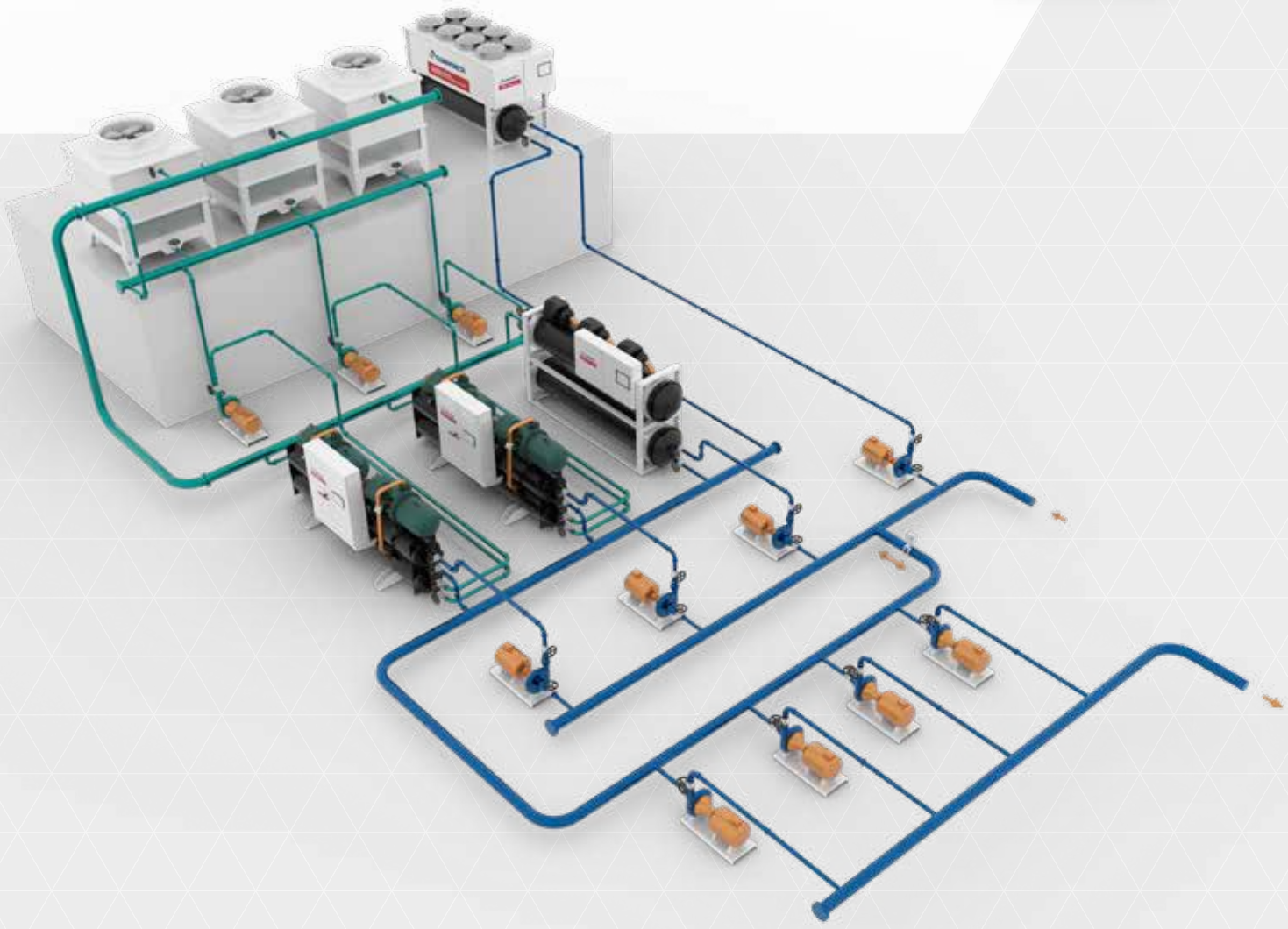
MITSUBISHI ELECTRIC
HYDRONICS & IT COOLING SYSTEMS S.p.A.

