MITSUBISHI ELECTRIC
Changes for the Better

Automating the World

BUILDING MANAGEMENT SYSTEM

2025/6/10

MITSUBISHI ELECTRIC CORPORATION

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Changes for the Better

BMS Fundamentals

1. What is BMS?
2. Why building need BMS?
3. What benefits BMS brings?
4. BMS components
5. Open Protocols (BACnet, Modbus, KNX, LonWorks, Niagara, oBIX)

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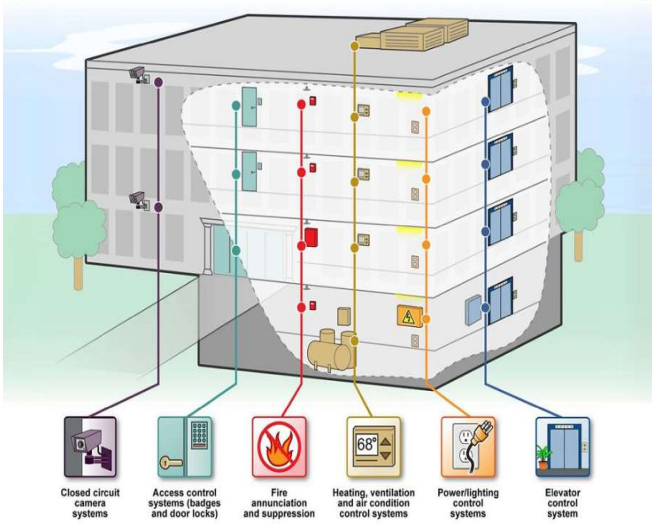
1.What is BMS?

BMS stand for Building Management Systems

- Control, monitor and manage various devices and systems to optimize building operations, such as heating, ventilating and air conditioning (HVAC) systems.
- In many case a BMS can include Lighting, Security, Fire Alarm, Elevator and more.



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Acronyms

Other names for BMS systems

BAS	Building Automation System
BCS	Building Control System
BMS	Building Management System
BMCS	Building Management & Control System
DDC	Direct Digital Control
EMS	Energy Management System
EMCS	Energy Management & Control System
FMS	Facility Management System
FMCS	Facility Management & Control System
BMES	Building Energy Management System

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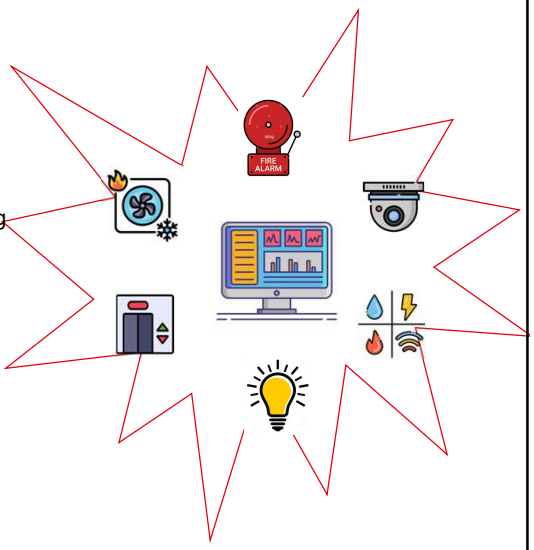
2.Why building need BMS?

BMS stand for Building Management Systems

- A Building Management System (BMS) is valuable because it centralizes control and monitoring of building systems, optimizing efficiency, reducing costs, and improving occupant comfort.
- By integrating various functions like HVAC, security, and energy management, a BMS streamlines operations, leading to energy savings, enhanced maintenance, and improved building performance.



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3.What benefits BMS brings?

Provides a building owner or property manager the ability to:

- View and record HVAC information (temperature, humidity, pressure, and HVAC plant status) in a building.
- Act on the information in a proactive manner to control building tenant comfort.
- Perform facility management (generate reports, graphs and annunciate alarms when there is a problem).
- Perform energy management scheduling and strategies to reduce operating and energy costs.
- Inter-connect building systems (fire alarm, security) in order to integrate building functions.

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4. BMS components

Monitoring

Monitoring values from all sorts of connected systems

Trending

Showing graphs of buidling parameters and their correlation within local systems

Alarming

Alarms and notifications sent to building maintenance and facility management teams

Controlling & Scheduling

Scheduling and energy efficient control of HVAC equipment is a key function

Optimizing

Knowledge about building performance helps in Energy optimization

Integrated Building Functions

Connectivity to other building systems such as lighting, meters, security, fire alarm and CCTV to optimize energy consumption

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5.Open Protocols

BACnet

BACnet | Building Automation & Control Network
Officially unveiled by ASHRAE in 1996
Approved as ISO standard 16454-5
Becoming a standard in the European Union

Modbus

Modbus | Serial communications protocol
Originally published by Modicon (now Schneider Electric) in 1979 for use with its programmable logic controllers (PLCs)

Niagara

The **Niagara Framework** | is a universal software infrastructure that allows building controls integrators, HVAC and mechanical contractors to build custom, web-enabled applications.

KNX

KNX | is an open standard for commercial and domestic building automation. KNX devices can manage lighting, blinds and shutters, HVAC, security systems, energy management, audio video, white goods, displays, remote control

LonWorks

LonWorks | Local Operating Network Networking platform specifically created to address the needs of control applications. The platform is built on a protocol created by Echelon

oBIX

oBIX | (for Open Building Information Exchange) is a standard for RESTful Web Services-based interfaces to building control systems. oBIX is about reading and writing data over a network of devices using XML and URIs, within a framework specifically designed for building automation.

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Benefits of Open Systems

ENERGY MANAGEMENT

Decrease in Energy Consumption

- Reduce kWh Energy Consumption
- Reduce Carbon Footprint

ASSET MANAGEMENT

Decrease Asset Service Costs

- Reduction in Asset Service Costs
- Improve Asset Availability
- Improve MTBR

OPERATIONAL EXCELLENCE

Reduction in fault detection time

- Focus on Prioritized Faults
- Reduce First Time Fix Rate
- Reduce Fault Diagnostics Lead Time

WORKSPACE UTILIZATION

Improve Space Utilization and Comfort

- Improve Space Cost per person
- Improve Space Comfort Index
- Improve Peak/Average Occupancy
- Utilization of Collaboration spaces

Normalization of Equipment & Properties
Data Aggregation & Integration

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Smart Building Solution

GENESIS64 & DIAMOND CONTROLS MITSUBISHI added to Smart Building portfolio

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Agenda

1. System Architecture
2. Hardware Features
3. Software Features
4. Typical Control Graphics
5. Project References

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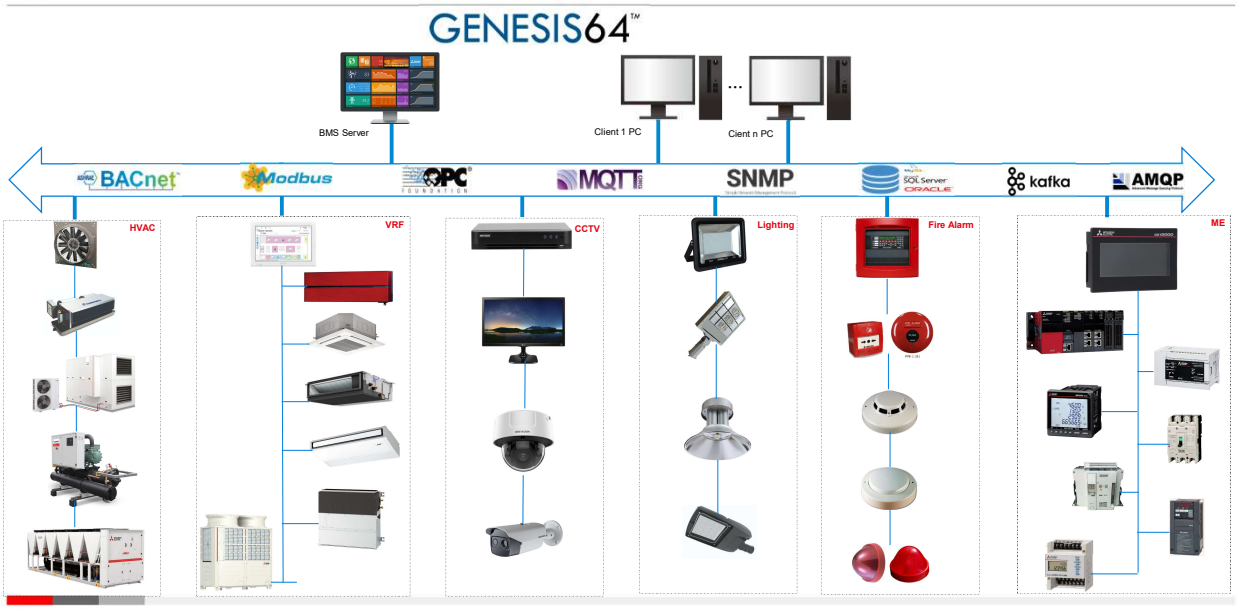
1.System Architecture



