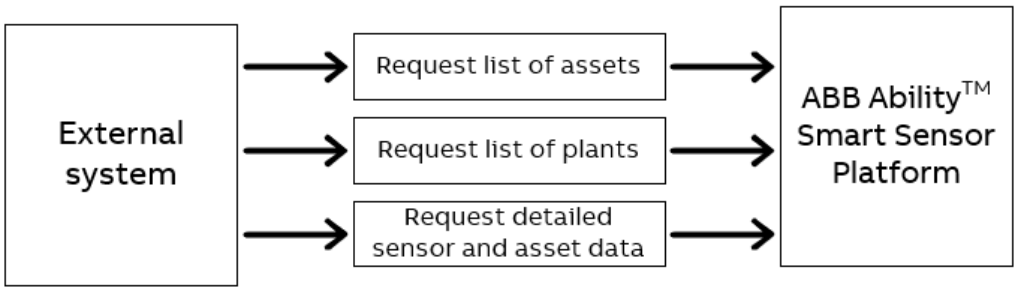

Figure 2: UC 1 - requesting asset details

Use the GET /Asset/{id} service to get all asset, sensor and last measurement data for the specified asset ID.

4.2.4 Receiving maintenance, alerts and alarm notifications

KPIs configured as asset health parameters have alert and alarm values specified by the user. These health parameters are used to identify the health status of the asset.

Raising an alert or alarm value of the health parameter, a notification will be created by ABB Ability™ Smart Sensor Platform. This notification will be pushed to the ABB Ability™ Smart Sensor Platform App, the Smart Sensor Portal and external systems.

Maintenance notifications will be provided to external systems for maintenance operations logged by the user in the Smart Sensor Platform App (UC 2).

The ABB Ability™ Smart Sensor Platform notification functionality per asset is implemented as subscribed email, push notification to mobile device or webhook.

Changing the threshold values for KPIs configured as asset health parameters is part of the example Use Case UC 3.

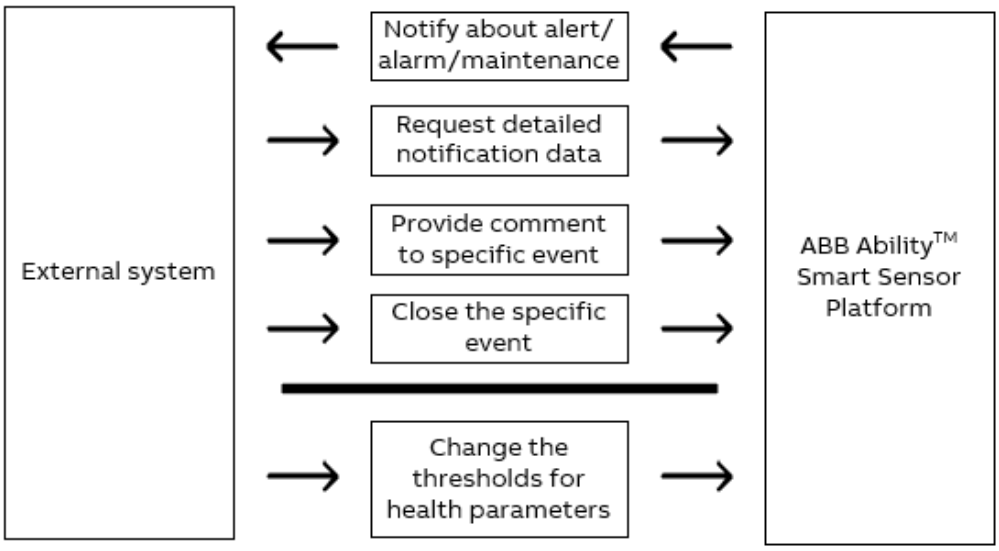

Figure 3: UC 2 – maintenance, alert and alarm notification and UC 3 - changing the thresholds for health parameters

4.2.5 Requesting detailed notification data

- Use the GET /EventLog service to get a list of events for the assets the authenticated User has access to.
- Use the POST /EventLog/Comment service to provide a comment to the specified event.
- Use the PUT /EventLog/Close service to close the event after providing the appropriate countermeasures.

