DAIKIN

System and Control Solutions

Daikin Applied Europe

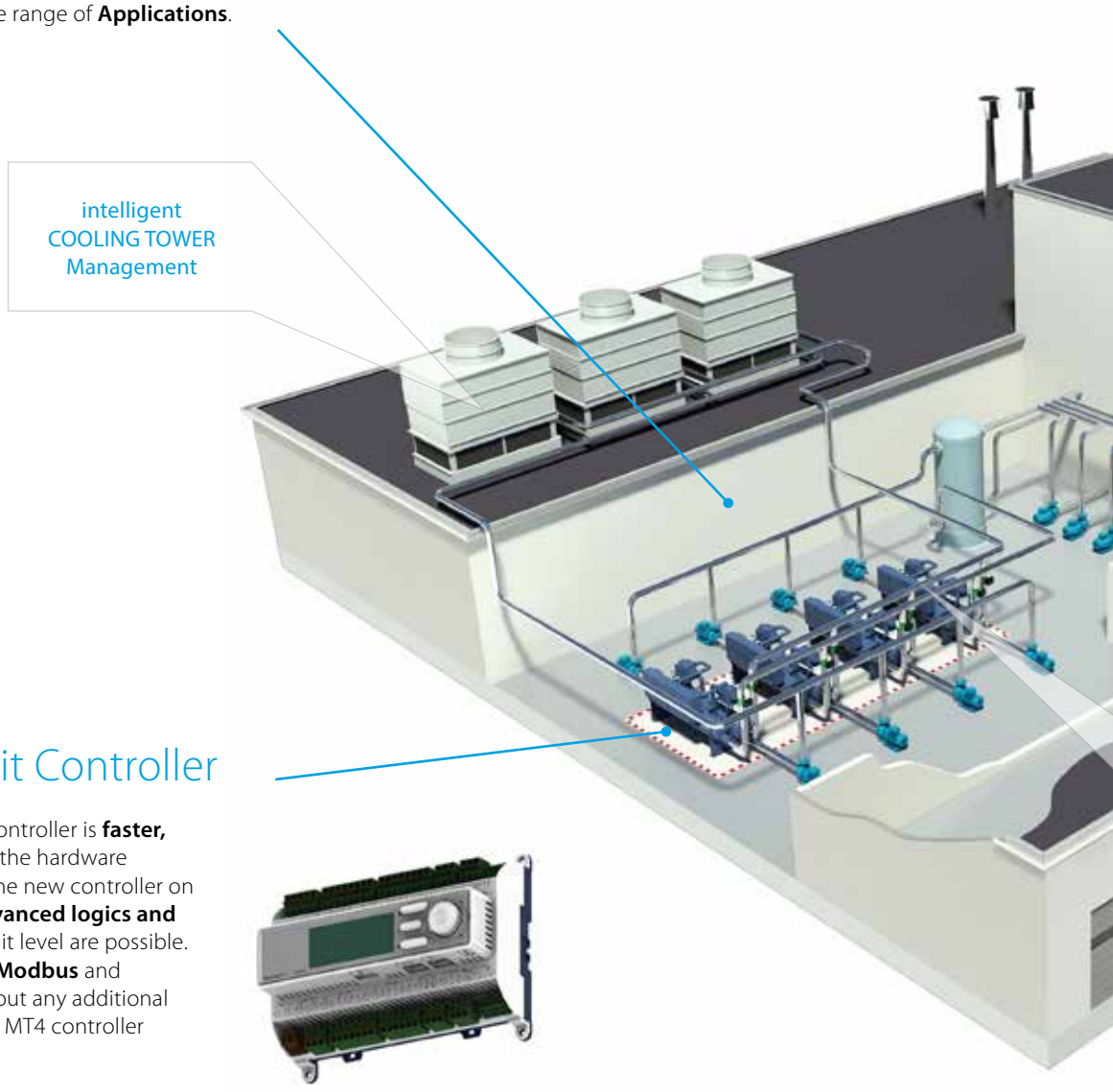
Control Solutions

intelligent Chiller Manager

The intelligent Chiller Manager is a factory-engineered control solution to manage a chiller plant room. It is responsible for the **optimal sequencing and staging** of Chillers, Heat Pumps and Multipurpose units even in a **mixed plant configuration** and in both Heating and Cooling modes.
The extended control solution integrated the management of Cooling Towers and manifolded Pumps for air and water cooled chiller plant.
By reaching higher plant performance and efficiency levels, the intelligent Chiller Manager is the best and qualified solution for your HVAC equipment in a wide range of **Applications**.