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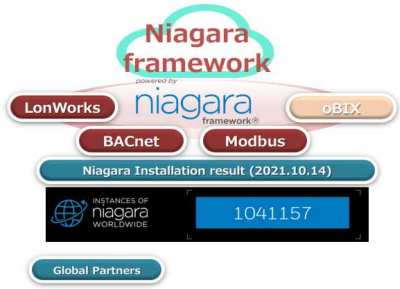
2.Hardware Features

What is Niagara?

Niagara Framework

Framework for integrating all standard network protocols (LonWorks, BACnet, Modbus, oBIX etc.) used in existing building management system developed by Tridium, USA.



1997 Tridium, Inc., founded
1999 Niagara Framework launched
2000 Strategic partners included with Honeywell, Schneider
2005 Honeywell acquired Tridium (100% capital subsidiary)
2006 Niagara Central launched
2008 achievement achievement of 100,000
2000 achievement achievement of 200,000
2012 achievement achievement of 300,000
2015 achievement achievement of 500,000
2023 Mitsubishi Electric Asia partners with Tridium APAC to launch Diamond Controls product range.

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Niagara Hardware?

DCM 9000 Controller

Agency Certifications

- UL 916
- C-UL
- CE EN 61326-1:2013
- RCM
- FCC part 15, class b
- RoHS
- REACH
- WEEE
- China ROHS
- Open Energy Management Class

HARDWARE SPECIFICATIONS
NXP iMX8M+ Quad Core CPU
2GB LPDDR4 RAM
Removable 8GB micro-SD card
Wi-Fi (Client or WAP) • Wi-Fi 5 (802.11ac) • 1x1 802.11 a/b/g/n/ac • Configurable radio (Off, WAP, or Client) • WPAPSK/WPA2PSK supported
USB type C connector • Debug port
(2) isolated RS-485 with selectable bias and termination
(2) 10/100/1000MB Ethernet ports
Secure boot
*Supply requirements: 24VAC rated at 24VA minimum, or 24VDC rated at 1A (24W) minimum
Runs Niagara 4: 4.13 and later
Real-time clock
Batteryless

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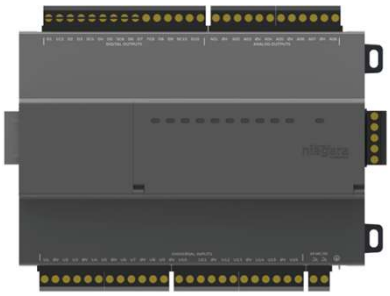
Expansion Modules – IO-R-16 & IO-R-34

IO-R-16

Input/ Output
8UI, 4DO, 4AO

IO-R-34



Input/ Output
16UI, 10DO, 8AO

- **Connect**: (1) DCM9000 module can expand up to (8) IO-R-34s or (16) IO-R-16s
- **Power**: (1) IO-R-34 can power (4) IO-R-16 modules

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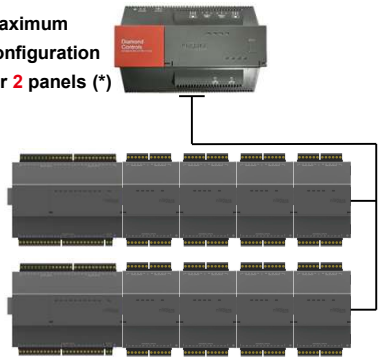
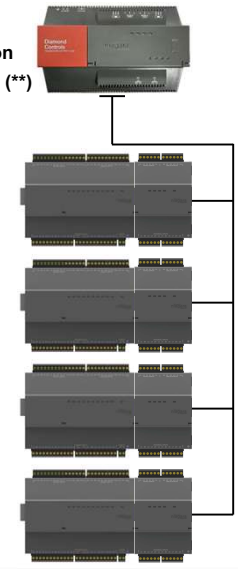
Common Configurations

Maximum configuration for 2 panels (*)

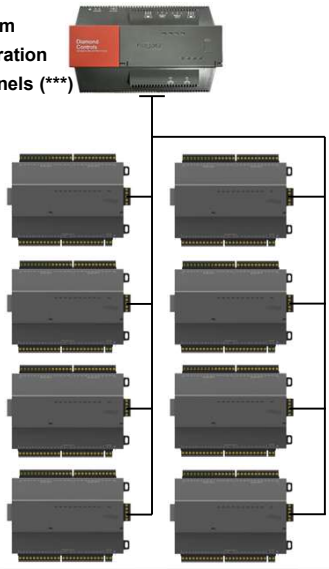


Shown with maximum of 4 IO-R-16s per IO-R-34

Maximum configuration for 4 panels (**)



Maximum configuration for 8 panels (***)



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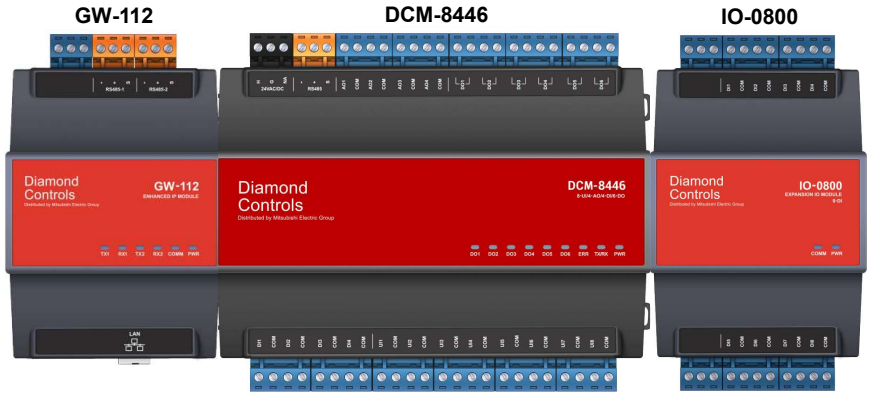
DCM HVAC Controller

DCM-8446 Controller - Direct Digital Controller



Input/ Output
8UI, 4DI, 4AO, 6DO

Input
8DI

Functions or IO point counts of DCM-8446 is extendable through ***right-sided slot*** with different modules. It can be applied with IO-0800, IO-6020, whereas its ***left-sided slot*** can be extended with GW-112.

Simple yet Open

- ❖ ARM Cortex 32-bits

Processor

- ❖ Fully Programmable
- ❖ Operate Independently
- ❖ HVAC Logic Calculation
- ❖ Login Password Protection
- ❖ Alarm Handler

Combination

- ❖ Timer Program
- ❖ Built-in Real-time Clock
- ❖ Mathematical and Logical Calculation

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Remote IO Module

Input
8DI

Output
8DO

Input
6UI, 2AO

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Remote IO Module-RS485

IO-0800-485

Input
8DI

IO-0008-485

Output
8DO

IO-6020-485

Input
6UI, 2AO

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DCM HVAC Controller

DCM-8044 Controller - Direct Digital Controller

Input/ Output
8UI, 4DO, 4AO

Features:

- Certifications: CE, FCC, BTL
- Build in Battery for RTC
- Can be used as- Modbus Master, Modbus Bridge, BACnet Router gateway
- Supports basic APM programming
- When used as Modbus Master, it can only support max 4 devices (Only DCM-8446, IO-0008-485, IO-0800-485 and IO-6020-485 are supported)

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DCM HVAC Controller

DCM-8044-D Controller - Direct Digital Controller

Input/ Output
8UI, 4DO, 4AO

Features:

