



Big Data Fault Detection & Diagnosis System

Identify, Analyze, Optimize:
Elevate Your Building's Energy Performance.



Where Faults Meet Solutions: Ensuring Peak Performance

The Big Data Fault Detection & Diagnosis(FDD) System is your all-in-one solution for identifying and addressing every type of fault in building systems. Whether dealing with hard faults, subtle undetected issues, or sensor biases, our advanced technology ensures that no problem goes unnoticed. This innovative platform provides precise root-cause diagnostics, quantifying the severity and impact of each fault to deliver actionable insights. It also recommends optimal rectification solutions, ensuring that your systems operate at peak performance.

Features:

- **Detection of Hidden Sensor Faults:** By utilizing SQL Server, the Big Data FDD system analyzes data logs at extremely short intervals of up to 15 seconds, enabling the detection of previously unnoticed faults, such as temporary sensor fluctuations, that can subtly affect system efficiency.
- **Cause Diagnosis:** The system provides detailed diagnostic results regarding the causes of faults, supported by data analytics and trend log graphics that illustrate triggers and associated timeframes for systematic tracking.
- **Fault Categorization and Severity Analysis:** Faults are automatically categorized based on their potential impact and severity, allowing operators to effectively prioritize fault handling schedules.
- **Rectification Suggestions:** The FDD system offers fault tracking and rectification recommendations based on detected faults and their potential causes.
- **Individual Equipment Health Monitoring:** Leveraging big data analytics, the system actively and passively monitors equipment health, utilizing a fault trigger system and data analytics graphics to highlight performance differences compared to baseline metrics.

*All pictures and specifications are for reference only and are subject to change without prior notice.

Innovative Technology for Smarter Decisions

The Big Data FDD system offers a future-proof platform for building operators to efficiently and dynamically uncover hidden faults within their facilities. By leveraging advanced big data analytics techniques, the system effectively discovers, identifies, and diagnoses the causes and impacts of faults while providing informed rectification recommendations. Additionally, the platform enables building operators to assess equipment health and deterioration rates. Consequently, operators can strategically plan maintenance and replacement schedules in a cost-effective manner.

System Components

The Fault Detection and Diagnosis System consists of two integrated systems:

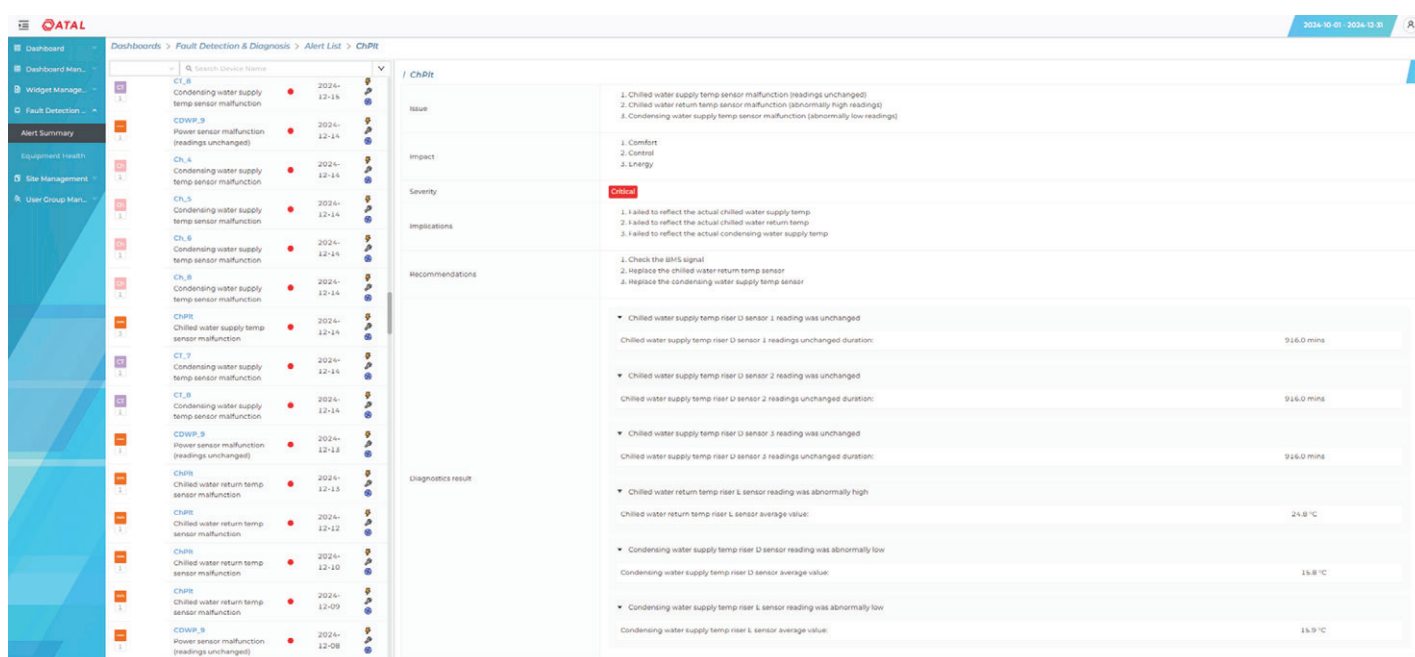
- 1. Big Data Fault Detection and Diagnostic Analyzer:** This component is responsible for dynamic computation for fault detection and diagnostics.
- 2. Big Data Fault Detection and Diagnosis Platform:** A user-friendly graphical user interface (GUI) designed for reviewing fault diagnostic results and monitoring asset health.

