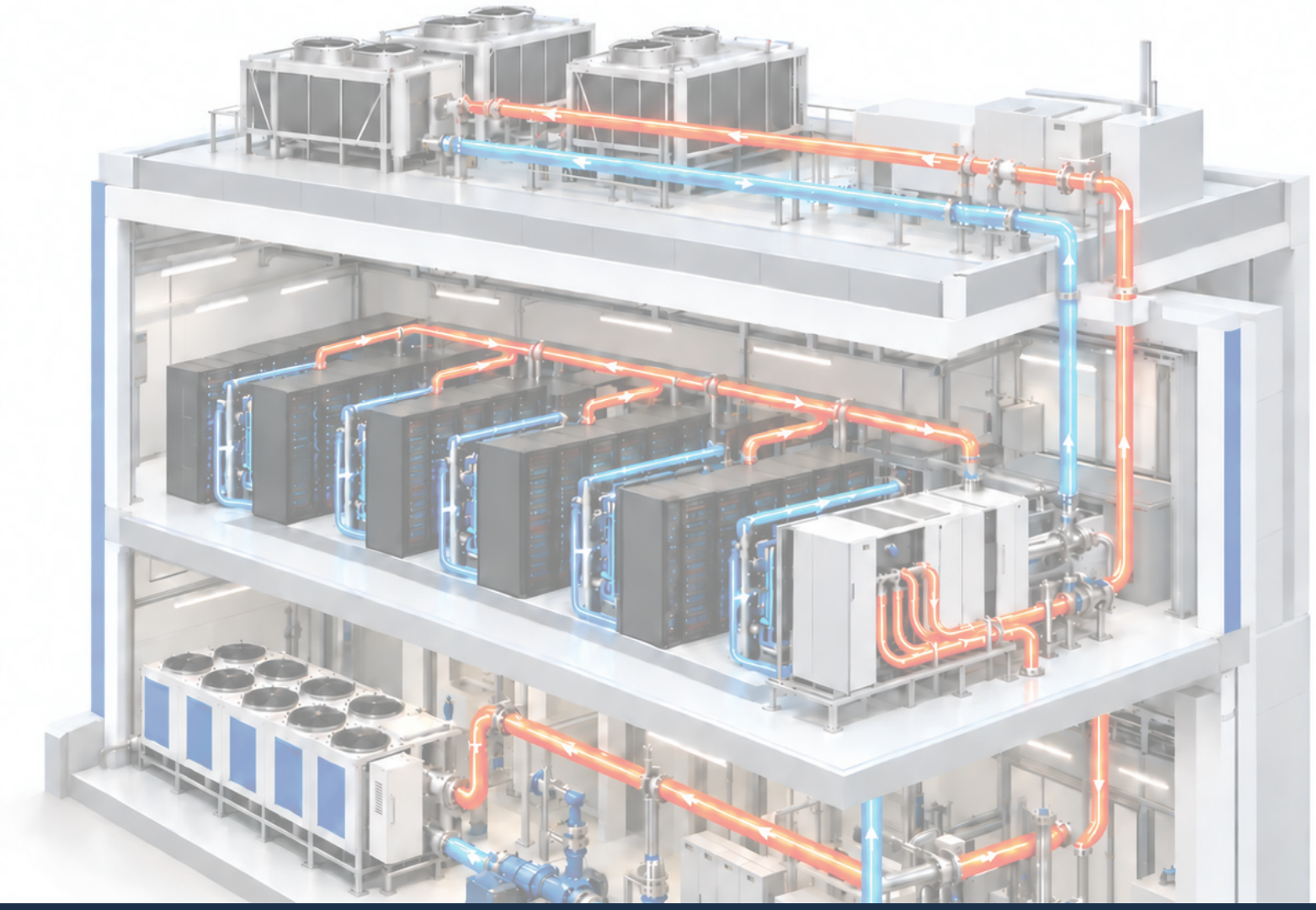
HIOKI

TECHNICAL WHITE PAPER



POWER + THERMAL VALIDATION

Synchronized Power and Temperature Measurement for AI Server Racks

Measure power and temperature at the same time to see how changes in server load affect cooling performance.

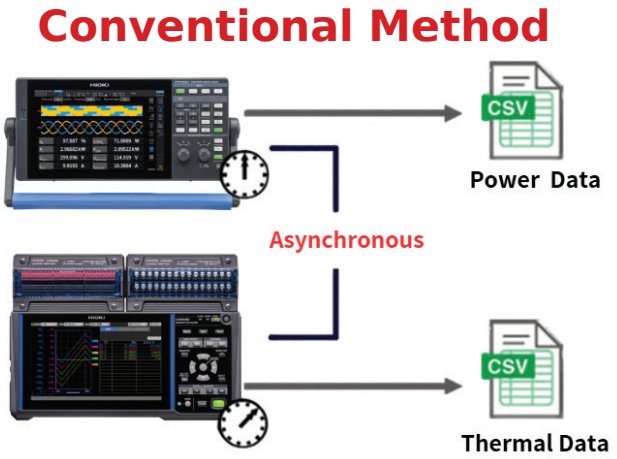
01 / CONTEXT & MEASUREMENT CHALLENGES

Electrical load changes. Cooling must respond.

Higher AI server power creates greater thermal demands. Engineers need to compare electrical load with server, rack and coolant temperatures on a common time base. This paper outlines how an LR8102-based system supports server-rack, power supply unit (PSU) and coolant distribution unit (CDU) evaluation.