- Certifications: CE, FCC, BTL
- LCD Display
- Build in Battery for RTC
- Can be used as- Modbus Master, Modbus Bridge, BACnet Router gateway
- Supports basic APM programming
- When used as Modbus Master, it can only support max 4 devices (Only DCM-8446, IO-0008-485, IO-0800-485 and IO-6020-485 are supported)

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Expansion Modules – IO-V6002 & IO-V0800

DCM-8044-D

Input/ Output
8UI, 4DO, 4AO

IO-V6002

Input/ Output
6UI, 2DO

IO-V0800

Input/ Output
8DI

- **Connect**: (1) IO-V6002 or (1) IO-V0800 module can be connected to the right of DDC-V8044/V8044-D
- **Power**: Power will be drawn directly from DDC-V8044

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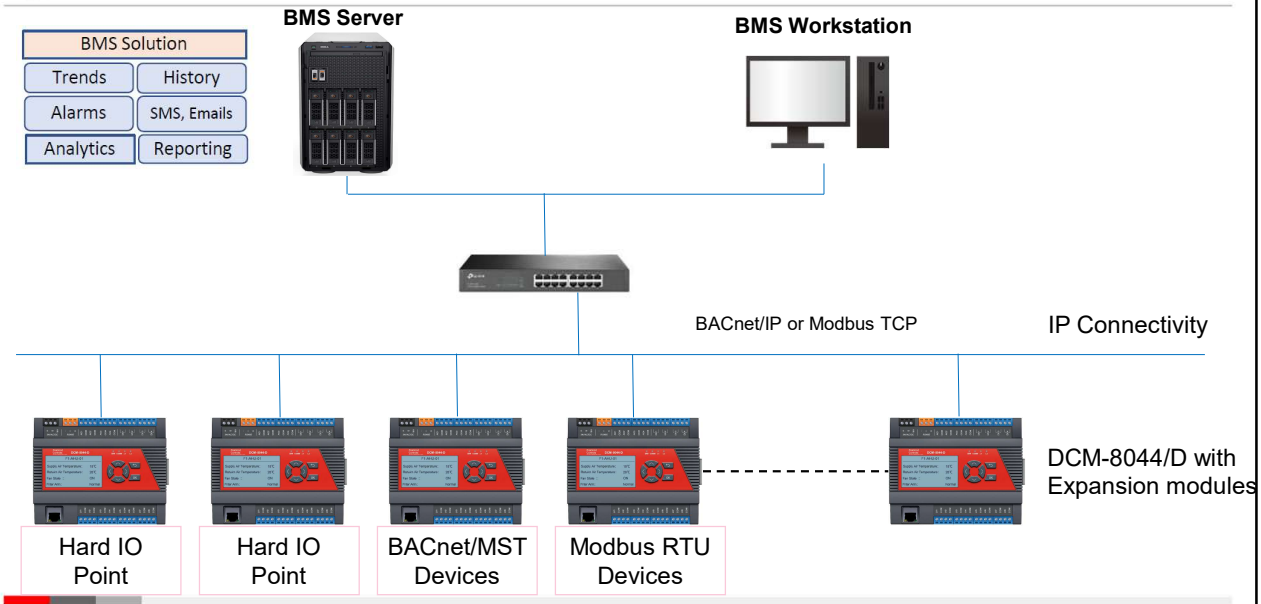
BMS ARCHITECTURE



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3. Software Features

In May 2019…

MITSUBISHI ELECTRIC CORPORATION
PUBLIC RELATIONS DIVISION

FOR IMMEDIATE RELEASE — No. 3282

Mitsubishi Electric to Acquire ICONICS, Inc. in United States

Will enhance software product lineup to strengthen e-F@ctory FA-IT integrated solution

TOKYO, May 13, 2019 – Mitsubishi Electric Corporation (TOKYO: 6503) announced today that it will acquire the remaining shares of ICONICS, Inc., a U.S. software company focused on SCADA,* IoT, mobile, analytics and cloud software products for the manufacturing, industrial and building-automation markets, to make the company a 100% subsidiary within the Mitsubishi Electric Group. Mitsubishi Electric aims to enhance its software product lineup to realize e-F@ctory,* including edge-computing, by combining ICONICS' software-developing capabilities and Mitsubishi Electric's factory-automation technology.

The acquisition is subject to regulatory approval and other customary closing conditions, and is expected to close within Mitsubishi Electric's fiscal year ending in March 2020.

* Supervisory Control and Data Acquisition (SCADA) is a software used together with programmable logic controllers or other automation products to monitor, or gather data from, productions sites.
* e-F@ctory is an integrated solution based on factory automation (FA) and information technologies to reduce the total cost of developing, producing and maintaining products.

About ICONICS

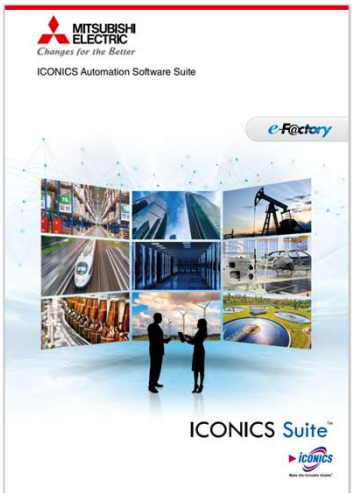
Company name	ICONICS, Inc.
CEO	Russell L. Agress
CFO	James L. Kent
Location	100 Foxborough Boulevard, Foxborough, MA 02035, USA
Foundation	June 1986
Business	Software development, sales and services of SCADA, IoT and cloud solutions
Website	http://iconics.com/

Background

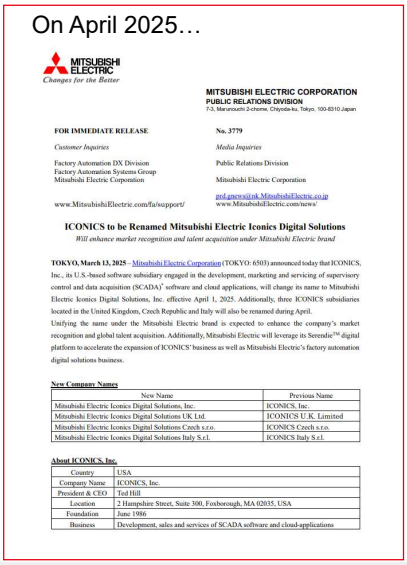
As the demand increases for data utilization with IoT technology in manufacturing industries, Mitsubishi Electric—based on its e-F@ctory concept—has been launching software products compatible with the Edgecross* platform. ICONICS has been developing and offering competitive software products for various business sectors, such as industrial automation, and it possesses established technology and remarkable knowledge for the development of industrial software for SCADA, IoT, mobile, analytics and cloud-based solutions.

1/2

In April 2021…



On April 2025…



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PUBLIC RELATIONS DIVISION
7-3, Marunouchi 2-chome, Chiyoda-ku, Tokyo, 100-8310 Japan

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Factory Automation DX Division
Factory Automation Systems Group
Mitsubishi Electric Corporation
www.MitsubishiElectric.com/fa/support/

Media Inquiries
Public Relations Division
Mitsubishi Electric Corporation
prd.gnews@ak.MitsubishiElectric.co.jp
www.MitsubishiElectric.com/news/

ICONICS to be Renamed Mitsubishi Electric Iconics Digital Solutions

Will enhance market recognition and talent acquisition under Mitsubishi Electric brand

TOKYO, March 13, 2025 – Mitsubishi Electric Corporation (TOKYO: 6503) announced today that ICONICS, Inc., its U.S.-based software subsidiary engaged in the development, marketing and servicing of supervisory control and data acquisition (SCADA)* software and cloud applications, will change its name to Mitsubishi Electric Iconics Digital Solutions, Inc. effective April 1, 2025. Additionally, three ICONICS subsidiaries located in the United Kingdom, Czech Republic and Italy will also be renamed during April.

Unifying the name under the Mitsubishi Electric brand is expected to enhance the company's market recognition and global talent acquisition. Additionally, Mitsubishi Electric will leverage its Serendie™ digital platform to accelerate the expansion of ICONICS' business as well as Mitsubishi Electric's factory automation digital solutions business.

