Greenwood NetCondition App

Introduction

Greenwood Power wants to provide a sensor-as-a-service product to energy providers bundling GWP current sensors and the Siemens SICAM Feeder Condition Monitor as a ready to use package including a graphical user interface application on BentoNet for service staff convenience. The sensors are passive and could be used for first- or retrofit installations, for primary or secondary energy distribution and for medium and low voltage applications. The SICAM FCM is a short circuit and ground fault indicator with direction indication in isolated, compensated or solidly earthed distribution networks. A graphical user interface on BentoNet presents the measured values to monitor the load of distribution network components thus providing accurate data on the network condition. The data is collected via the BentoNet high security mobile network and visualized by the GWP NetCondition App in any modern web browser.

Graphical User Interface

The GWP NetCondition App is developed as a responsive web application presenting the information of each connected FCM in a compact view component. Despite its compact design, it allows a comprehensive analysis of the current status of the distribution network.

Dashboard

The GWP NetCondition App always starts in dashboard view. In dashboard view the user is shown one presentation element for each FCM (condition component) that displays the actually measured values. The condition components are laid out responsively so that the actual screen size can be used as good as

possible. The maximum width of the condition component is 480px to fill the screen of a typical smartphone completely. In that use case condition components are ordered from top to bottom to enable the user to vertically scroll over all elements actually shown. If the GWP NetCondition App is running on a display with a higher horizontal resolution the condition components are laid out from left to right breaking to the next line as soon as there is no more space available. If the number of condition components is greater than the maximum number that can be displayed on the screen a scrollbar is enabled to make also in this case a vertical scrolling possible.

Condition Component

<Label> <Location>	<Label> <Location>	<Label> <Location>	<Label> <Location>

Total Current	Cosphi	Frequency
0,0A	0,0°	0,00Hz

L1	L2	L3
0,0V	0,0V	0,0V
0,0A	0,0A	0,0A
0,0°	0,0°	0,0°

Status: OK

Effective Power	Reactive Power	Apparent Power
0,0kW	0,0kVar	0,0kVA

Status: GROUND FAULT

Status: SHORT CIRCUIT

Status: OFFLINE
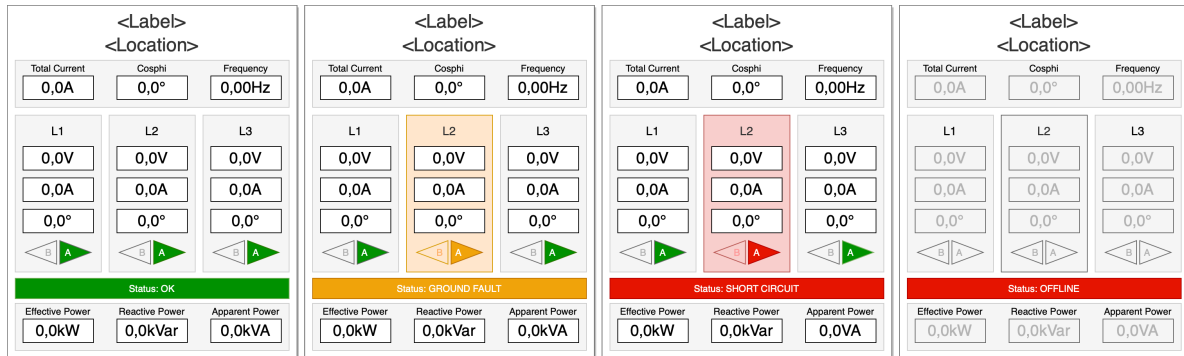
The condition component is a user interface element that implements a compact view of important measured values of the associated SICAM FCM. It is a composition of display elements for the following data:

Header Information

- Label: Since there may be many condition components on the screen each component can be named differently e.g. in the naming convention of the customer. The label is a free-text field with a maximum size of 30 characters that can be changed in the settings view of the condition component.
- Location: As an additional information each condition component can contain a location. The location information is also a free-text field with a maximum size of 30 characters that can be changed in the settings view of the condition component.

General Information Block I

The first block of display elements contains general information about the connected power source:

- Total current: The total current is calculated continuously as the sum of all currents measured on L1, L2 and L3 for convenience.
- Cosphi: The actual total cosine phi as measured by the FCM.
- Frequency: The actual net frequency as measured by the FCM. If the frequency exceeds the configured tolerance this display element is colored with red background and white text color.

Information Blocks for Phase L1, L2 and L3

Each of the phases has its own block of data display:

- The voltage currently measured by the FCM on the appropriate phase.
- The current currently measured by the FCM on the appropriate phase.
- The cosine phi currently measured by the FCM on the appropriate phase.

- The direction indicators show whether current flows in forward direction (direction "A", arrow to the right) or backward direction (direction B, arrow to the left) by being filled with green color.
  If there is a short circuit or a ground fault the appropriate arrow will be filled with red or orange color indicating the direction where the fault occurred. Additionally the background of the phase block will turn to red or orange accordingly.
  Condition components with a short circuit or ground fault will be rearranged to the top row of the dashboard view and the dashboard will be scrolled automatically to the top of the screen as soon as the fault event occurs.

General Information Block II

In the general information block II the measured power values are displayed:

- Effective power: the measured effective power in kW.
- Reactive power: the measured reactive power in kVar.
- Apparent power: the measured apparent power in kVA.

Status Block

The status block signals the current status:

- OFFLINE: The connection to the FCM is not available.
- OK: The connection is established and there are no power faults to report.
- GROUND FAULT: Unintentional pathway of the electrical current directly to the ground detected by FCM.
- SHORT CIRCUIT: Electrical flow outside its intended circuit with little or no resistance detected by FCM.

Settings

Each condition component can be configured using the settings dialog. A user must have the associated role "admin" or "monitor_admin" to have the right to change condition component settings. If a user is allowed to change the settings then a gear wheel icon will appear on the upper right corner of the condition component. By clicking or tapping this icon the settings dialog will open up.

In the settings dialog the following options have to be configured:

- Project: The project number used for administration of the installation. This value is defined and delivered by BentoNet.
- Ordinal: An identifier for the corresponding device in the project. This value is defined and delivered by BentoNet.
- Measurement: The type of measurement configured in the FCM: 3 phase current measurement mode or 2 phase current plus 1 ground current measurement mode.
- Label: The label as informational field shown on the user interface.
- Location: Informational field describing the location to be displayed on the user interface.
- Ground fault as: Display ground fault status as "Warning" (orange) or "Error" (red). Default is "Error".
- Short circuit as: Display short circuit status as "Warning" (orange) or "Error" (red). Default is "Error".
- Offline as: Display offline status as "Warning" (orange) or "Error" (red). Default is "Error".

Add Entity

A user with the associated role "admin" or "monitor_admin" can add new condition components on the dashboard by clicking on the "Add entity…" link at the bottom of the page. The settings dialog will open up and after filling out the form and saving the information added a new condition component is displayed on the screen.

Remove Entity

An entity of a condition component can be removed from the dashboard by opening the settings dialog and pressing the "Remove" button. A user must have the associated role "admin" or "monitor_admin" to have the right to remove an entity via the condition component settings dialog.