COMFORT
PROCESS

CONTROL, SUPERVISION AND OPTIMISATION SYSTEMS

MANAGER3000+

ADVANCED HVAC PLANT ROOM SYSTEM MANAGER



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CLIMAVENETA®

MANAGER 3000+

THE PERFECT SOLUTION FOR HYDRONIC SYSTEMS MANAGEMENT

Factory-engineered plant room control for chillers, heat pumps, units for simultaneous and independent production of hot and chilled water.

Dedicated to both Comfort and Process applications, MANAGER 3000+ is the ideal solution to efficiently control and manage hydronic groups of chillers on a centralized plant room.

Thanks to unique control algorithms, MANAGER3000+ selects the best sequencing for unit operation, smartly manages heat loads according to the plant demand and gives users a valid monitoring tool to check the plant conditions.
This ensures stable and reliable control in any condition, complying with the strictest standards of 'uptime' required in comfort and process cooling applications.

DESIGNED FOR ANY PRODUCT TECHNOLOGY

- **Chillers**
- **Reversible Heat Pumps**
- INTEGRA **4-pipe systems**
- **Combined** INTEGRA **4-pipe systems + Chillers**
- **Free-Cooling Chillers**

IDEAL FOR ANY PIPING CONFIGURATION

The primary pumps can be controlled at variable speed and take advantage from the benefits of adopting intelligent control strategies achievable with the VPF and VPF.D configurations, thus minimizing the overall electrical consumption of the plant room.

ADVANCED MANAGEMENT OF HEAT LOADS

ALWAYS RUN YOUR PLANT AT PEAK PERFORMANCE

MANAGER3000+ performs advanced control logics for managing the heat loads in the most efficient and cost-saving way.

LOAD SATURATION

This function automatically activates the units one after the other, selecting the most efficient sequence of units.

LOAD DISTRIBUTION

The heating and cooling load is demand equally distributed among the units, fully exploiting partial load operation.

OPTIMIZED FREE-COOLING OPERATION

According to outdoor temperatures and conditions, MANAGER3000+ activates chillers giving priority to free-cooling mode, in order to always exploit the outdoor air as the main source of cooling.
Compressors are activated only in case the cooling demand exceeds the available free-cooling energy with a consequent benefit of reducing the compressors' runtime.

HOT & CHILLED WATER OPTIMIZATION

Optimization of the working temperatures is further enhanced through hot and chilled water setpoint compensation based on the outdoor ambient temperature.

Optimise your plant room performance with advanced control logics.