New Company Names

New Name	Previous Name
Mitsubishi Electric Iconics Digital Solutions, Inc.	ICONICS, Inc.
Mitsubishi Electric Iconics Digital Solutions UK Ltd.	ICONICS U.K. Limited
Mitsubishi Electric Iconics Digital Solutions Czech s.r.o.	ICONICS Czech s.r.o.
Mitsubishi Electric Iconics Digital Solutions Italy S.r.l.	ICONICS Italy S.r.l.

About ICONICS, Inc.

Country	USA
Company Name	ICONICS, Inc.
President & CEO	Ted Hill
Location	2 Hampshire Street, Suite 300, Foxborough, MA 02035, USA
Foundation	June 1986
Business	Development, sales and services of SCADA software and cloud-applications

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About ICONICS

Headquartered in Foxboro, MA
Since 1986

100+ Countries
400+ Partners

375,000+
Installations Worldwide

Gold
Microsoft Partner
Microsoft

Six-time Microsoft
Partner of the Year

Smart Buildings
and Smart Cities

Discrete Manufacturing
and Factory Automation

Process
Automation

Public and Defense
Infrastructure

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Automation Software for Any Industry

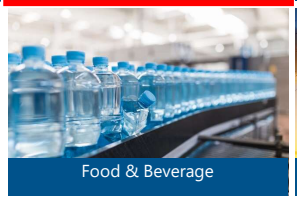
Automotive

Building Automation

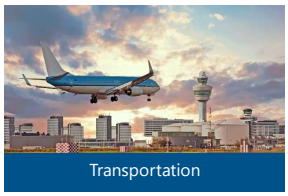
Oil & Gas

Government & Military

Manufacturing


Food & Beverage

Utilities & Energy


Transportation

Materials & Mining

Pharmaceutical

Sustainability

Water & Wastewater

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50,000+ Buildings Operate with ICONICS

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Microsoft IIoT Partner of the Year 2022

- **Over 30 years** of experience in **automation software** for multiple industries.
- Integrates **IoT technology** with **affordable devices** for secure, **cloud-ready solutions**.
- Supports **energy management**, **building automation**, and **industrial applications**.
- Runs **Microsoft IoT technology** at the edge, **Azure** in the cloud.
- Integrates with **Dynamics 365** and **Teams** for work order management.
- Allows **remote optimization** of operations via **Azure IoT Edge** and **IoT Hub**.

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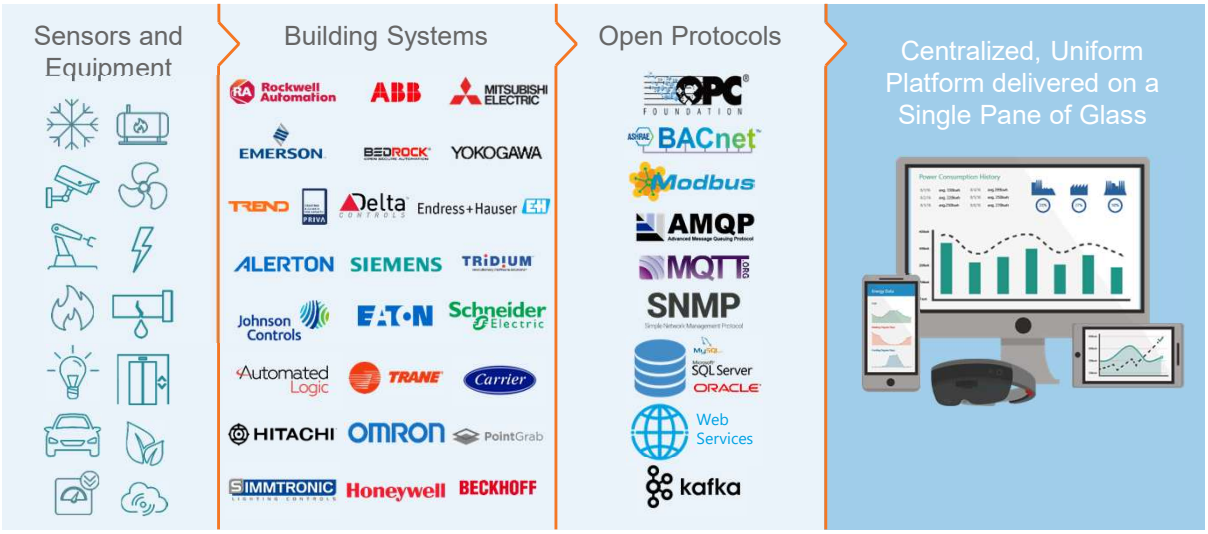
Intelligent Buildings Universal Connectivity



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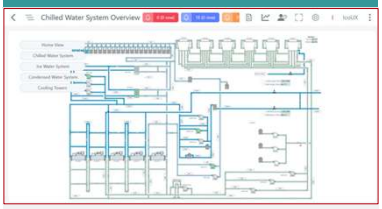
Smart Building Solutions

Universal Connectivity and Integration

- ❑ Vendor agnostic
- ❑ Universal Connectivity
- ❑ Leading Edge HTML5 Dashboards
- ❑ Advanced Analytical Tools

Operations and Maintenance



- ❖ Real-time Monitoring, Control, and Reporting
- ❖ High Performance Long-term Data Historian
- ❖ Alarm Management, Mobile Notifications, and Alerts

Centralized, Uniform OneView Platform

- ➢ Dynamic and Flexible Dashboards for Facilities Management Industry
- ➢ Reporting Requirements Supported by Historical Data
- ➢ Interface with MS SQL, SAP, Oracle, and Asset Systems

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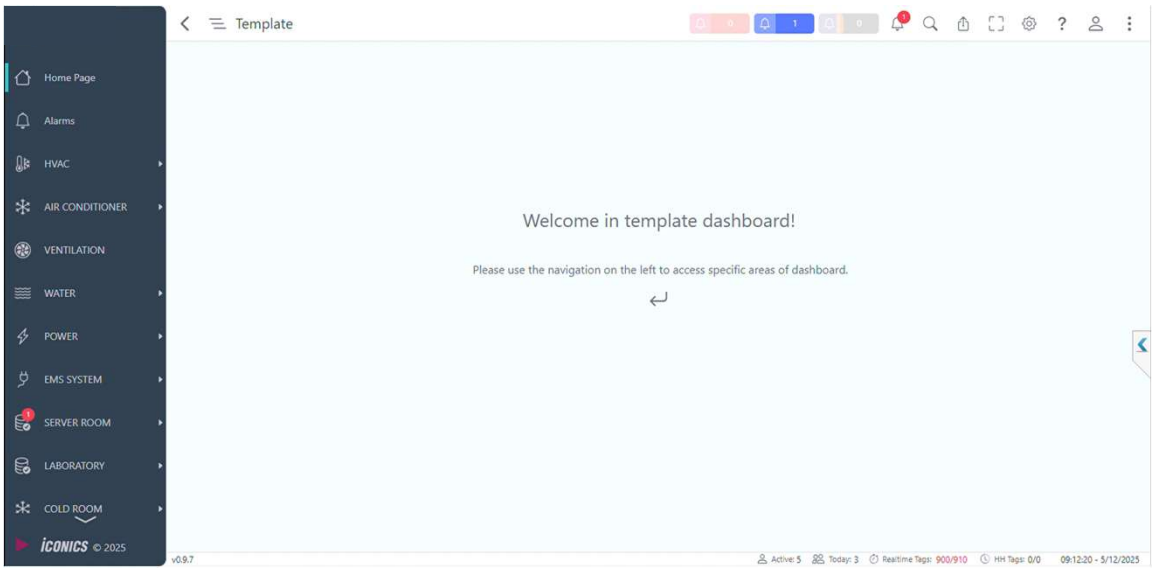
4. Typical Control Graphics – Home Page