4.2.6 Changing the thresholds for health parameters

To change the threshold values for KPIs configured as asset health parameters use the PUT / /Measurement/HealthInterval/{id} service of the ABB Ability™ Smart Sensor Platform API.

4.2.7 Requesting condition indexes of the asset

The health status of the asset is presented in an abstract way and independently from the type of the asset in condition indexes described below:

- **Availability:** status of the KPIs indicating the quality of the asset of being able to be used or obtained showing characteristic of the asset that is committable, operable, or usable upon demand to perform its designated or required functions.
- **Environment:** status of the KPIs indicating the current impact of external and internal environmental parameters to the operating of the asset, e.g. the internal and / or external temperature and the humidity in relation to the asset and / or asset type specific defined maximum or threshold values.
- **Reliability:** status of the KPIs of the asset indicating the quality of being trustworthy to perform its intended or required function consistently without degradation or failure. It includes the degree to which the result of a KPI measurement and calculation can be depended on to be accurate. Example KPIs are any kind of asset maintenance advice or the number of asset failures in the past operating period.

- **Stress:** status of the KPIs indicating the current load and performance of the asset regarding the main functionality in relation to the asset type specific maximum value of the load, e.g. the current power of the motor in relation to the maximum power.

The condition indexes are calculated by ABB Ability™ based on the following input parameters:

- values of the KPIs of the sensors (cumulative and trend data)
- alert and alarm values of the KPIs
- values of the nameplate data of the asset.

Every condition index has a value between 0 and 10. A value of 0 represents the unhealthiest status, 10 the healthiest status.

Additionally, every condition index value is transformed to a “traffic lights” status using appropriate thresholds and presenting the status with the following values: poor, tolerable and ok.

The Use Case 4 requesting condition indexes of the asset is shown in the following Figure.

Figure 4: UC 4 – requesting condition indexes of the asset

The condition indexes of the Asset can be requested from the ABB Ability™ Smart Sensor Platform using the GET /ConditionIndex and GET /ConditionIndex/{id}.

4.2.8 Requesting historic measurement data of the asset

The example Use Case 5 to request historical / trend Data and analytics results is shown in the following Figure:

Figure 5: UC 5 – requesting historic measurements

Use the GET /Measurement/Value service to get all historic measurement data for the specified Asset ID for one or more measurement types.

4.2.9 Receiving notifications about operational events

The ABB Ability™ Smart Sensor Platform generates notifications about operational events:

Asset-specific events

- KPI alert / alarm (UC 2)
- loading measurements
- load measurement reminder
- asset nameplate data edition
- low battery capacity

- return to normal operation after KPI alert/alarm status.

General events

- transfer asset to asset group

These notifications could be setup as Webhook with appropriate content and endpoint URL to inform the external System about the events in ABB Ability™ Smart Sensor Platform.

4.3 Feature codes

Some services of the Smart Sensor REST API require a feature code in an additional request header with the key "FeatureCode". This feature code corelates with the use cases of the external system integration scenario, where the appropriate service is requested.
The following table shows the features, the use cases, the appropriate services and the value of the feature code header.

Feature	Use Case	REST API Services	Feature Code Value
List Assets	UC1	GET /Asset/List	EXT_ListAssets
View Asset Details	UC1	GET /Asset/{id}	EXT_ViewAssetDetails
Asset Health Parameter Configuration	UC3	PUT /Measurement/HealthInterval/{id}	EXT_ConfigureAssetHealth
Asset Condition Index	UC4	GET /ConditionIndex GET /ConditionIndex/{id}	EXT_AssetConditionIndex
Asset Event Log	UC2	GET /EventLog	EXT_AssetEventLog
Asset Trend Graph	UC5	GET /Measurement/Value	EXT_AssetTrendData