EASY ACCESSIBILITY AND INTEGRATION WITH THIRD PARTIES

EASY INTEGRATION TO THE BMS/BAS

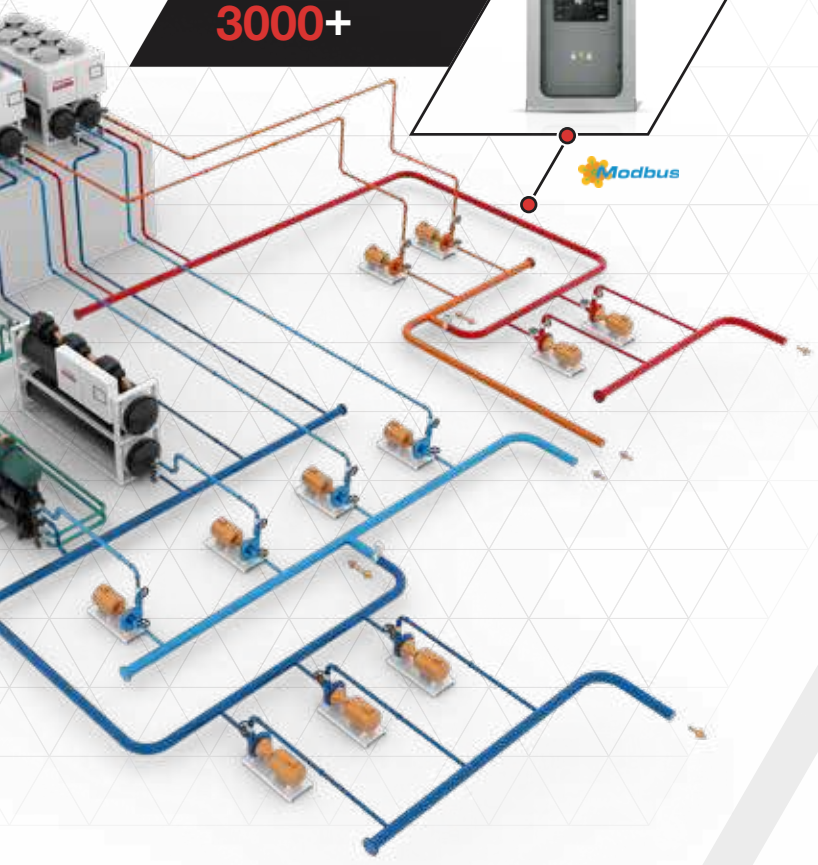
BACnet™ is a trademark of ASHRAE

through OPEN PROTOCOLS

EASY INTEGRATION INTO THE BUILDING NETWORK

LAN via TCP/IP

MANAGER 3000+



EASY ACCESSIBILITY VIA Wi Fi

Proximity Virtual Interface

Mobile and smart devices can access the MANAGER3000+ via Wi-Fi or via LAN connection.
No need to stand in front of the unit's electrical switchboard since all parameters are available via smartphone.

Easy accessibility is possible also in case of any restriction:

- Unit's distance from the control room
- Plant room spread out between different floor levels or buildings
- Protected areas or with restricted accessibility
- Uncomfortable weather conditions

AFTER-SALES AND MAINTENANCE SERVICES

For the client's complete peace-of-mind, MANAGER3000+ offers devoted services aimed at making the service activity easier and quicker.

ALARM SERVICE

Notification, by e-mail, service for quick notification of system failures. The notification is available to all users (Site Managers, Site Service & Maintenance, Facility Managers) and includes all the most relevant information related to:

- Site name
- Alarm identification code
- Date / Time of the event

RESPONSIVE USER INTERFACE

MANAGER3000+ features a new responsive interface with a user-friendly layout to allow the client to easily detect:

- The operating variables of each individual unit
- Pre-configured charts with the behavior of the common temperatures of both hot and chilled primary circuits
- High-priority alarms
- The status of the units operating in sequence
- The diagnostics variables

The new interface can be used on any browser and is compatible with all smart devices (smartphones and tablets).

REMOTE SERVICE ASSISTANCE

Thanks to the secure remote connection via VPN tunnel, MANAGER3000+ offers a quick and safe remote service assistance supporting Commissioning Engineers during start-up operations.

- It improves and accelerates maintenance and service activities from centralized office to technical personnel operating on-site.
- It reduces travel costs in case of trouble shooting and operator assistance.
- It supports specialists in analysing the system behaviour during the warranty period.

ADVANCED MANAGEMENT OF HEAT LOADS

MANAGER3000+ performs advanced control logics to improve the overall system operation and achieve the most critical working conditions.

The proven Load Saturation and Load Distribution control algorithms represent the perfect way to stage and sequence unit operation in medium to large commercial installations. Today the new MANAGER3000+ has been further empowered by the Free Cooling Optimization logic, which reduces running costs by exploiting the available surface area offered by the air-water coils of the chillers.

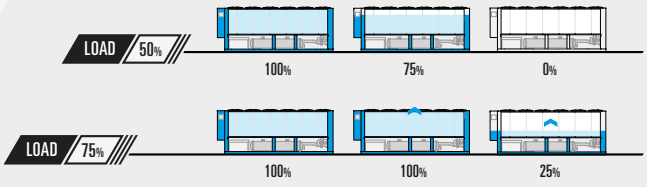
ADVANCED CONTROL OF HEAT LOADS

There are two possible load management logics:

LOAD SATURATION

According to the specific plant demand, the system automatically activates the units with the best sequence of units.
Different priorities can be assigned in order to deliver both heating and cooling simultaneously, without rejecting any energy to the atmosphere.