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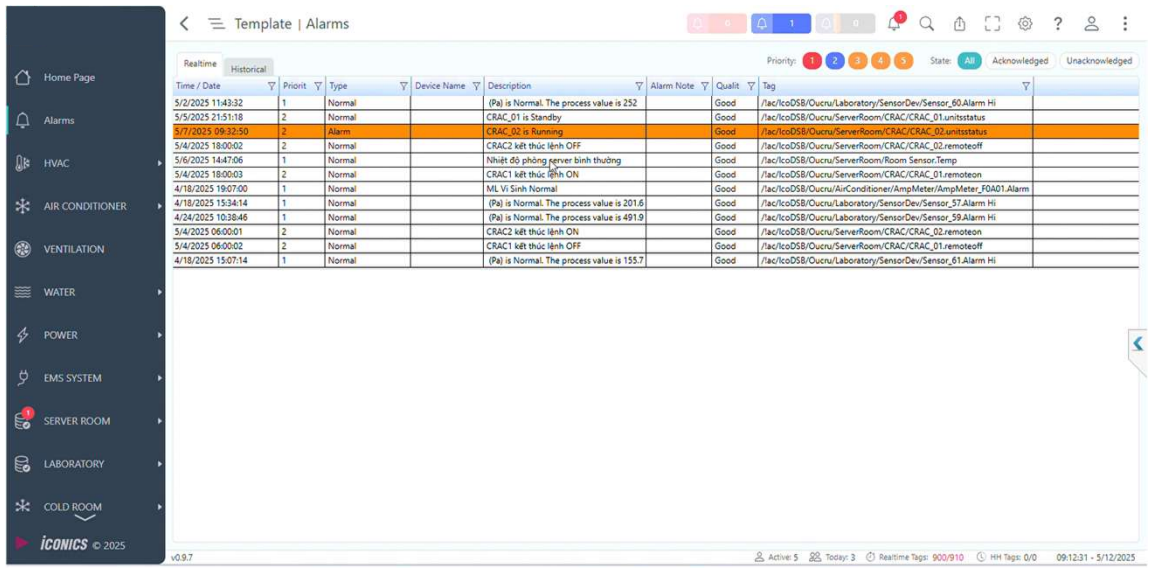
4. Typical Control Graphics – Alarm



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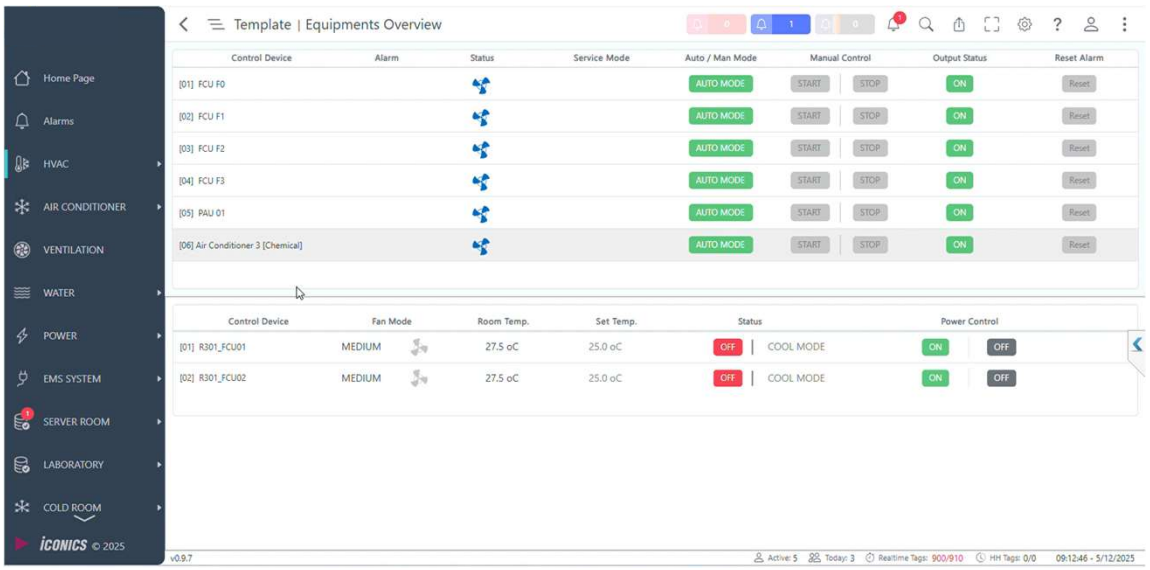
4. Typical Control Graphics – FCU



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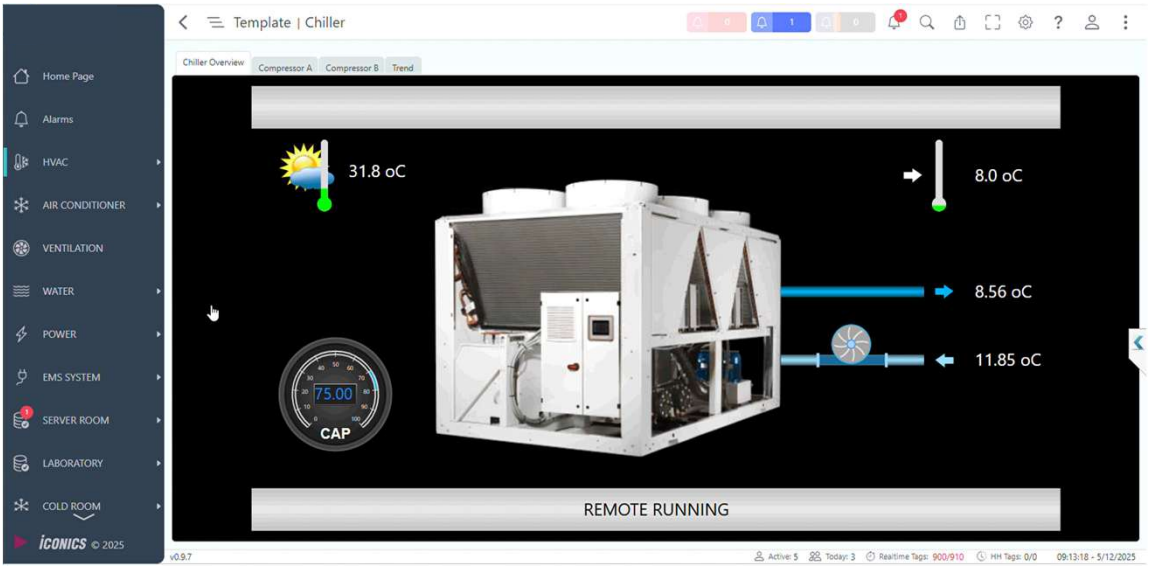
4. Typical Control Graphics – Chiller



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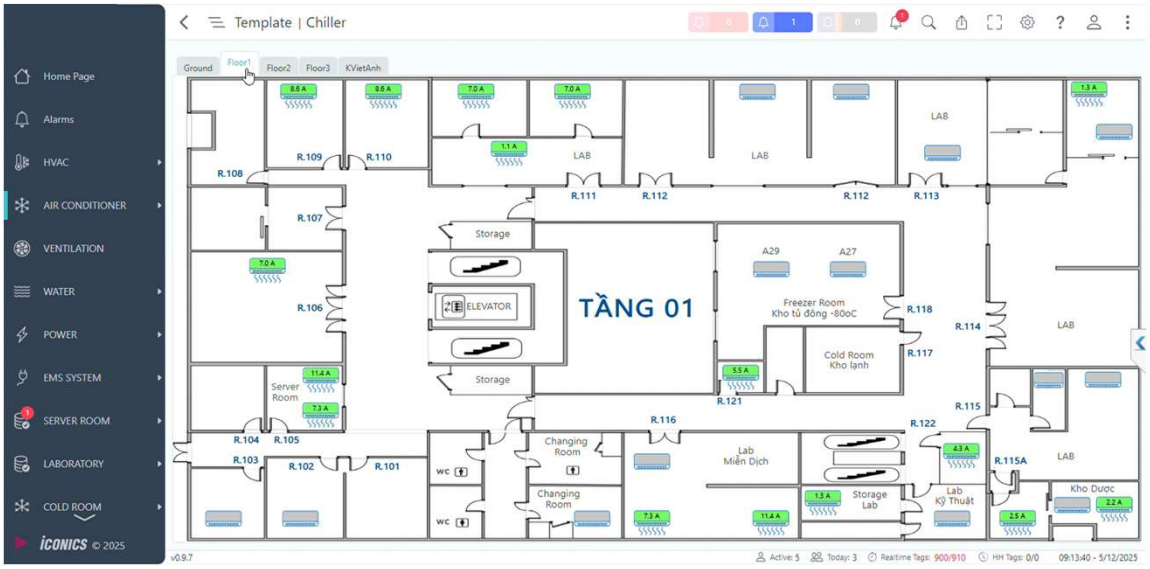
4. Typical Control Graphics – VRF