Key Benefits

› High performance
› Lower energy & Maintenance Costs
› Increase reliability & lifetime
› Remote control and monitoring through Daikin on Site
› **No additional installation required**



Microtech® 4 Unit Controller

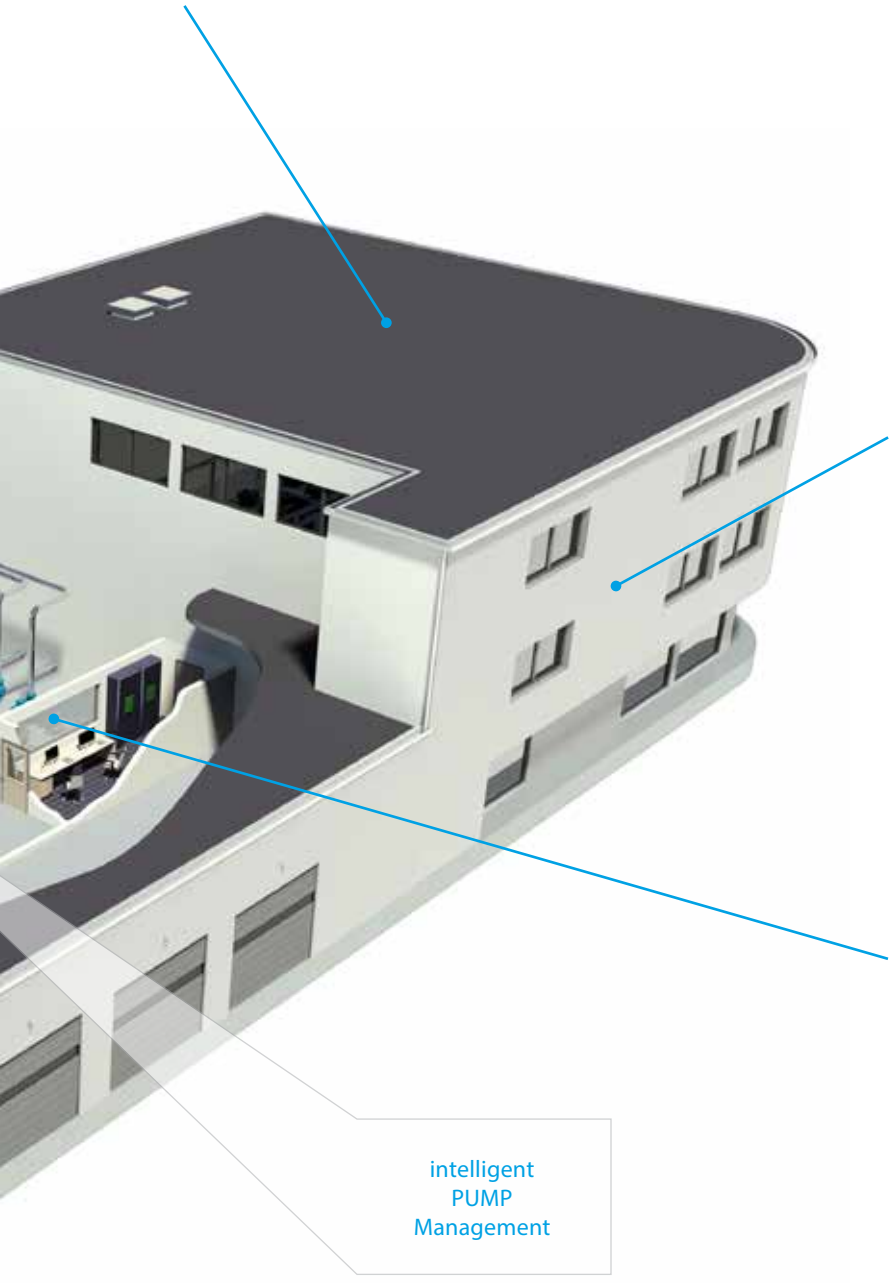
The new **Microtech® 4** (MT4) controller is **faster, smarter and connected**. With the hardware improvements introduced by the new controller on all air/water cooled chillers, **advanced logics and algorithms** development at unit level are possible. Communication protocols like **Modbus** and **BACNet** are also available without any additional hardware required because the MT4 controller supports them natively.

