

# Developing Techniques for Monitoring Battery Operations

## The Remote Monitoring via the Communication Device

Part 4 of this series described our remote monitoring system. The remote monitoring system is created from a network of communication devices and a server; the server gathers information from the communication devices, and the communication devices may be attached to a power component. Both the communication device and the server function as web servers. The communication device presents a graphical user interface (GUI) that allows for monitoring and controlling the status of each power component (●Fig. 1).

GS Yuasa has devised a remote monitoring system that organizes and presents vast amounts of information in an intuitive format. This article describes the web interface presented by a communication device that can be installed with a power component. This article also introduces an example of controlling a power component through the web interface.

### 1. Transitioning to the Communication Device Web Interface

The remote monitoring system is typically used to monitor a device in a power generation facility. The server in the remote monitoring system collects and organizes data from the monitored component, e.g., a storage battery, a power conditioner, an uninterruptable power supply (UPS), or power converting rectifier by using a web interface that presents a comprehensive listing of information (● Fig. 2). When a detail icon is selected, the web interface changes from one presented by the server to one presented by the communication device attached to the monitored component.

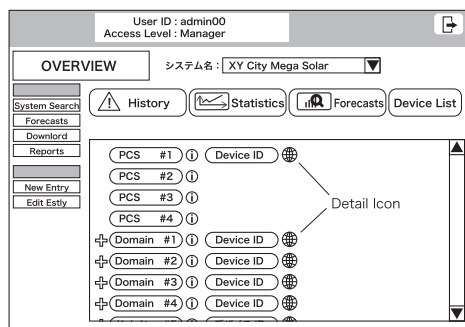
A domain represents a group of storage batteries; here, selecting the detail icon for a domain changes the web interface to the web interface presented by a communication device for a storage battery(●Fig. 1). The communication device attached to this storage battery presents the latest information obtained from the storage batteries belonging to the aforementioned domain via a web interface. The web interface displays intuitive and easy-to-follow graphics to present information such as: the overall status of the group of storage batteries; the state of charge (SOC) of the group of storage batteries; and the amount of current flowing through the group of storage batteries.

On the other hand, a user may select the detail icon next to "PCS" in the web interface presented by the server (●Fig. 2). Here, the web interface displayed changes from one presented by the server to one presented by the communication device attached to the power conditioner (●Fig. 3). The communication device presents the latest information for one or multiple power conditioners connected in series at, for instance, a power generation facility. The web interface displays intuitive and easy-to-follow graphics to present information such as: the power available from the power system; the operating status of a power conditioner (group); and an indicator for whether power is being bought or sold.

●Fig. 1 GUI for a communication device attached to a lithium ion battery



●Fig. 2 Web interface presented by the remote monitoring system server



●Fig. 3 Web interface presented by a communication device attached to a power conditioner (PCS)



## 2. Shared and Independent Design Components

As illustrated (●Fig. 1 and ●Fig. 3), the communication device attached to a storage battery presents one web interface, and the communication device attached to a PCS presents another web interface. While the overall design of these web interfaces is similar, the graphics, particulars, and background colors presented by each of the web interfaces differ depending on the monitored component that is selected<sup>1</sup>.

Traditionally, different manufacturers provide the storage battery and the power device, and so in many cases the user interface available for monitoring or controlling the storage battery or power device is different. GS Yuasa has been manufacturing and distributing both storage batteries and power devices for many years. Our expertise in this area has allowed us to develop a remote monitoring system that presents a careful selection of parameters that provide a unified and encompassing view via remote monitoring.

Our remote monitoring system is capable of presenting information for other types of power devices; for instance, the system may present the information from a communication device attached to a UPS or a power converting rectifier through a dedicated interface. A communication device may also be attached to a lead-acid battery monitor, thus allowing the remote monitoring system to present information on a lead-acid battery through a dedicated web interface (●Fig. 4). It is thus possible to comprehensively monitor a system containing various types of power devices and storage batteries.

## 3. Suppressing Output from a Power Conditioner

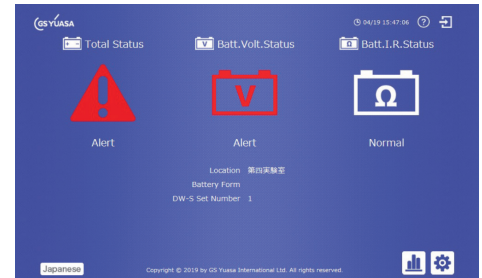
The remote monitoring system is designed for device monitoring as well as for device control and configuration through the web interface presented by the communication device.

The communication device attached to a power conditioner may receive a curtailment signal distributed over the Internet by the power company; and the power conditioner may use this information to control output. When the user selects the maintenance menu via the web interface (●Fig. 3), the client is forwarded to another web interface (●Fig. 5) or another maintenance-related interface. For instance, this maintenance-related interface may be used when scheduling output controls to select automatic or manual calendar update, to enter a URL for a power server to which the communication device connects for automatically updating the calendar, or to read from a file containing a manually created schedule.

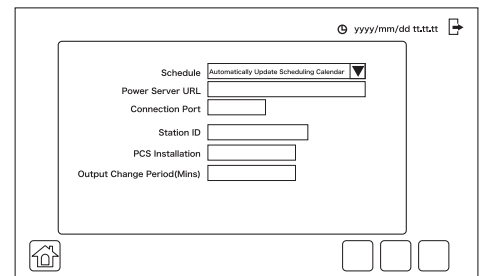
This reduces the work of sending a maintenance technician to the facility with the power conditioner to rewrite the schedule. This greatly optimizes the work involved in operating the power conditioner.

This article described the web interface presented by a general-purpose communication device that can be provided to a storage battery or power device, along with an example of device control through the web interface. Part 6 will introduce remote monitoring for exterior uninterruptible power supplies.

●Fig. 4 Web interface presented by a communication device attached to a lead-acid battery monitor



●Fig. 5 Web interface for configuring output<sup>2</sup>



1. Japanese Patent No. 6515992

2. Japanese Patent No. 6515991