

## SERVICE NOTE

# Low-Voltage Products Predictive Maintenance



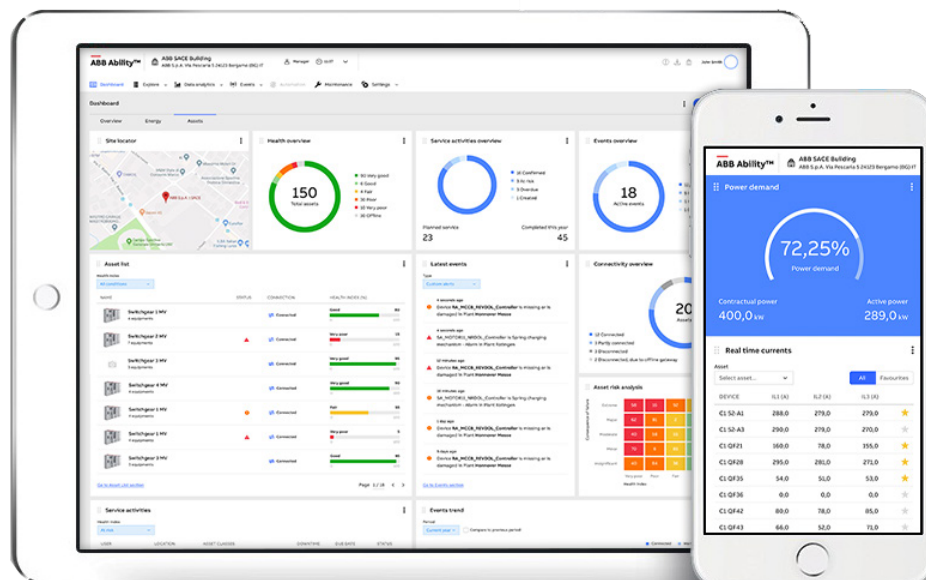
Investing to prevent failures and their costly consequences, such as loss of production and possible violation of health and safety laws, is a primary concern for many businesses. Successful prevention of failures can make a big difference but it must be minimized by optimizing costs.

By integrating the Predictive maintenance into the ABB Ability™ Energy and Asset Manager, ABB has created an easy-to-use tool to immediately understand, analyze and predict the health and status of monitored devices. A web-based platform, accessible from anywhere and anytime, provides a dedicated analysis with an overview of the health of all the devices monitored in the plant, along with a detailed analysis of each device with a clear indication of the deadline (“Next maintenance”) for its next maintenance work.

This deadline date is optimized according to the real utilization of the device and its real environmental conditions.

The device’s health conditions are represented by colors with meanings like the colors of a traffic light; the risk of a failure increases as they change from green to yellow to orange to red. Each color represents a specific health condition status:

- Green** = the risk of a fault is very low
- Yellow** = the risk of a fault is medium
- Orange** = the risk of a fault is moderate
- Red** = the risk of a fault is high.



By clicking on each single monitored device, it is possible to access a more detailed representation of the health conditions.

A **blue** curve, on a chromatic scale, shows the health conditions of the device:

When it is new, the product is at its top level (100%). The curve starts from the production date (point 1 in Image 2). Between the production and the date (point 2 in Image 2) when the product is put into service, the the health conditions of the device gradually decrease.

If the product is put into service many years after its production, maintenance is recommended. When the product is put into service, the the slope of the curve increases based on utilization and environmental conditions. In particular:

- 1) Utilization conditions:
  - a. Current (real current compared to the nominal one)
  - b. Voltage
  - c. Number of operations (open/close)
  - d. Contact Wear (CW) based on trips for overload (L - ANSI 49), short circuits (S - ANSI 51 & 50TD, I - ANSI 50), earth faults (G - ANSI 51N & 50NTD)
  - e. Trip unit malfunctions or errors.
- 2) Environmental conditions:
  - a. Temperature
  - b. Humidity
  - c. Vibration
  - d. Corrosive environment
  - e. Dust level.

All these data are collected and analyzed to calculate the circuit breaker's working life.

In addition to the real time data, maintenance can also influence the curve. ABB with Predictive maintenance integrated in ABB Ability™ Energy and Asset Manager can evaluate the effect of a maintenance activity.

It is in fact represented with a vertical segment (from point 3 to point 4 in Image 2): the length of this segment can change based on type of maintenance performed: components replaced, lubrication, tests, ...

Maintenance is effective only when performed by authorized personnel: maintenance performed at the right time by skilled and authorized ABB field service engineers has a positive influence on product health trends. With the right training, the proper tools and genuine spare parts, extending the working life of installations is simple.

Authorized field service engineers can be either from within the ABB organization or from external qualified sources.