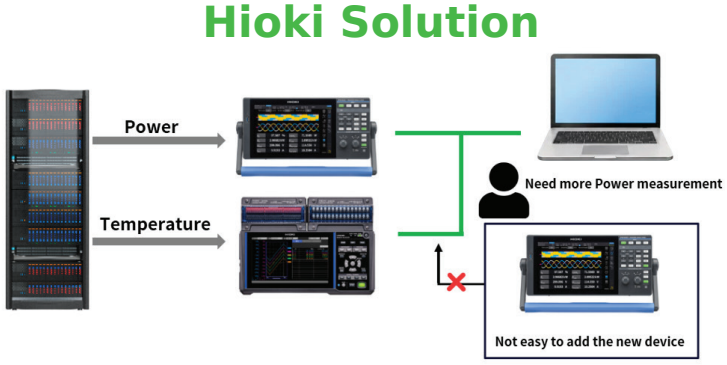
01 Separate files and timelines

Power and temperature may be recorded by different instruments on different timelines. Engineers must align and combine the data before comparing electrical and thermal behavior.



02 More channels, more setup

Adding measurement points can require more instruments, increasing setup, synchronization and data-management complexity.



02 / SYNCHRONIZED MEASUREMENT

One system. One timeline. A connected workspace.

The HIOKI LR8102 measurement system records power and temperature on the same timeline, enabling rack, PSU and CDU evaluation without manually aligning data from separate instruments.

01

Measure

Power and temperature

02

Synchronize

One common timeline

03

Review

GENNECT Space



Figure 1. Centralized instrument control and data review with an LR8102-based system and GENNECT Space.

Scale the measurement to the application

Add modules as channel requirements grow. Use power-analyzer-class accuracy to evaluate rack and CDU power consumption and calculate PSU AC/DC conversion efficiency.

03 / APPLICATIONS & CONFIGURATION

Connect power measurements with thermal response.

AI server rack

Measure rack input power, PSU AC input and DC output power, and key temperatures. Evaluate input power versus compute load, PSU efficiency and temperature response.

Standalone CDU

Measure CDU input power, VFD and pump circuit power, and coolant and component temperatures. Evaluate electrical operation alongside thermal response.

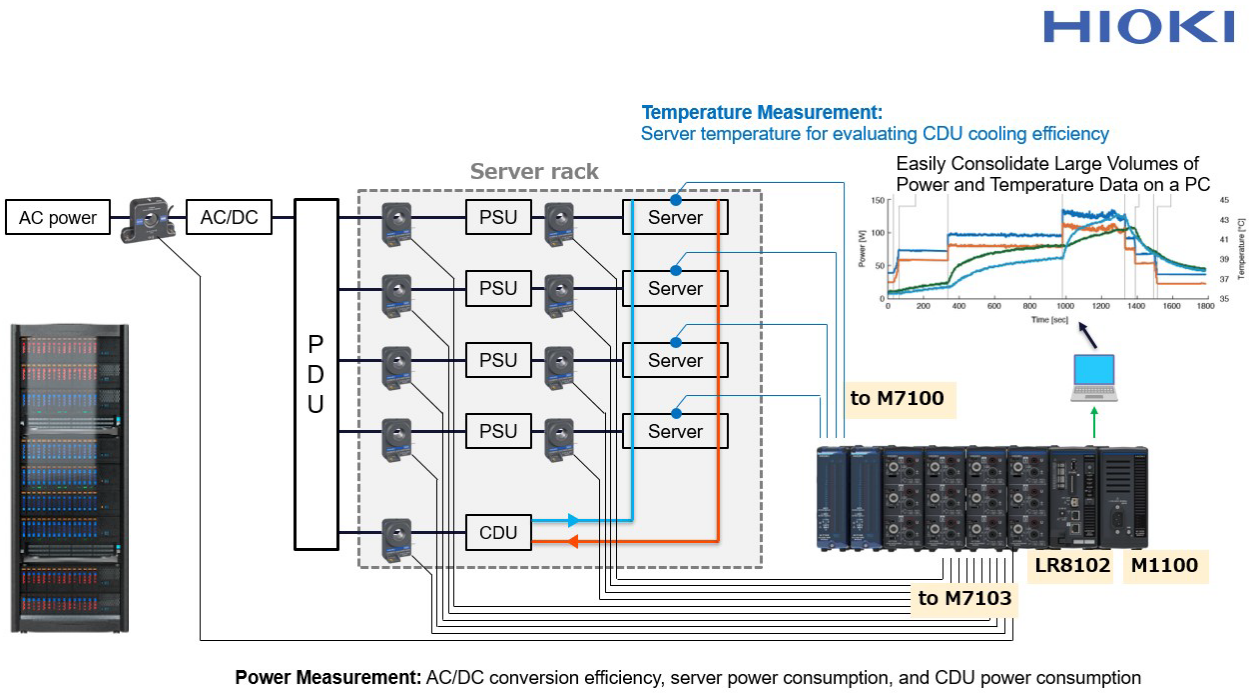


Figure 2. Example server-rack and CDU measurement configuration.

Configuration shown: LR8102, M7100 Voltage/Temperature Module, M7103 Power Measurement Module and M1100 AC Power Module.

Discuss your measurement application with Hioki

LR8102 product information

Power conversion efficiency

High-accuracy efficiency