Daikin on Site

Daikin on Site is the unique solution for remote monitoring and smart maintenance. It allows a complete remote operation of every unit with different users and levels of access.

Daikin on site is fully compatible with All Daikin Applied Europe products and it can integrate **third-party products** like **IoT devices** (i.e. IAQ sensors).

- REMOTE MONITORING
- REPORTING
- ALARM TROUBLESHOOTING
- ENERGY ANALYSIS



Building management system Integration

With MT4 unit the communication protocols such as **Modbus** and **BACNet** are available directly from the controller and activated from Factory when ordered or through the after-sales channel.

Performance Monitoring

With MT4, advanced algorithms implementation in the unit controller are possible, such as the **Performance Monitoring** (Option 186).
This **sensor-less algorithm** calculates the unit cooling capacity by using refrigerant pressure and temperature readings. Electrical power is calculated either from compressor VFD power and fan, or directly measured through optional energy meter. As a standard, **no extra-hardware is required.**

Microtech® 4 Unit Controller

faster, integrated and connected!

- ☑ +125% memory
- ☑ +35% faster
- ☑ +30% booting

Microtech® 4 (MT4) is capable of controlling single or dual-circuit air/water-cooled liquid chillers. Microtech® 4 stages compressors necessary to maintain the desired heat exchanger leaving water temperature. In each unit mode it controls the operation of the condensers to maintain the proper condensation process in each circuit. Safety devices are constantly monitored by Microtech® 4 to ensure their safe operation. Microtech® 4 also gives access to a Test routine covering all inputs and outputs.

Whatever is your **Application**, special control options can be directly activated from Microtech 4 controller to manage **free cooling (hydronic or refrigerant migration), heat recovery and variable primary flow**.

The standard communication protocols are directly available within MT4 controller without any additional hardware to be installed. This will lower commissioning costs and speed up BMS integration.

As a standard, MT4 is ready to be connected through DoS with a LAN or a M2M data connection (Option 155).

Communication protocols for BMS integration are directly available from MT4 Controllers:

- Modbus RTU (Option 180)
- BACNet MSTP (Option 181)
- BACNet IP (Option 182)

Special Control options to improve system and unit efficiency while expanding control features, such as:

- Demand Limit, Current Limit, Double Setpoint, Setpoint Reset
- Heat Recovery (total and partial with control)
- Optimized Free Cooling
- Free Cooling with migration
- Rapid Restart
- Performance Monitoring
- Energy Monitoring
- Master/Slave
- Intelligent Chiller Manager

Advanced Algorithms:

Performance Monitoring (Option 186)

Performance Monitoring is **patented** sensor-less algorithm, that means **no extra hardware** is required, which is implemented in the new MT4 unit controller.

It calculates **the Global EER** of the unit through a precise estimation of the cooling capacity and the electrical power.

Unit power consumption is calculated either from **compressor inverter power and fan**. It can be also measured directly with an optional energy meter (Option 16a).

The unit **Cooling capacity** is instead the result of an **advanced calculation** on the refrigerant cycle that uses the liquid pressure and temperature data.

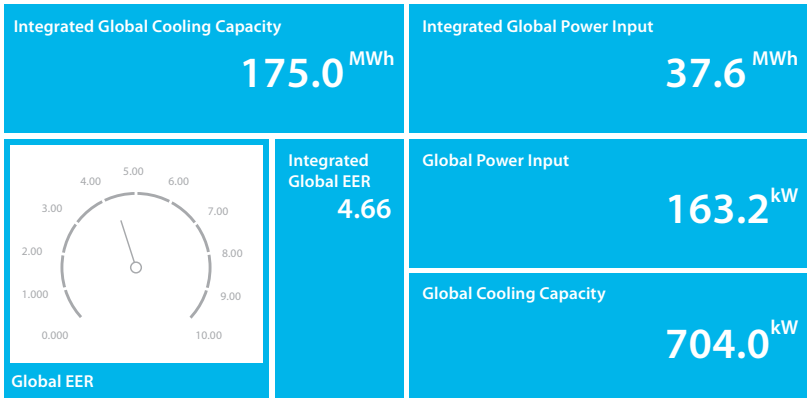
If Performance Monitoring and DoS subscription are active, the energy and performance analysis, trend and cumulated data are completely available in a **dedicated dashboard** on DoS.

