Part 04

EMS

Developing Techniques for Monitoring Battery Operations

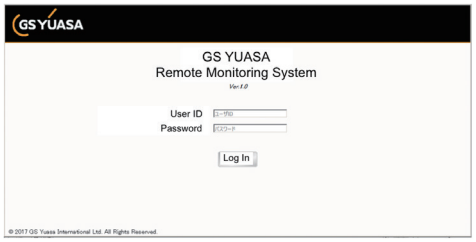
Remotely Monitoring Power Components

GS Yuasa delivers a variety of power components: storage batteries; power conditioners; uninterruptible power supplies (UPS); and power converting rectifiers. Storage batteries and power conditioners are useful for stabilizing power in remote power systems; UPS for supplying backup power and power converting rectifiers are favored for communication and railway installations. Power components, which are expected to operate for at least ten years, need to be monitored periodically and automatically to ensure reliable operation by preventing potential problems and reducing recovery time.
GS Yuasa offers a monitoring system that facilitates reliable operation of the kinds of power components installed in remote systems. This article introduces our remote monitoring system and the accompanying web interface (●Fig.1) for organizing and presenting a large amount of information in a format that is easy to digest.

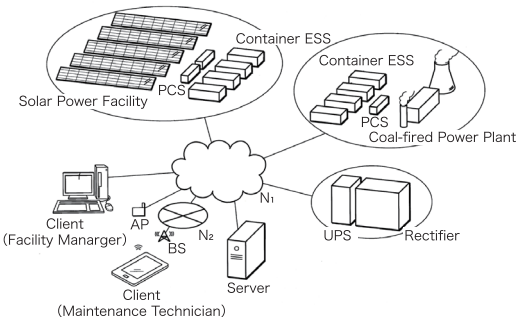
1. Overview – Why Remote Monitoring?

Large-scale power generation facilities host countless storage battery cells configured to supply power to cover dropoff in the power generated. A power generation facility may have an energy storage system (ESS) made up of multiple freight-type containers that hold thousands of lithium-ion battery cells and multiple power conditioners (PCS). Therefore, depending on the size of the facility, tens of thousands of storage battery cells and multiple power conditioners may need to be monitored (●Fig. 2).

●Fig. 1 Remote Monitoring System



●Fig. 2 Remote Monitoring System



GS Yuasa's remote monitoring system is comprised of a communication device (e.g., a network card[1]) provided to a power component, a server for collecting information from the communication device; and a client from which the information collected can be viewed. The communication device, server, and client are all connected via a network. The network includes the public communications network N1 and a carrier network N2 that provides wireless communication through a mobile communication standard. The network also includes an access point AP, which is connected to the public communications network N1, and a base station BS in the carrier network N2.

The server functions as a web server, and presents a web interface responsive to access from a client. The client may be a facility manager's computer, or a maintenance technician's tablet; the client connects to the network for communication with the server and the communication device in each of the power components. A communication device collects and sends the server information about the status of the host power component via the network. It is therefore possible to remotely monitor the status of a variety and number of power components to prevent potential problems and ensure reliable operation.

2. Remote Monitoring Web Interface

Storage batteries and power devices have always been listed separately for management or control, despite the interrelated operation of these components. As previously stated, the GS Yuasa remote monitoring system organizes and presents the large amounts of information collected in a format that is easy to digest.

On successful log-in from the client, the server presents the client a listing of the systems to which the logged-in user is permitted to access. The web interface presented to the client displays system names as hyperlinks along with a summary of the status of each system (i.e., normal or abnormal) at that time (● Fig. 3).

For example, selecting XY City Mega Solar System would display a list of the many storage batteries and power conditioners installed at that power generation facility (●Fig. 4).

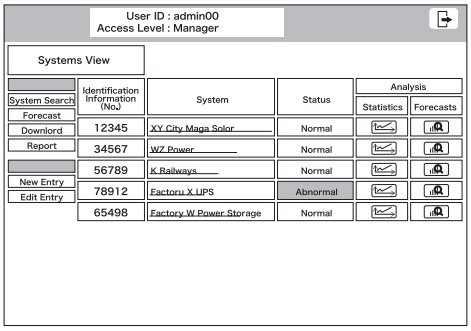
In our remote monitoring system, the storage batteries and power conditioners are presented in a single view. Thus, it becomes possible to quickly determine the status of all the power components, and to efficiently provide maintenance (planned and preventative maintenance). Furthermore, selecting the detail icon allows the user direct access to the communication device installed in a power component. Here, the user can review the most up-to-date information for the power component.

A storage battery may be displayed within a hierarchy (●Fig. 5). Here, module refers to a collection of multiple battery cells; bank refers to a collection of multiple modules connected in series, and domain refers to a collection of multiple banks connected in parallel. Selecting the expander icon for a bank reveals a list of modules in that bank and selecting the expander icon for a module reveals a list of battery cells in that module. Thus, depending on the selection, a user may drill down into the hierarchy to reveal information in a lower level of the hierarchy; therefore, even in a system containing a vast number of battery cells, a user can confirm the details associated with a specific status while understanding the overall configuration of the system.

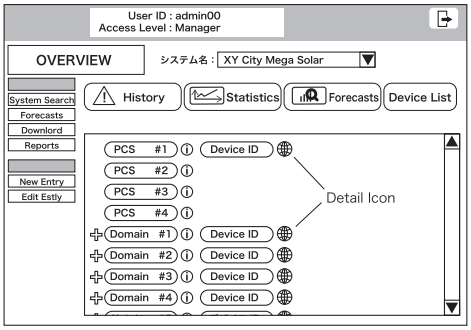
Power components may be provided in a variety of configurations and locations. Remote monitoring allows users to view and control the status of the power components to prevent potential problems and ensure reliable operation. Therefore, with large-scale in particular, it is important for the vast amount of information available to be organized and presented in a format that is easy to digest. GS Yuasa does exactly that with its remote monitoring systems.

This article provided an overview of GS Yuasa's remote monitoring system and described the web interface presented by the server. Part 5 will introduce the web interface presented by a communication device installed in a power component.

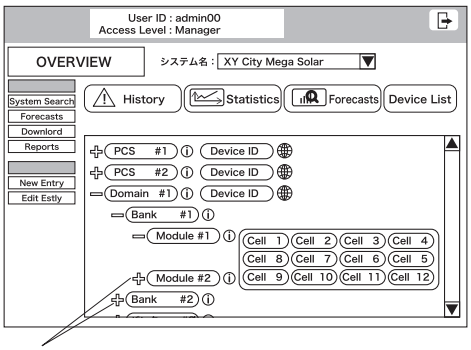
●Fig. 3 Remote Monitoring Web Interface



●Fig. 4 System view for all power components; in this case, storage batteries and power conditioners[2]



●Fig. 5 Drilling down to the storage battery level[2]



1. GS Yuasa Technical Report Volume 11, No. 2, published 2014
2. International Publication No. WO2019/131078 (Filed in 2017)

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