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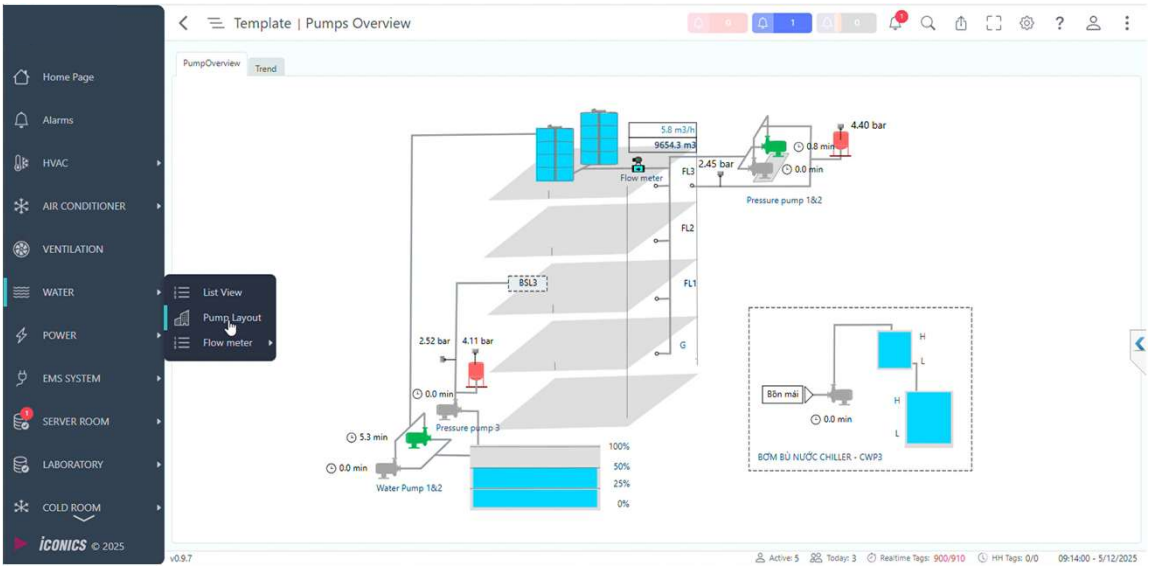
4. Typical Control Graphics – PUMP



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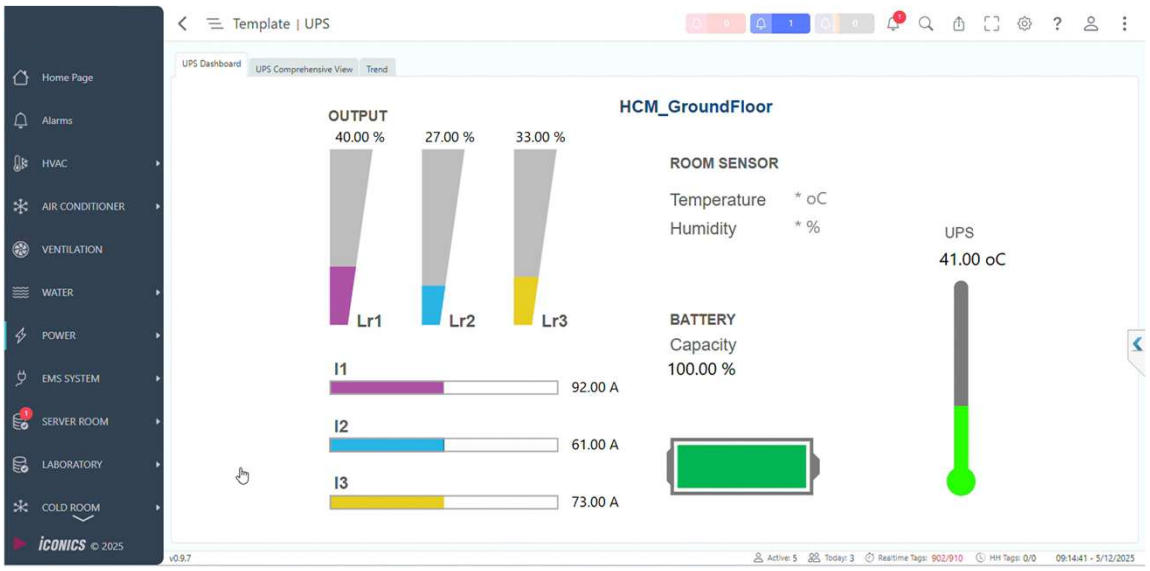
4. Typical Control Graphics – UPS



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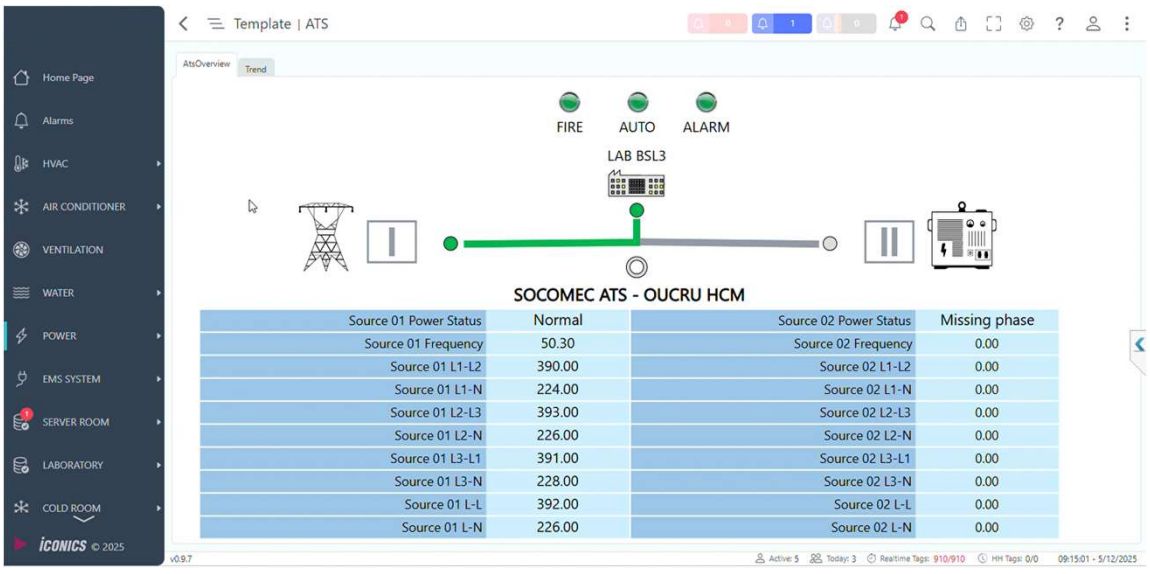
4. Typical Control Graphics – ATS



Source 01 Power Status	Normal	Source 02 Power Status	Missing phase
Source 01 Frequency	50.30	Source 02 Frequency	0.00
Source 01 L1-L2	390.00	Source 02 L1-L2	0.00
Source 01 L1-N	224.00	Source 02 L1-N	0.00
Source 01 L2-L3	393.00	Source 02 L2-L3	0.00
Source 01 L2-N	226.00	Source 02 L2-N	0.00
Source 01 L3-L1	391.00	Source 02 L3-L1	0.00
Source 01 L3-N	228.00	Source 02 L3-N	0.00
Source 01 L-L	392.00	Source 02 L-L	0.00
Source 01 L-N	226.00	Source 02 L-N	0.00