Having always under control the performance of the unit, it enable parameter optimization through DoS in order to increase the overall efficiency of a HVAC Plant.

The data can also be exported in a monthly report automatically generated by DoS solution.
Energy analysis and audits can be also performed in order to select the best and most efficient control configuration to fulfil the requests, in terms of Cooling or Heating, from the Plant and form the Building.

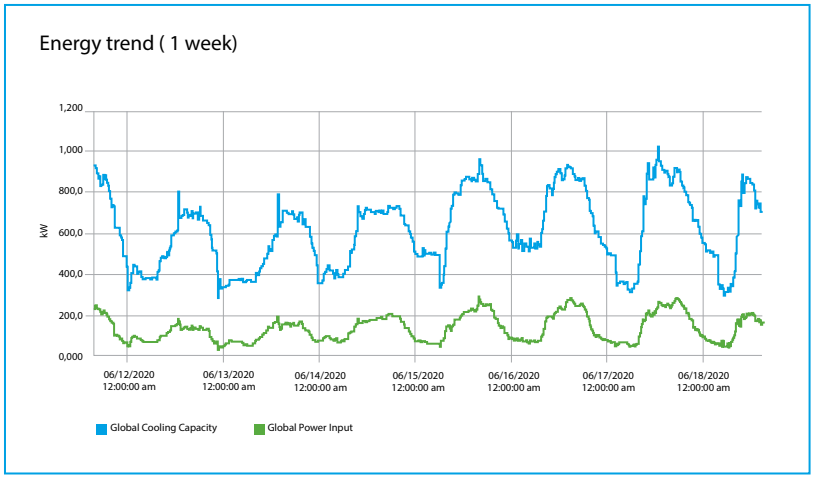
Visualization

Energy and Performance data can be displayed on a dedicated Daikin on Site dashboard in order to have always the plant under control and supervision.



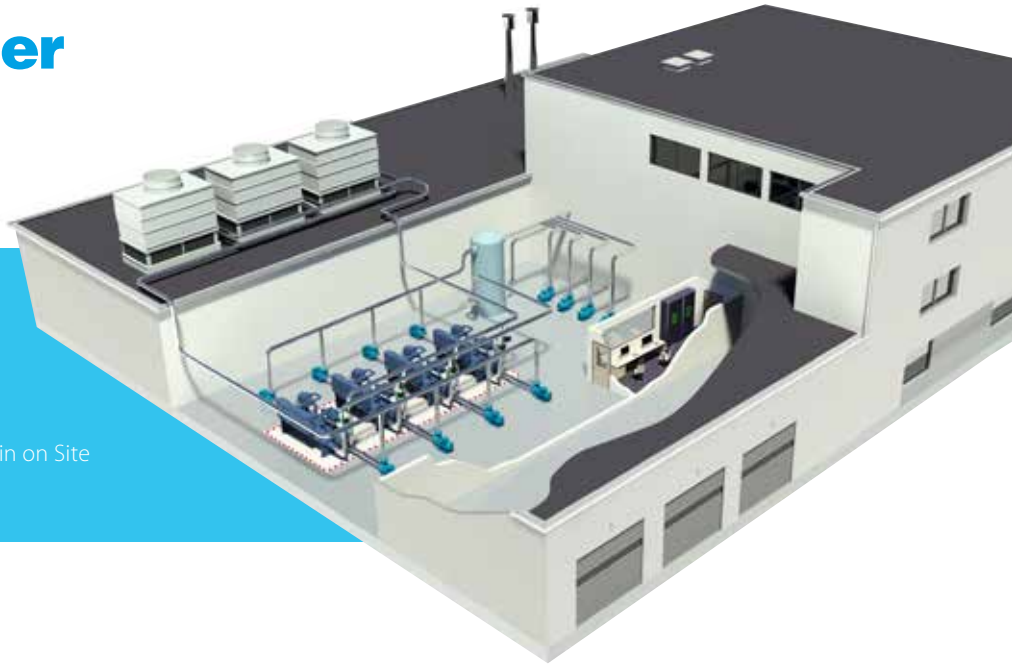
Trend and history

All the data are securely store in Daikin on Site and can be explored and visualized in a graph that can include many other datapoints for finding correlations and improving the overall system performance.



