Lead Batteries Deterioration Monitoring System

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Abstract

In preparation for power outage in cases of emergency, maintenance, and inspection, major electrical facilities are equipped with many lead storage batteries for an uninterruptible power system or an in-house power generating system. In order to ensure sound operation of these units and equipment, proper maintenance management is critical.

From a viewpoint of productivity improvements, reduction of maintenance cost and effective periodic inspections are required.

In order to meet these requirements, we have developed ESW-100B system that monitors in real-time the lead storage batteries conditions and identifies the state of deterioration.

1   Preface

In the field of maintenance management for storage batteries, the battery status was checked at the time of periodic inspection and replacement was carried out according to the age of service in the conventional method. Since batteries are replaced in large quantities, renovation costs generally rise to a high level. Therefore, in many cases, replacement on the cell level is often requested. Even during periodic inspection, it is very difficult to definitively decide when such life extension measures should be implemented.

The lead battery deterioration monitoring system we recently developed always monitors the status of voltage, internal resistance, and ambient temperature (using the sensors mounted on the respective battery cells to judge the soundness of batteries in real-time mode, and judge the level of deterioration).

This paper introduces the functions of Meiden lead battery deterioration monitoring system, ESW-100B ("ESW-100B" hereafter).

2   Outline of ESW-100B

2.1   System Configuration

Fig. 1 shows the system configuration and **Fig. 2** shows an image of sensor installations. The Web server unit receives the measured data from the respective sensors connected through the
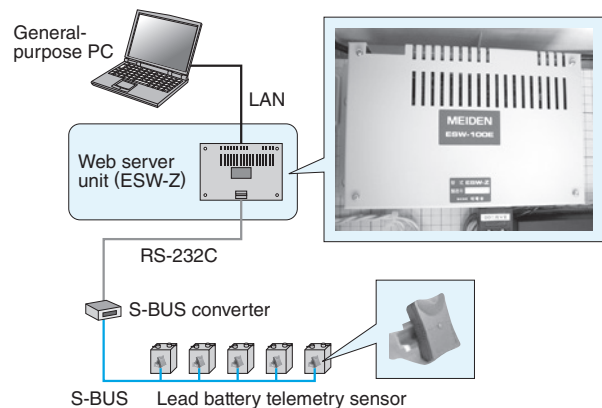

Fig. 1   **ESW-100B System Configuration**

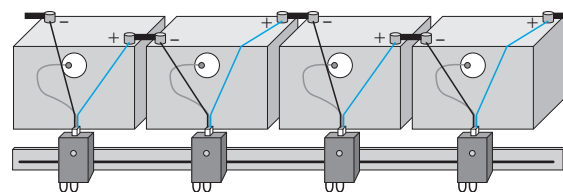The ESW-100B system configuration is shown.

Fig. 2   **Image of Sensor Installations**

This shows an image of telemetry sensors installed on lead batteries.

RS-232C communication cable. Using an Internet browser, you can see the status and graphic expressions screens from a Personal Computer (PC) connected through the LAN network.

2.2 Features of the System

（1） Since sensors and the Web server unit used in this system are small, outstanding workability is secured in the location of a battery installation.

（2） Regarding software, everything has been incorporated in the Web server unit and no large scale system building work is needed.

（3） No particular tools and applications are needed because operational settings and adjustments are carried out using the Web browser.

（4） In case of any error in a cell, an error code notice will present on the PC screen. In addition, an alarm mail of error code notice can be immediately sent to facility managing personnel.

（5） Collected data can be transferred to a USB memory stick or a PC so that these long-term operation data can be automatically saved for an extended amount of time.

3　Introduction of Major Functions

3.1　Display of Web Status List

Fig. 3 shows a list of overall status in battery facilities. The related cell changes its color if any variations are found where a measured value in the cell is deviating from an alarming level. By selecting this cell, more detailed information can be acquired.

3.2　Web Document Display

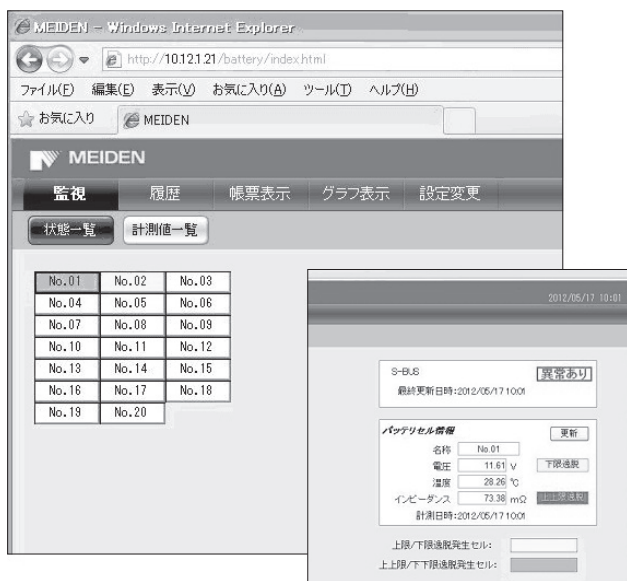**Fig. 4** shows a Web document screen of all cells. It is possible to display the data accumulated for a period specified in the listing.