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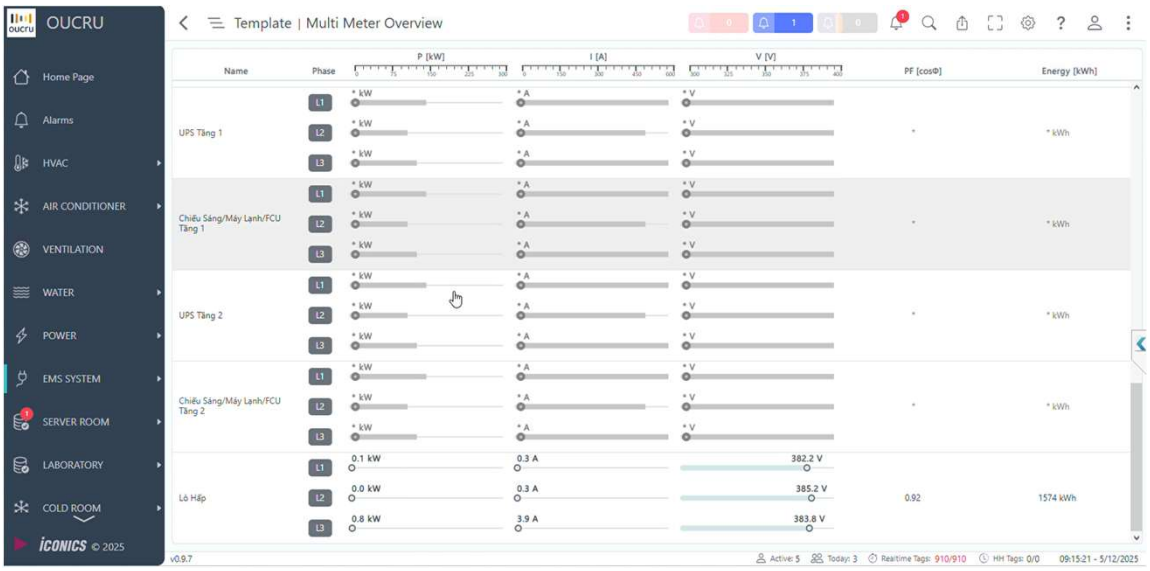
4. Typical Control Graphics – EMS



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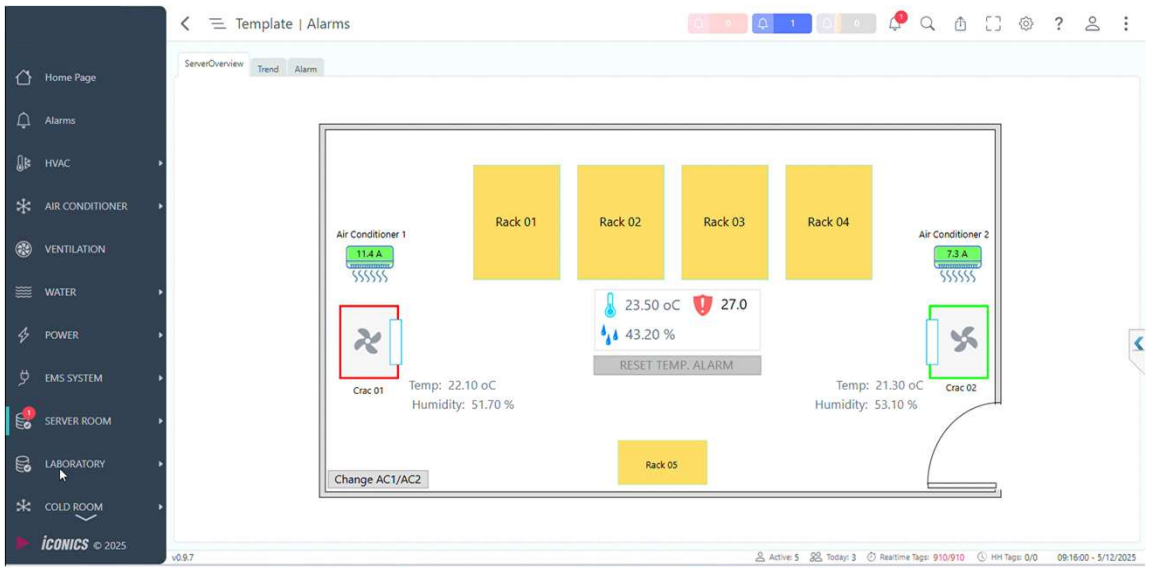
4. Typical Control Graphics – Server Room



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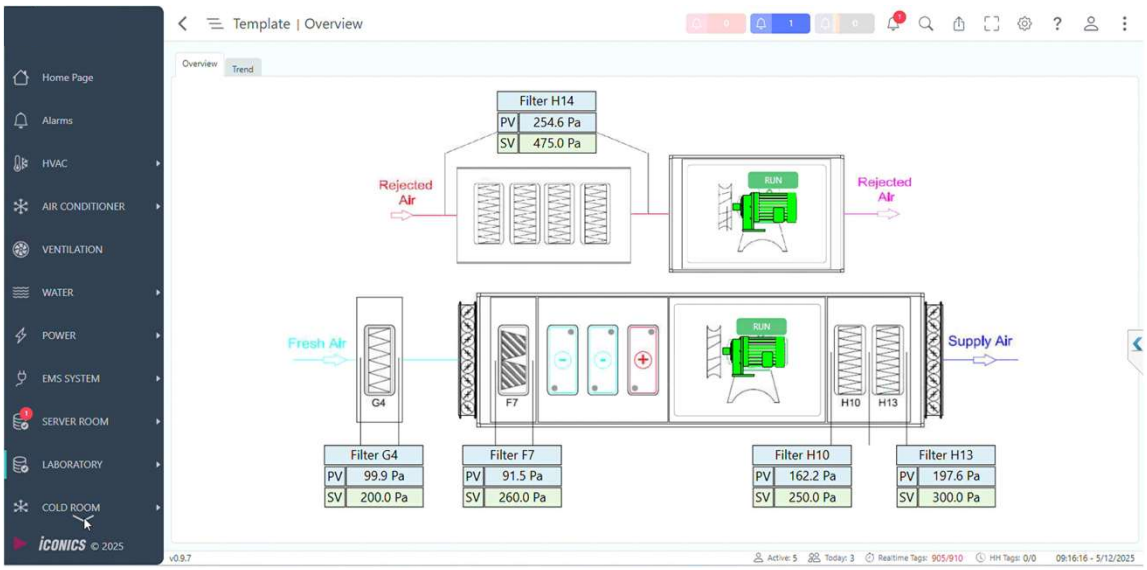
4. Typical Control Graphics – Laboratory



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4. Typical Control Graphics – Cold Room

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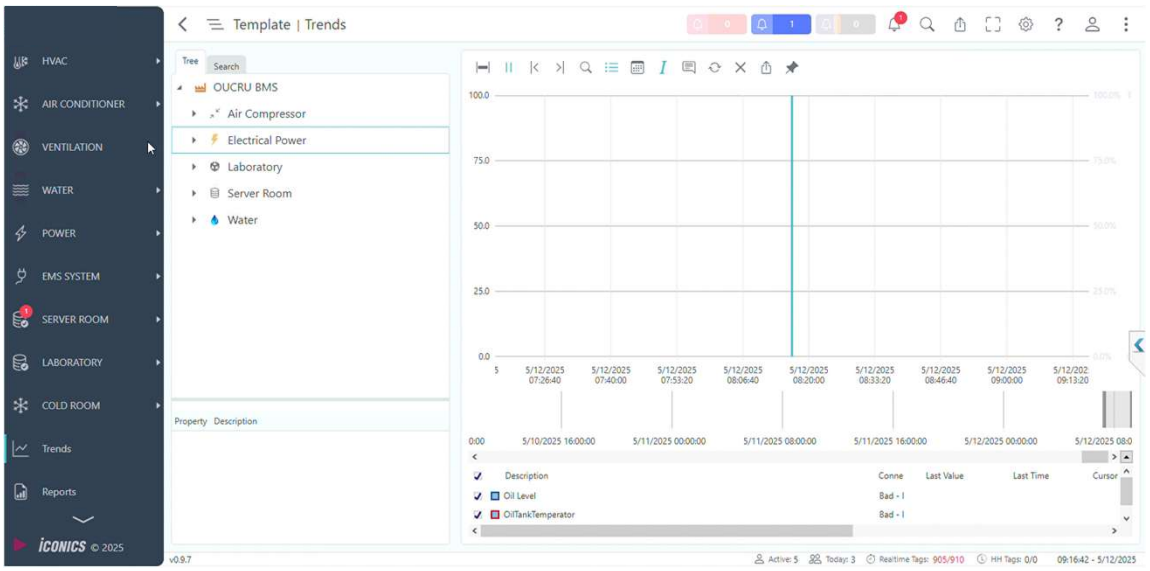
4. Typical Control Graphics – Trend