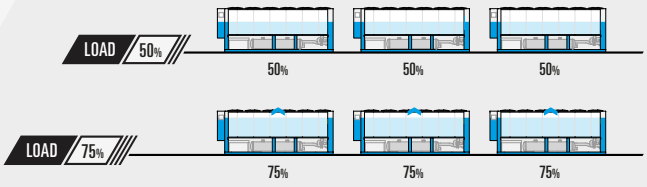
This corresponds to a significant increase of the entire plant efficiency thanks to the ability of the software to run the plant in heat-recovery mode, thus saving energy with any cooling load.



LOAD DISTRIBUTION

The heating and cooling plant demand is equally divided among the available units, fully exploiting the ability of the units to increase their efficiency during partial loads.

This operating mode distributes the hours each units works and these hours are the same for all units, making the maintenance and service activities easier to be planned and executed.



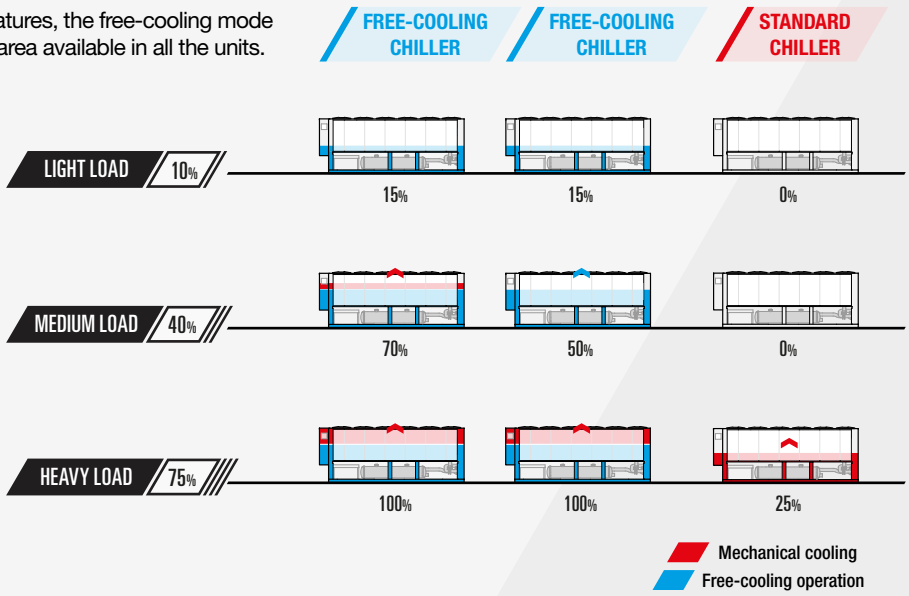
OPTIMIZED FREE-COOLING OPERATION

According to operating conditions and outdoor temperatures, the free-cooling mode is used in order to exploit the total free-cooling surface area available in all the units.

Free-cooling chillers have the highest priority in the activation sequence, whereas the mechanical chillers stay inactive in order to minimize the electrical consumption of the compressors.

If the cooling demand exceeds the available free-cooling energy, MANAGER3000+ activates the compressors in order to meet the full plant cooling demand.

Standard mechanical chillers maintain the lowest priority and are added in the chiller sequence after the free-cooling units are operating at full load.



IN ANY PLANT CONFIGURATION

PLANT CONFIGURATION 1

2-PIPE APPLICATION WITH CHILLERS OR REVERSIBLE HEAT PUMPS

UNITS STAGING & SEQUENCING

Both saturation and distribution operating modes are suitable for controlling a proper unit sequence in 2-pipe installations, thus avoiding unforeseen continuous activation and de-activation within same group of units.

