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

Specifications
GROUP MANAGER C1_202505_EN

Series: GROUP MANAGER C1

Version:

Function: Plant Room System Manager

GROUP MANAGER C1 - Plant Room System Manager

General description
The equipment manufacturer in accordance with the specifications contained herein shall supply a dedicated Plant Room System Manager (PRSM) for management and control of the plant room.

The PRSM ensures to control the plant room by managing and adjusting each component directly involved in the production and the distribution of the heating and the cooling energy, therefore involving units (chillers, heat pumps and 4-pipe units), pumping groups internal the units or external but directly controlled by the units themselves.

The PRSM shall perform the following functions:
- Management of the system load based on the direct control of the internal resources of each individual unit (compressors, valves and water pumps).
- Management of the unit sequence at full load, limiting the number of active units and therefore optimizing the consumption of electricity resulting from the use of active pumps.
- Management of partial load unit resources thanks to the distribution of the load demand inside the available units, therefore optimizing the use of electricity from each individual unit.
- Prioritization of free-cooling mode by opening the valves of each individual free-cooling chiller in order to exploit all the available surface area offered by the air-water coils before activating the mechanical operating mode (compressors activation).
- Balancing of the hours of operation of compressors.
- Reduction of the compressor starts and stops for limiting the thermal and mechanical stresses of units and preventing damage due to continuous and sudden activation.
- System stabilization with limitation of the overproduction of thermal energy.
- In temperature-based variable flow circuit control, definition of the primary circuit pumps' flow rate based on the temperature difference measured across each individual unit's refrigerant-to-water heat exchanger (applicable only for variable flow pumps installed on the machine and controlled by them).
- In pressure-based variable flow circuit control, definition of the flow rate on primary circuit pumps based on the pressure difference detected on secondary circuits (applicable only in case of pumps directly controlled by the units or build-in the units).
- In pressure-based variable flow circuit control, adjustment of the bypass valves in order to ensure the minimum water flow rate across each individual unit's refrigerant-to-water heat exchangers in order to prevent the risk of ice (cooling operating mode).
- Visualization of graphs charting the flow and return temperatures of chilled water and low temperature hot water primary circuits.
- Visualization of hydraulic plant schematic reflecting the actual plant configuration and monitoring the main parameter in real time.
- Time bands management thanks weekly program for the entire plant or single unit.
- Hydronic units integration by an automatic scanning process of the serial connection bus.
- Optimized defrost operation for group of heat pumps to avoid loss of heating production during the defrosting phase
- Native web server to allow local and remote accessibility to the PRSM from any computer via web browser.
- Graphical user interface (GUI) based on HTML5 "responsive" technologies to allow ease of use from any smartphone and tablet.
- Integrated hot spot to allow direct accessibility to the PRSM via any smartphone and tablet device.
- Availability of a dedicated and independent high-level interface (HLI) to connect the PRSM to a LAN network via TCP / IP protocol.
- Availability of a dedicated and independent high-level interface (HLI) to connect the PRSM to a BAS / BMS building supervision system (optional on request).
- Notification of the presence of serious alarms by automatically sending e-mails to all user profiles (service to be configured).

- The e-mail message must contain the following information:
    - Alarm code.
    - Alarm date and time.
    - Site of origin.
- Access to PRSM on three (3) distinct levels:
    - "User" read only.
    - "Operator", reading and modification of main plant operating parameters.
    - "Maintenance", reading and modifying of main plant operating parameters, modifying the system settings.

Software architecture and operational requirements

The PRSM shall operates over the Niagara4® framework on top of which a number of specialized software modules run for taking the full control of the plant room. The PRSM shall not require the installation of any special software on any PC to connect to or operate the system.

Graphs

The PRSM shall display the graphs charting main operating figures of the plant. The graphs shall be predefined and have the following characteristics:
- Acquisition and charting of flow and return common temperatures of the primary chilled water circuit for a period not less than 30 minutes.
- Acquisition and charting of flow and return common temperatures of the primary low temperature hot water circuit for a period not less than 30 minutes.
- Acquisition and charting for a period of not less than 30 minutes of the outdoor air temperature.

System integration and network communication

The PRSM shall operates stand-alone or can be integrated into third-party building management and automation systems (BMS or BAS).

The PRSM shall support all following standard protocols and bus:
- ModBUS RTU over IEA RS-485,
- BacNET MS/TP,
- BacNET over IP.

Software specifications and requirements for PC

The PRSM shall operate over the Niagara Framework®.

The PRSM shall operate over a license-free integrated web server that allows the local and remote "system" accessibility by using the most common web browser from any PC connected to the network without the need to install any additional third-party software.

The PRSM shall not require the installation of any special software on any PC to connect to or operate the system. Freely available plug-in software available from the Internet to enable the Java Runtime Environment to support the running of applets within a standard web browser is indeed allowable.

The minimum system requirements for the remote PC are:
- MS Windows® XP, MS Windows® Vista, MS Windows® 7, MS Windows® 8, MS Windows® 10.
- Web browser (Mozilla Firefox®, Microsoft® Edge, Safari®, Google Chrome®).

Electrical and control panel

The PRSM consists of pre-assembled hardware tested at the factory in an independent industrial perimeter for indoor and outdoor installation.

The PRSM shall be connected to each individual unit, primary and secondary chilled and hot water pump groups (when applicable), to source-side pumps group (when applicable), to temperature sensors and to differential pressure transmitters installed in the plant room.

The PRSM shall be connected to the units by means of IEA RS-485 communication network operating on ModBUS RTU protocol for the acquisition of the main operating variables from each individual unit.

Epoxy painted stainless steel enclosure built in compliance with EN60204-1 and EC204-1 standards, complete with:
- Electrical panel ventilation.
- Double external glass door.
- Screw terminal blocks for the control circuit lines.
- 230Vac +/- 10% 50Hz single phase +N+PE power supply.
- Absorption 0.92 A.
- Maximum absorbed power 213 W

System testing and configuration

Tests performed during the production process as imposed by the UNI EN ISO9001:2008 regulation.

The PRSM consists of pre-assembled hardware including the main control board and the expansion devices based on the necessary I/O for every specific installation.

The PRSM must be preconfigured by associating all the I/O lines to the corresponding physical devices, in order to avoid any system configuration errors, based on the "design once apply many" criteria.

Certification, reference standard
- CE – European Union Declaration of Conformity.
- 2006/95/EC Low Voltage Directive.
- 2004/108/EC Electromagnetic Compatibility Directive.
- Regulation: UNI EN ISO9001:2008 - Company Quality Management System Certification.
- UNI EN ISO 14001:2004 Regulation - Company Environmental Management System Certification.
- IP54 international protection (EN 62208/02:2012; EN 60 529; EN 61439-1).
- IK10 mechanical protection (EN 62208/02:2012; EN 62 262; EN 61439-1).
- Operating temperature -10..45°C.
- Storage temperature -20..+60°C.
- Operating and storage relative humidity 30..90%, non condensing.