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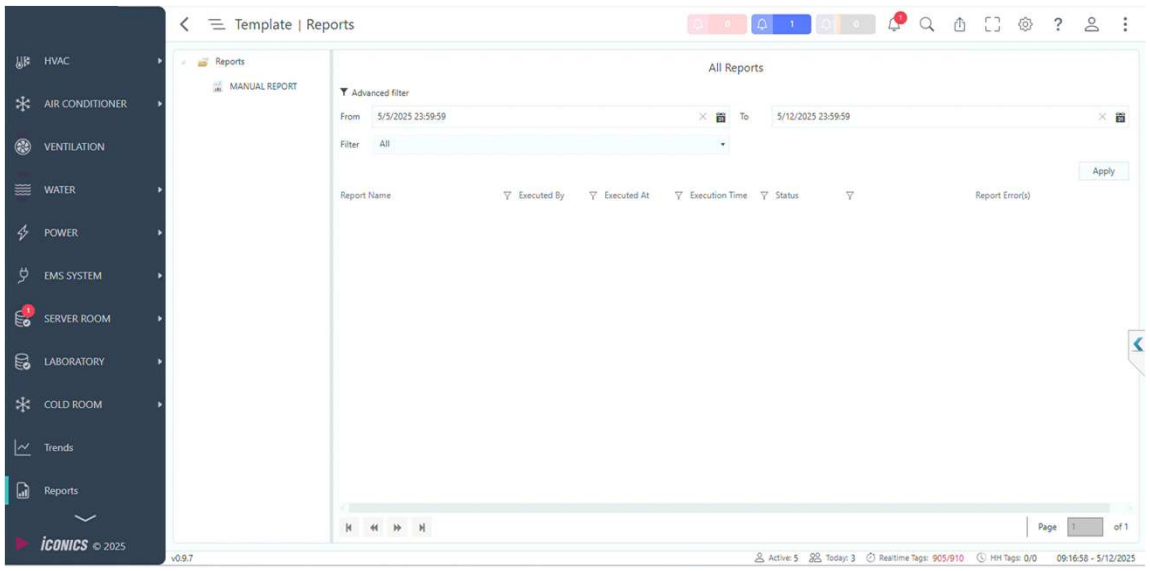
4. Typical Control Graphics – Report



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5. Project References

- **Owner**: Investment and Development Management Joint Stock Company (IDMC)
- **Location**:15 Pham Hung, My Dinh 2 Ward, Nam Tu Liem, Hanoi
- **Project size**: 3 basements + 20 floors above ground
- **Service**: BMS
- **Year of completion**: 2019

- **Owner**: The Oxford University Clinical Research Unit
- **Location**:764 Vo Van Kiet Street, Ward 1, District 5, Ho Chi Minh City
- **Project size**: Research area
- **Service**: BMS
- **Year of completion**: 2024

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Thank You!

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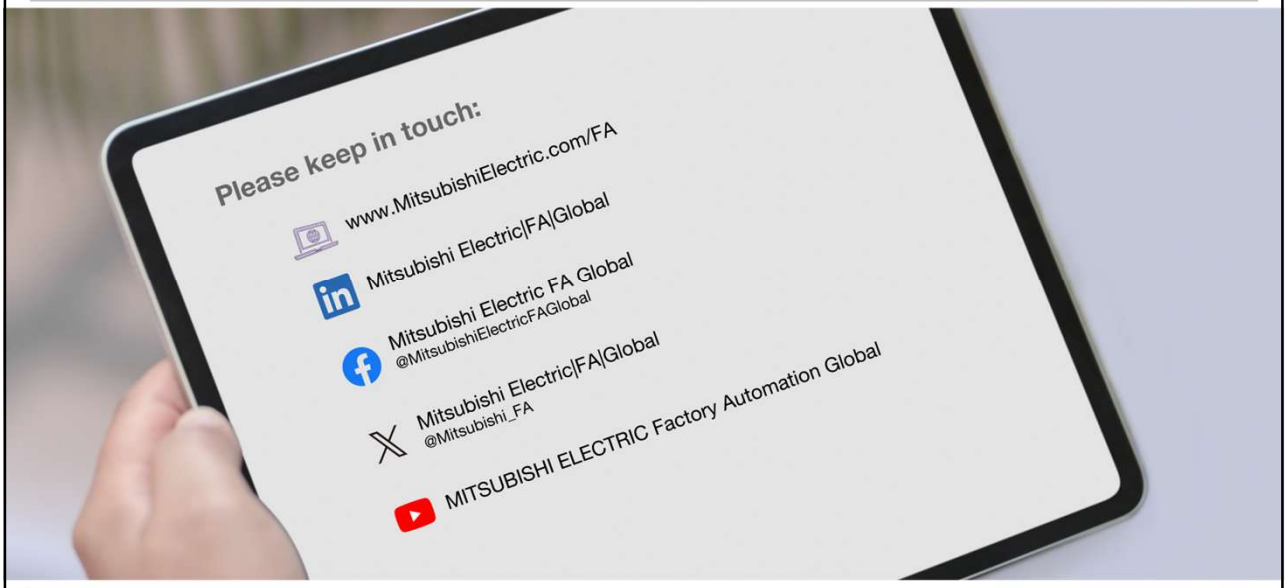

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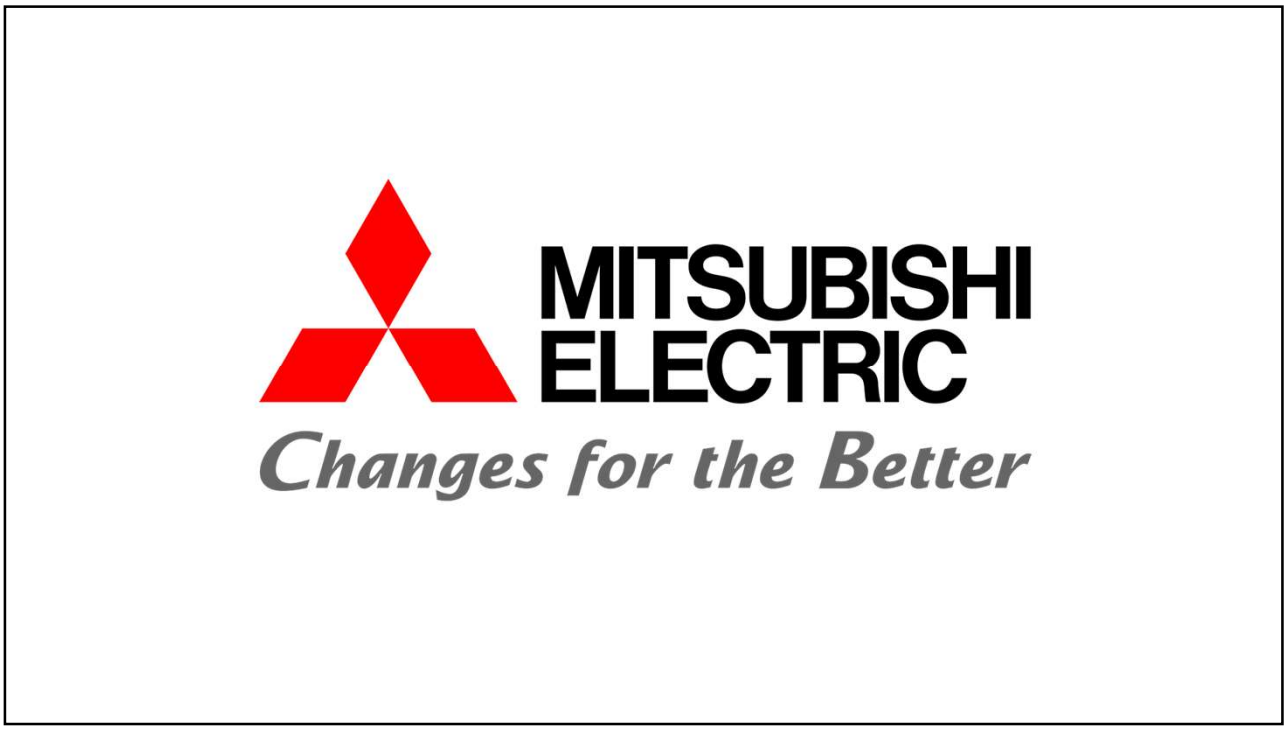
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