COMPRESSOR OPERATION DISTRIBUTION

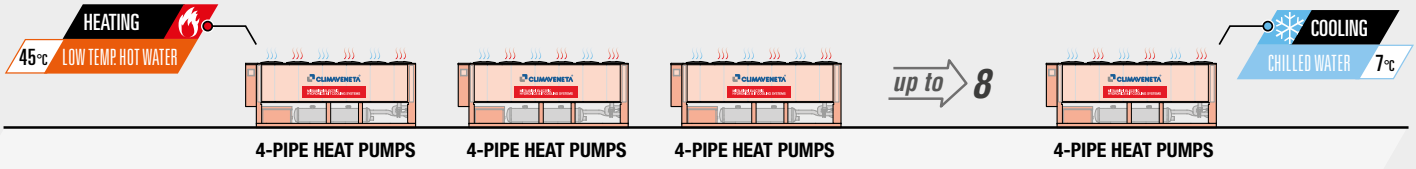
Runtime distribution of compressors for each individual unit in order to reduce short cycling and preventing wear.

OPTIMIZED FREE-COOLING OPERATION

Prioritization of the free-cooling mode by opening the valves of each individual chiller in order to exploit all the available surface area offered by the air-water coils.

PLANT CONFIGURATION 2

4-PIPE APPLICATION WITH INTEGRA HEAT PUMPS



The 4-pipe heat pumps units produce simultaneous heating and cooling.

Load matching is achieved by MANAGER3000+ by running the units in LOAD SATURATION mode in order to reduce the energy released into to the atmosphere.

LOAD SATURATION

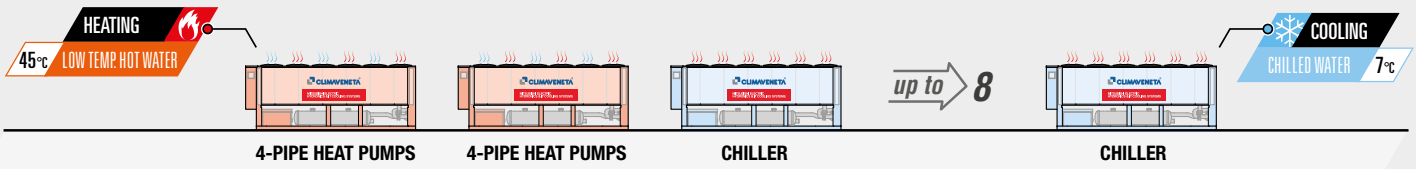
Units are activated one after the other.
Each unit is activated when the previous one has achieved full load either in terms of cooling or heating. Under this condition the MANAGER3000+ “unlocks” a new unit in the sequence.

PLANT EFFICIENCY

Manager3000+ exploits the ability of units to operate in heat recovery mode as long as possible, avoiding inefficient combinations which happen with units operating independently in “cooling only” and “heating only” modes.

PLANT CONFIGURATION 3

4-PIPE APPLICATION WITH CHILLERS AND INTEGRA HEAT PUMPS



Mixed configuration is highly recommended for applications where the cooling demand is higher than the heating demand during the year.

In this case the MANAGER3000+ can optimize the unit’s operation according to the building’s actual energy demand.

PRIORITY ASSIGNMENT

MANAGER3000+ can assign the highest priority to a specific unit. This unit is the first in the sequence to be activated and the last to be deactivated.

PLANT STABILIZATION

MANAGER3000+ stabilizes the plant by limiting the over-production of thermal energy.

PLANT EFFICIENCY

The most convenient technology can be prioritized in order to meet the most critical building demand:

- 4-pipe heat pumps if simultaneous heating & cooling production is needed.
- The most efficient units featuring the best performance levels as, for example, chillers with magnetic levitation compressors.

SUPPORTED PIPING CONFIGURATION

MANAGER3000+ controls the primary chilled water and low temperature hot water pumps (CHW and LTHW) at variable flow, obtaining significant energy savings from the circulation of fluids.

