Improvement of Temperature and Humidity Measurement System for KEK Injector Linac

I. Satake†, M. Satoh, T. Suwada, Y. Yano, T. Kudou*, S. Kusano*, Y. Mizukawa*

High Energy Accelerator Research Organization(KEK),
*Mitsubishi Electric System & Service Co., Ltd

THMPA07
Temperature and Humidity Measurement System

- Consists of 26 data loggers connected to 720 sensors, one EPICS IOC, and CSS archiver.
- There are 17 types of objects to be measured.
- The temperature stability of the cooling water is very important for stable beam operation.
- The temperature change may cause the rf phase drift and eventually the beam energy change.

Table 1: The stability goal of cooling water temperature

<table>
<thead>
<tr>
<th>Type</th>
<th>Cooling water temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accelerating structure and SLED</td>
<td>30 ± 0.3 °C</td>
</tr>
<tr>
<td>Klystron</td>
<td>30 ± 0.5 °C</td>
</tr>
</tbody>
</table>

Fig. 1: Measurement object.
Data logging system

- Measurement data obtained by each sensor is firstly sent to the data logger.
- EPICS IOC obtains the temperature data and stores them into EPICS PVs in 0.1 Hz.
- CSS archiver w/ PostgreSQL backend retrieves the data from EPICS PVs in 0.1 Hz.

Fig. 2: Schematic layout of data acquisition software.
New Alarm System and Viewer

- Python scripting language, matplotlib, and Tkinter
- The new software for managing the temperature and humidity data.
- It can detect the anomalous temperature fluctuation with a good operable user interface.

![Image example of the new archiver data viewer and alarm display panel.](image)

Fig. 3: Image example of the new archiver data viewer and alarm display panel.

- We have a plan to detect the defects of equipments by using this alarm system not only for the temperature but also for the status of other subsystems.