3.3　Web Graphic Expressions Display

Fig. 5 shows a Web graphic expressions screen of each cell. The graphic expressions of an arbitrarily selected cell are displayed for a specified period. The upper and lower limits alarming lines of overall battery facilities can be displayed at the same time.
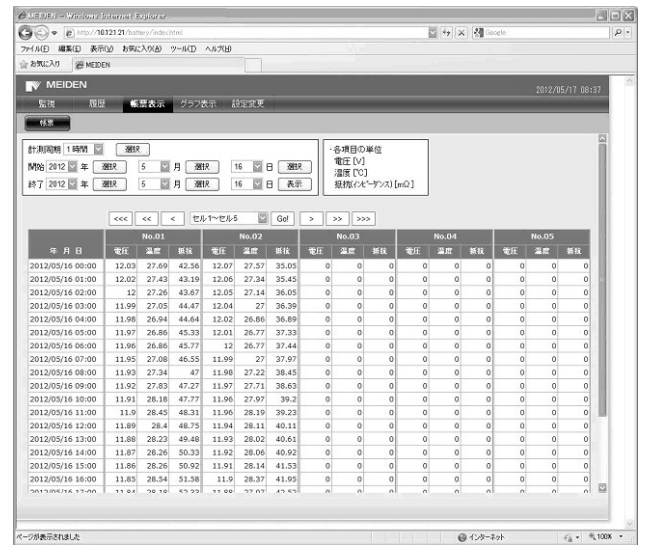

Fig. 4　Web Document Screen

This shows a Web-based format reporting screen of ESW-100B. This is shown for the entire cell overview.
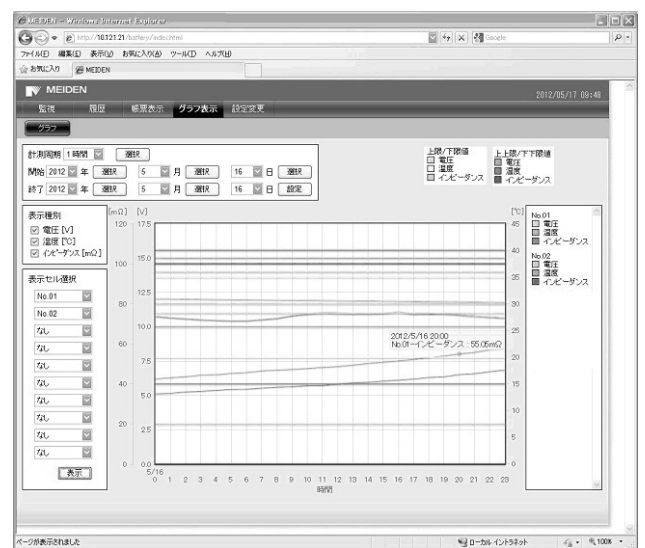

Fig. 5　Web Graphic Expressions Screen

A Web graphic expressions screen of ESW-100B is shown for each cell.

Fig. 3　Status List Screen

This shows a screen of ESW-100B list showing the status of overall battery facilities.

Table 1 ESW-100B System Functions

In addition to a system function of real-time telemetry display, this system offers an alarming feature and can show accumulated past data in a formatted report or in the graphic expressions style.

Display function	List of status, list of measured values, recorded messages
Alarming function	Upper/lower limits alarming, mail transmission
Data transfer function	FTP file and USB memory transfer
Reporting function	Web-based formatted reporting and Web-based trend showing graphs

Table 2 ESW-100B System Specifications

In system specifications, an outstanding feature is that data setting can be made easily using the Web browser. Wireless LAN and related devices are applied between PCs.

Max. points of supervisory cells	254 points
Data logging period	1h, 3h, 6 h, 12h, and 24h
Data storage period	Approx. 3 months at a shortest period of 1h Approx. 6 years at the longest period of 24h
Max. Web access	10 users
Communication protocol	RS-232C, S-BUS, 10/100BASE-T/TX
Applicable telemetry sensors	LEM Japan Sentinel 3+

4 System Functions and Specifications

Table 1 shows the system functions and **Table 2** shows the system specifications.

5 Postscript

The monitoring system introduced in this issue is intended to monitor the conditions of lead storage batteries in real-time mode. We will continue to add and improve the functions for deterioration diagnosis based on aging deterioration and a function for reporting.

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