1. Big Data Fault Detection and Diagnostic Analyzer

The Big Data FDD Analyzer retrieves high-frequency data from the Building Management System (BMS) through SQL Server. It employs advanced big data analytics techniques to effectively identify, analyze, and diagnose faults within the HVAC system as well as assess the health of equipment. This component performs dynamic data processing to ensure that any anomalies are detected promptly, allowing for timely interventions.

2. Big Data Fault Detection and Diagnosis Platform

The results generated by the Big Data FDD Analyzer are presented on the Big Data FDD Platform, which features a user-friendly graphical interface (GUI). This platform allows users to review a comprehensive fault summary, understand the underlying causes, and access actionable recommendations for rectification. Additionally, the GUI provides insights into asset health, enabling operators to monitor the performance and reliability of their equipment effectively.



Dashboards > Fault Detection & Diagnosis > Alert List > ChRit			
Search Device Name	Alert	Time	Action
CT-4	Condensing water supply temp sensor malfunction	2024-12-14	[Details]
CDWRP-3	Power sensor malfunction (readings unchanged)	2024-12-14	[Details]
Ch-4	Condensing water supply temp sensor malfunction	2024-12-14	[Details]
Ch-5	Condensing water supply temp sensor malfunction	2024-12-14	[Details]
Ch-6	Condensing water supply temp sensor malfunction	2024-12-14	[Details]
Ch-8	Condensing water supply temp sensor malfunction	2024-12-14	[Details]
Ch-9	Condensing water supply temp sensor malfunction	2024-12-14	[Details]
ChRit	Chilled water supply temp sensor malfunction	2024-12-14	[Details]
CT-7	Condensing water supply temp sensor malfunction	2024-12-14	[Details]
CT-8	Condensing water supply temp sensor malfunction	2024-12-14	[Details]
CDWRP-3	Power sensor malfunction (readings unchanged)	2024-12-14	[Details]
ChRit	Chilled water return temp sensor malfunction	2024-12-15	[Details]
ChRit	Chilled water return temp sensor malfunction	2024-12-12	[Details]
ChRit	Chilled water return temp sensor malfunction	2024-12-10	[Details]
ChRit	Chilled water return temp sensor malfunction	2024-12-09	[Details]
CDWRP-3	Power sensor malfunction (readings unchanged)	2024-12-08	[Details]

ChRit	
Issue	1. Chilled water supply temp sensor malfunction (readings unchanged) 2. Chilled water return temp sensor malfunction (abnormally high readings) 3. Condensing water supply temp sensor malfunction (abnormally low readings)
Impact	1. Comfort 2. Control 3. Energy
Severity	Critical
Implications	1. Failed to reflect the actual chilled water supply temp 2. Failed to reflect the actual chilled water return temp 3. Failed to reflect the actual condensing water supply temp
Recommendations	1. Check the BMS signal 2. Replace the chilled water return temp sensor 3. Replace the condensing water supply temp sensor
Diagnosis result	• Chilled water supply temp riser D sensor 1 reading was unchanged Chilled water supply temp riser D sensor 1 readings unchanged duration: 916.0 mins • Chilled water supply temp riser D sensor 2 reading was unchanged Chilled water supply temp riser D sensor 2 readings unchanged duration: 916.0 mins • Chilled water supply temp riser D sensor 3 reading was unchanged Chilled water supply temp riser D sensor 3 readings unchanged duration: 916.0 mins • Chilled water return temp riser L sensor reading was abnormally high Chilled water return temp riser L sensor average value: 24.9 °C • Condensing water supply temp riser D sensor reading was abnormally low Condensing water supply temp riser D sensor average value: 15.8 °C • Condensing water supply temp riser L sensor reading was abnormally low Condensing water supply temp riser L sensor average value: 15.9 °C

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Connectivity and Stability

- **Higher Server Standards Required:** For on-premises installation, a higher-grade server is needed to support the Big Data FDD Analyzer if applied.
- **Active High-Frequency Data Querying:** Instead of solely relying on data logs from the BMS, the Big Data FDD system employs a SQL server to actively query high-frequency data (every 15 seconds) from the BMS.

Comprehensive View of Chiller Plant Operation Patterns: The high-frequency data enables the AI to learn more effectively by capturing conditions that may be missed in larger interval BMS data logging.

Centralized Computing Power: The computational demands of high-frequency querying are managed within the Big Data FDD system server, ensuring that the BMS remains unaffected and operates smoothly.

Service	On-premises	Online
Server Requirement	(See Below Table)	(See Below Table)
SQL Server	Local Server	Local Server
Big Data FDD Analytic (optional)	Local Server	Cloud Service

Technical Specifications

Features	On-premises	Online
Processor	Intel Xeon E-2378 2.6GHz, 16M Cache, 8C/16T, Turbo (65W), 3200 MT/s	Intel Xeon Silver 4314 2.4G, 16C/32T, 10.4GT/s, 24M Cache, Turbo, HT (135W) DDR4-2666
Memory	2 x 8GB UDIMM, 3200MT/s, ECC	2 x 32GB RDIMM, 3200MT/s, Dual Rank 16Gb BASE x8
Storage Controllers	RAID 5 PERC H755 SAS Front	RAID 5 PERC H755 Adapter FH
Drive Bays	3 x 2TB Hard Drive SATA 6Gbps 7.2K 512n 3.5in Hot-Plug	3 x 2TB Hard Drive SATA 6Gbps 7.2K 512n 3.5in Hot-Plug
Power Supplies	Dual, Hot-Plug, Redundant Power Supply (1+1), 600W, Mixed Mode	Dual, Hot Plug, Redundant Power Supply (1+1), 800W, Mixed Mode
Mounting Method	Rack-mounted / Tower	Rack-mounted / Tower
Embedded Management	iDRAC9, Basic 15G	iDRAC9, Enterprise 15G
Operating System	Microsoft Office/Linux	Microsoft Office/Linux

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