VPF VARIABLE PRIMARY FLOW

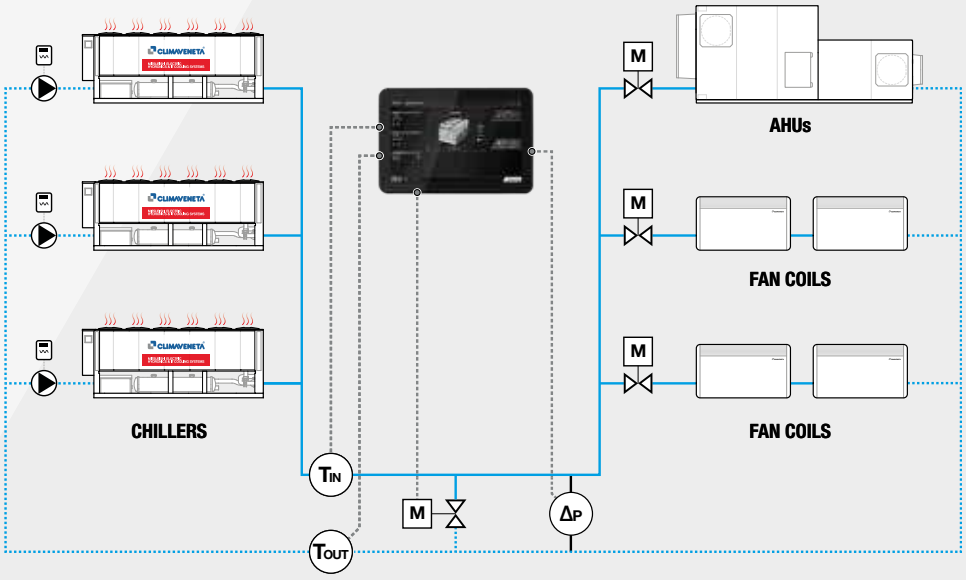
Primary Pumps Control on ΔP [Pressure]

MANAGER3000+ controls the circulation of fluids through the system according to the plant's actual cooling and heating demand.

In the event of a low system load, the minimum water flow across the units' exchanger is managed by the modulating valve that diverts part of the water flow rate through the by-pass circuit.

The major benefits of this configuration are:

- Reduction of investment costs by eliminating circulation pumps in secondary circuits.
- Reduction of pumps' electrical energy consumption deriving from modulating the water flow rate.



VPF.D VARIABLE PRIMARY FLOW WITH DECOUPLER

Primary Pumps Control on Δt [Temperature]

This configuration foresees the presence of variable pumps in both the primary and secondary circuits.

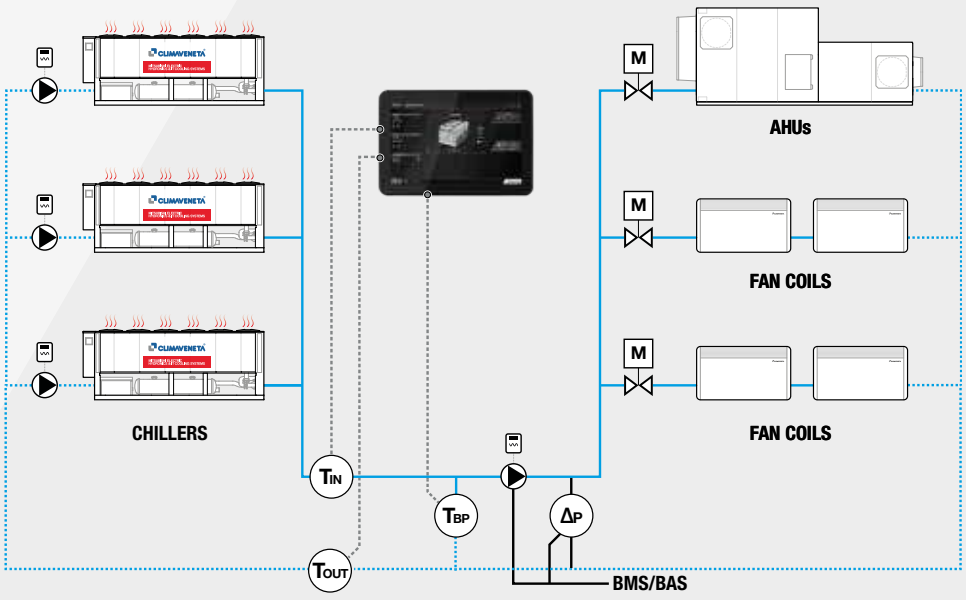
The water flow varies according to:

- the actual energy demand of secondary circuits
- the delta °T of the units in the primary circuits

Minimum circulation is ensured thanks to the presence of a decoupling line between the primary and secondary circuits.