Integrated logics for Plant Management

Chiller intelligent Manager



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Control strategies

Advanced control strategies can be chosen to optimise units life time and the energy efficiency of a chillers plant:

› by sequencing it is decided which unit must start or stop
› by staging the unit shares the load based on a threshold specified by the user

Control options

iCM can manage:

› Special control options such as: VPF, Demand Limit, Rapid Restart are manged by iCM in a multiple unit system
› Heat recovery option management
› Free cooling option management
› Manifolded pumps management (evaporator/condenser) – iPM control panel is required
› Cooling tower system management – iCT control panel is required

What are the main differences between Master/Slave and iCM?

For Daikin unit equipped with MT4, iCM are set of functions embedded directly in the unit controller. In addition for those applications not covered by the embedded functions, iCM customized are also available.

While Master/Slave can manage systems composed by units model of the same type, iCM can manage cooling, heating and plants made of different kind of units

Feature	Master/Slave	New iCM
Number of chillers	UP TO 4	UP TO 8
Plants with All Chillers	same models	YES
Plants with all Heat Pumps	same models	YES
Plants with Multipurpose	YES	YES
Mix of Chillers (max 2 circuits) + Multipurpose	NO	**YES**
Mix of Chillers + Heat Pumps	NO	**YES**
Chillers with Heat Recovery	NO	**YES**
Chillers with free cooling	NO	**YES**
Units with modulable capacity control	YES	YES
Units with step capacity control	YES	YES

Remote Monitoring and Service

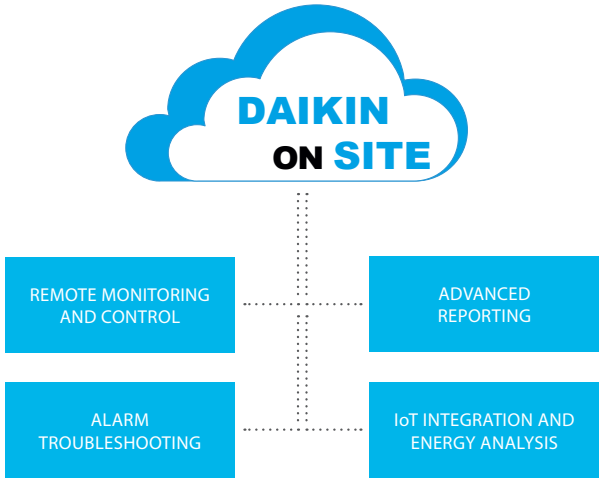
Daikin on Site

Daikin on Site is the Applied Solution for Monitoring and Control Daikin Chillers and AHU. It is seamlessly integrated in all new Daikin products and available for the old one.

Daikin on Site requires no extra hardware such as special gateway, because on every Microtech III and 4 controller an integrated web server continuously pushes the data into the cloud. The number of datapoints available with DoS are huge and accessible with different access level.

Leak Detection algorithm is implemented on DoS by using historical data to understand possible unit damages causing gas leakage.

All Daikin Applied products are supported by Daikin on Site, included iCM.



Advanced Reporting

Standard and Customized reports can be created through Daikin on Site data. Daikin Service expertise is able to identify and anticipate unit failures avoiding stops as wells as extraordinary maintenance activities.

Energy analysis is fully integrated and all consumption and performance data can be easily accessed through DoS dashboard.

IoT sensors, i.e. IAQ, and third-party units can be also integrated and managed by DoS.

Recommendations

Recommendations for Service engineers and Daikin Remote Monitoring Engineers are made available through a Diagnostic Tool developed along with DoS.

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