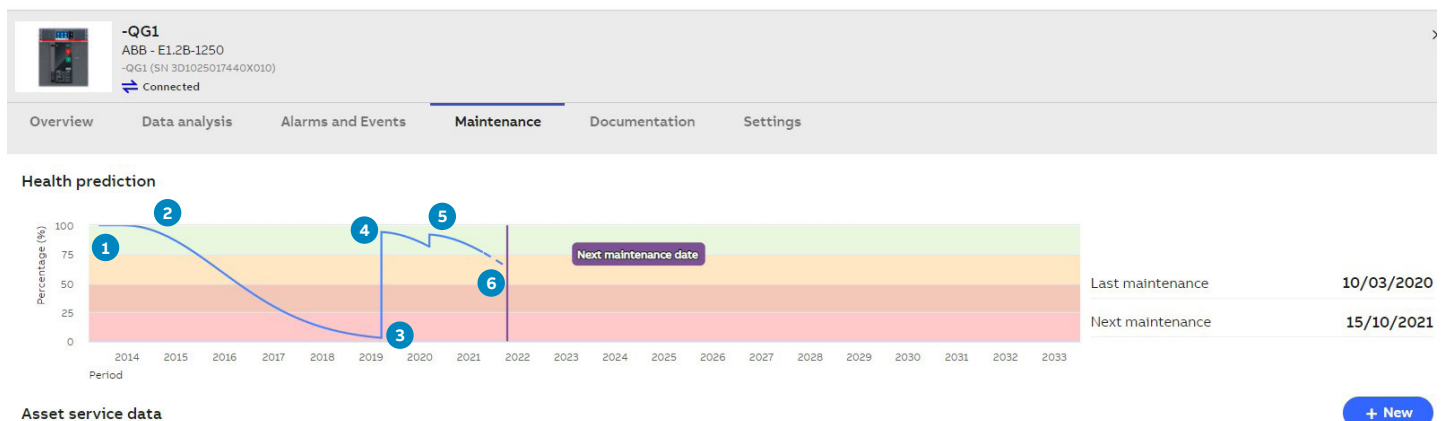
Internal authorized personnel are:

- ABB Level 3: ABB's top level of expert field service engineers who are able to replace complicated and important components marked as Type "A" (e.g., operating mechanism, poles), for which a particular expertise is required.
- ABB Level 2: ABB field service engineers not trained to replace components marked as Type "A."

External ABB authorized personnel are people who an perform ordinary maintenance activities:

- Authorized service providers (that have successfully attended ABB AVP training)
- ABB MAN, people who attended MAN training.

When maintenance is performed by non-ABB authorized personnel, the health conditions asset curve is not affected.



After maintenance, the curve starts to decrease according to utilization and environmental conditions.

The curve is continuous until the last update date. After that date, the curve is dotted to indicate the expected trend between the last update date and the next maintenance date (vertical purple line). If an important event influences the next maintenance date, ABB Ability™ Energy and Asset Manager sends an automatic notification. With this feature ABB enables users to optimize their available power with targeted maintenance for both standard and critical applications, while preserving reliability and maximizing operational efficiency. The Predictive maintenance is available for new or existing installations.

#### New installation:

- 1) Emax 2 circuit breakers equipped with one of the following trip units:
  - a. Ekip Touch
  - b. Ekip Hi-Touch
  - c. G-Touch
  - d. G Hi-Touch
  - e. LCD
- 2) Tmax XT: XT7 equipped with Ekip Touch or Ekip Hi-Touch trip unit
- 3) Emax 2 switch disconnector + Ekip UP (Protect or Protect + or Control +).

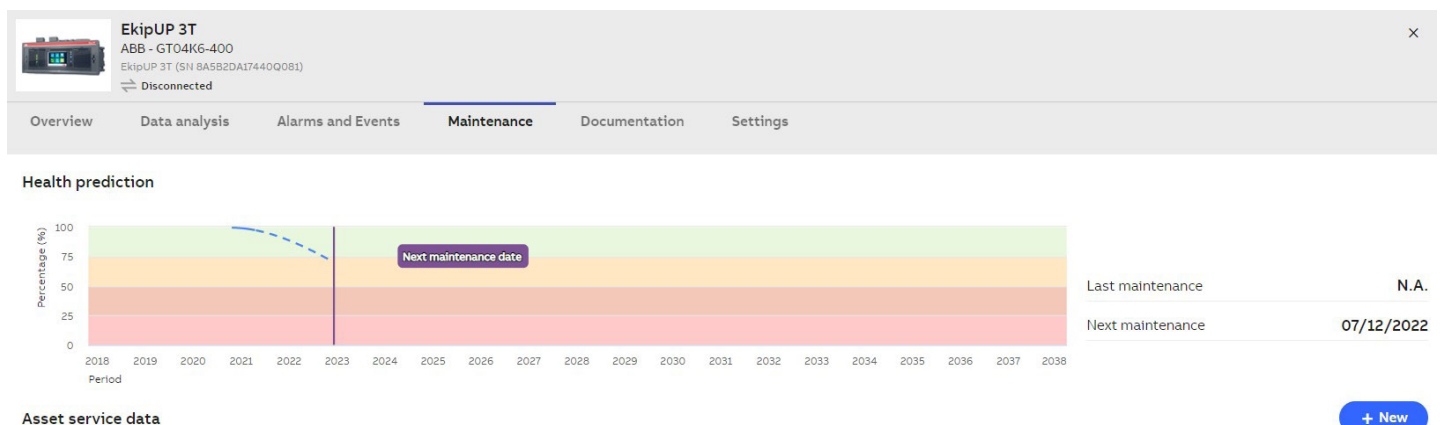
#### Existing installation:

- 4) Any retrofit kit solution using Emax 2 (equipped with Ekip Touch or Ekip HiTouch or G-Touch or G Hi-Touch or LCD)
- 5) New Emax circuit breakers (automatic or switch disconnector) + Ekip UP (Protect or Protect + or Control +)
- 6) Entelliguard G (automatic or switch disconnector) + Ekip UP (Protect or Protect + or Control +).

When installing Ekip UP with an already installed product, maintenance on the installed asset by ABB authorized personnel is required to restore the device's health conditions. Ekip UP + maintenance can be available as part of a maintenance bundle. Moreover, the device health condition curve represented in Predict will consider the date when Ekip UP was installed as a starting point of the curve (image 3).

#### Key benefits

- Improve service profitability by optimizing maintenance costs. Dynamic management of maintenance for cloud-monitored ABB electrical equipment, scheduling according to real needs
- Manage and connect from anywhere, thanks to the ABB Ability™ cloud-based platform
- Extend product lifetime by optimizing performance
- Increase safety for devices and personnel by reducing the risk of unexpected shutdowns.



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