The major benefits of this configuration are:

- Reduction of energy consumption deriving from the variable speed pumps on both primary and secondary circuits.
- System reliability thanks to the coexistence and independence of primary and secondary water circuits.



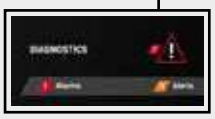
RESPONSIVE USER INTERFACE

The new Responsive HTML5 based Interface makes the MANAGER3000+ easy-to-use from any web browser and compatible with all smart devices (smartphones and tablets).

SYSTEM DASHBOARD
The most relevant operating variables of the plant are displayed, in addition to pre-configured charts with the behavior of the common temperatures of both chilled water and hot water primary circuits.

ALARM BANNER
Gives a direct and instantaneous indication on high-priority alarms.

ALARM WIDGET
The user is informed about high-priority and low-priority alarms, signaling relevant information for both plant and unit operation.



INSPECTION BAR
Always available in the footer of the each pages, it shows the number of active units in the actual control sequence and their status (green = active, red = in alarm).

UNIT DETAIL
This provides a comprehensive overview of the most relevant operating variables of each individual unit without necessarily being physically nearby.

A dedicated group of widgets shows all circuits and relevant compressors running statuses as well as the electrical power consumption acquired from the electronic controller installed onboard (when the function is available).

PRODUCT LINE-UP AND TECHNICAL FEATURES

SYSTEM CONTROL & FUNCTIONS

PLANT CONFIGURATION	2-PIPE SYTEMS - Chillers	✓	✓
	2-PIPE SYTEMS - Free cooling chillers	✓	✓
	2-PIPE SYTEMS - Reversible heat pumps	✓	✓
	4-PIPE SYTEMS - Integra / Integra + Chiller	✓	✓
	Maximum connectable units	5	8 (1)
	Primary pump control	✗	✓
CONTROL LOGICS	Load DISTRIBUTION control logics	✓ (2)	✓
	Load SATURATION control logics	✓ (2)	✓
	OPTIMIZED free cooling operation	✗	✓
	Neutral zone on flow temperature sensor	✓ (2)	✓
	Proportional on return temperature sensor	✓ (2)	✓
	Proportional + integral on return temperature sensor	✓ (2)	✓
ADDITIONAL FUNCTION	Setpoint compensation based on the outdoor ambient	✓	✓
	Double setpoint (digital input)	✓	✓
	Setpoint adjustment (analogue input)	✓	✓
	Fixed demand limiting (digital input)	✓	✓
	Variable demand limiting based (analogue input)	✗	✓
	Reduced wear (RUNTIME balancing)	✓	✓

SERVICES & ACCESSIBILITY

USER INTERFACE	Multi-language user interface	✗	✓
	Icon-based intuitive GUI	✗	✓
	“System Dashbord” with plant room operating variables	✗	✓
	“Unit Details” with individual units’ operating variables	✗	✓
	“Alarm” with all alarms and signallings	✗	✓
SERVICES	Accessibility via web from any PC within the LAN	✗	✓
	Accessibility via any mobile devices	✗	✓
	Accessibility keyboard function via WI-FI	✗	✓
	ModBUS over EIA-485	✓	✓
	BacNET over IP	✓	✓
	Electrical panel with double glass door	✗	✓
	Mail service for alarm notification	✗	✓ (3)
	Pre-configured charts for operating plant temperatures	✗	✓

Notes:

✓ ▸ Standard
✗ ▸ Not available

1 ▸ Standard operating up to 6 units in the same water loop, optional up to 8 units
2 ▸ Applicable to 2 pipe systems for cooling operation or heating/cooling operation based on seasonal change-over
3 ▸ Mail service available when the MANAGER3000+ is connected to the LAN of the building and appropriately set by local IT Managers

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CLIMAVENETA®

eco Changes for a greener tomorrow

Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.

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